

Designing tangible interfaces for collective decision making in interactive theatre

*Or understanding audience behaviour as result of tangible interfaces and
various decision making mechanisms.*

Author Karina Korsgaard Jensen

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Abstract

The focus of this project-based thesis work is how to design for audience participation in the context of an interactive live theatre play. The interactive play, Anatomy of a Decision, requires the audience to decide which direction the story of the play should take throughout nine scenes.

These are the research questions answered in this thesis:

How can I design for audience participation in an interactive theatre play?

What behaviours emerge among the audience members due to the interaction design?

The first question is answered through an iterative design process, outlined in the thesis. The second question is answered through an analysis of key findings derived from audience observations, questionnaires, and a qualitative interview with one of the audience members.

The research confronts two design problems. The first design problem is how to mediate audience participation via interactive technology in a live theatre context without letting the technology set the boundaries for participation. The second is how agency (i.e. the individual's feeling of control in an interactive narrative), can be provided and ideally increased for multiple co-located participants simultaneously rather than limiting a participant's power in the decision because of multiple people making a single choice.

The project was started in the beginning of 2014 with the creating of the interfaces, and ended with the premiere of the show Anatomy of a Decision in March of 2015. The outcome of the project is twelve interconnected tangible interfaces, integrated into preexisting tables within the theatre hall, and nine different applications for collective decision-making processes to be used with these interfaces.

The decision mechanisms encourage the audience to either compete, collaborate, or discuss in order to take part in the decision. We discovered that the competitive and collaborative decision-making mechanisms were perceived as the most interesting and engaging by the audience, and that only these succeed in providing agency for the individual. These particular mechanisms give the individual the power to either compete to win, and in the case of the collaborative mechanisms, the ability to disrupt or collaborate in the collectives aim of success.

This thesis consists of a written documentation along with online documentation of the performance in the form of video clips.

Keywords Tangible User Interfaces, Interactive Theatre, Audience Engagement

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Karina Korsgaard Jensen
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Thesis Supervisor:
Mariana Salgado

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**Designing tangible interfaces for collective
decision making in interactive theatre**

1. INTRODUCTION

The topic of this project-based thesis work is exploring mediated audience participation in an interactive theatre play through interconnected tangible user interfaces. This chapter outlines the frame and aim of the thesis by presenting the project itself and the approach I have taken to the it, ending with presenting my research questions.

The project is in the field of user experience design. In this it deals specifically with interaction design.

1.1 THESIS STRUCTURE

The thesis is production based and will evolve around the production, evaluation and discussion of the interaction design created for the play, *Anatomy of a Decision*. The aim of the thesis production is to create audience participation with a live theatre play through interactive technology and includes both the creation of the custom tangible interfaces and the applications enabling the audience to make collaborative decisions through these interfaces. The reason for writing the thesis, is to investigate how this design affects the audience members behaviour. The specific research questions are presented at the end of chapter two, which introduces the theoretic background leading to the questions.

The thesis is structured in four parts. The first part is this introduction where I introduce the project and the play *Anatomy of a Decision*. In the second part I present the background study leading to my research questions. After this I describe the development and creation of the production itself. In the third part I present the data collected from the performance and analyse these findings via the theoretic framework presented in the background study. Finally I will sum up the

conclusions found via the analysis and reflect on the learning outcomes from the production and from writing the thesis.

1.2 ABOUT THE PROJECT

Anatomy of a Decision (original title, *Otsuse Anatoomia*, from here on referred to as AD) is an interactive theatre play, which premiered 19th of March, 2015. In the play it is up to the audience to decide what will happen. This means that the story of the play changes each time it is viewed. AD is produced by the independent Estonian theatre group, *Cabaret Rhizome*, in the theatre hall *Erinevate Tubade Klubi*, translating to *Club of Different rooms* (from here on referred to as ETK).

Cabaret Rhizome consists of five actors; Ajar Ausma, Päär Pärenson, Anatoli Tafitšuk, Joonas R. Parve and Liisa Linhein. Three sound and visual designers; Mart Manic, Mark Duubas and Härä Eero and Director Johannes Veski. My role in this team is as a freelance interaction designer.

ETK is located at Telliskivi Centre for Creative Industries, Tallinn, Estonia. *Cabaret Rhizome's* work in ETK is known in Tallinn for the theatre hall's alternative audience seating area, and

for their usage of media and interactive technologies in their performances.

The audience's seating area consists of twelve "rooms", all with different themes, hence the name *Club of Different rooms*. Each room has a table, a TV screen and a number of chairs and/or couches where the audience members are seated. See fig. 1.

The performance was produced and scripted in Estonian. This could present some issues regarding the production of the interaction design and my analysis of the play, since I do not speak nor understand Estonian. However, the thesis focuses on the interaction design created mainly by myself and partly by Taavi Varm, and not on the story of the play itself. The references given to the story in the thesis are based on the informal translations made by the director, Johannes Veski (personal communication, February 5th, 2015).

The documentation consists of edited video recordings from two performances, 19th of March, 2015 and 21st of May, 2015 which are available online by following the links provided in the text.



FIGURE 1

ETK theatre hall. In the image, the rooms of the audiences seating area are shown with the green-screen stage in the background.

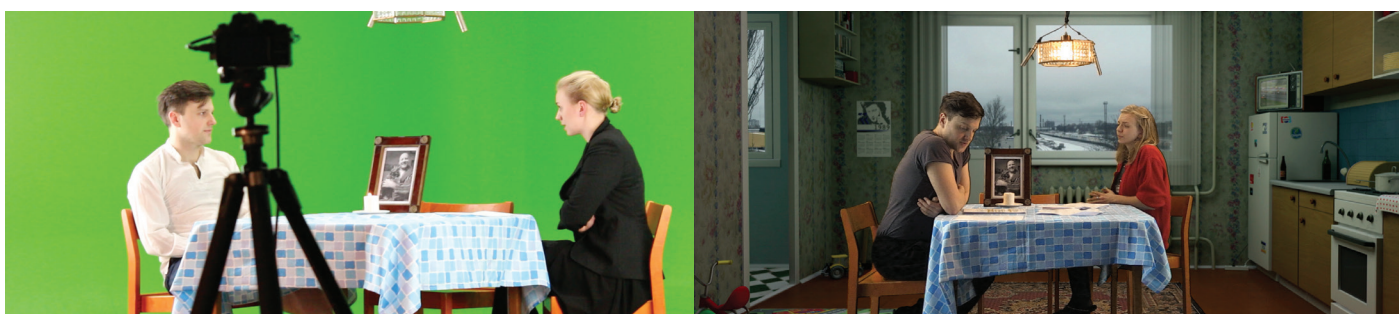


FIGURE 2

Illustrating the concept of "keying". Right side is how the stage looks in reality. Left is how it looks on the TVs where the actors have been keyed into the background image.

FIGURE 3

Screenshot from how the scene is displayed to the audience on the TV-screens, 19th of April 2015, scene 9, act 1. The main character is sitting alone on the stage. On the TV screens he is keyed into a video showing multiple instances of himself playing different characters. The other instances of him, are visualisations of how he could have ended up, if he had made different life choices.



FIGURE 4

Audience members using the tangible interfaces installed in the tables in the theatre hall.



LINK: INTRODUCTION

URL: <https://vimeo.com/140556481>
password: 409818



1.2.1 ANATOMY OF A DECISION

A short introduction and summary of one of the plays, e.i. 19th of March, 2015, can be viewed via the link "introduction" either via the URL or by scanning the QR code.

Before explaining the story of the play itself, it is necessary to describe the setup; the stage the actors perform on is a green screen. While performing on this, they are keyed¹ into a visual backdrop which is shown on the 12 TV screens, see fig. 2. In the case of AD, the visual backdrop is a 3D model of a kitchen room. The 3D modeled room allows the team to create an experience that lies in-between cinema and live theatre by filming the actors from three angles, cutting between these and keying them into the virtual room, creating a live cross-cut effect². See fig 5.

1 keying refers to a technique where a specific colour is removed from an image or video file. The removed area becomes transparent and is replaced with another image or video file. In this case, the green is replaced with a three dimensional model of a kitchen, as seen in the image above.

2 cross-cutting is a film editing technique where the camera will cut from one frame to the other, used in scenes where there of dialogue between two people.

The aim of the play is first of all to entertain. Secondly it aims to encourage discussion and interaction in-between audience members and let the audience gain insights into group dynamics and collective decision making mechanisms.

The action of the play is centered around the life of the main character, set in his fathers apartment in Estonia. The story of the play spans over approximately thirty years, from the conception of the main character, to the death of the father. To cover this timespan, each scene jumps multiple years in time.

The name of the character is given by the audience in the first scene. The audience chooses one name out of four possibilities: Martin, Artur, Willem or Evald. Once chosen, the audience will interfere with the character's destiny six times throughout the play (scene three to eight) via the twelve tangible user interfaces installed in the tables. See fig. 4

As the audience interferes, the character evolves, shaped by the choices made by the audience on his behalf.

Each choice is a crossroad leading to a different situation, each situation

leads to a distinct choice and so on. Following combinational logic (two multiplied with itself six times) there are sixty-four possible outcomes for the main character.

The first act of the play consists of nine scenes plus an introduction to the interface. The names of the scenes are translated from Estonian:

A) Introduction

1) Conception

2) Naming the character

3) Childhood years

4) Choice of Schooling

5) The divorce of the parents

6) Teen years

7) After pre-school

8) The death of the father.

9) Retrospect

In the last scene of the first act, *Retrospect*, the character is joined by the virtual ghosts of his other never-happened-destinies, as he reflects on the choices of his life and how it lead him to where he is now. As he reflects, the idea of turning back time and starting over is introduced. The audience then chooses which scene they want to go back to. The chosen scene becomes the beginning of the second act, and the audience now has the possibility of experiencing an alternative ending for the main character, see fig. 3.



FIGURE 5

Screenshots of the three angles: Actor one, full frame and actor two. When the actors are performing a dialogue the frame will cut between these three frames creating a cinematic effect.

Konsensus:

Et Paul ja Tiiu oma lapsele nime saaksid panna, tuleb neil langetada konsensuslik otsus. Et Paul ja Tiiu konsensusliku otsuseni jõuaksid, peate ka teie saalis jõudma meie tulevase peategelase nime asjus täielikule üksmeelele.

	1	2	3	4	5	6	7	8	9	10	11	12
A	▲	▲	▲	▲	■	■	■	■	▲	▲	▲	▲
B	▲	▲	▲	▲	■	■	■	■	▲	▲	▲	▲
C	▲	▲	▲	▲	■	■	■	■	▲	▲	▲	▲
D	▲	▲	▲	▲	■	■	■	■	▲	▲	▲	▲
E	■	■	■	■	▲	▲	▲	▲	■	■	■	■
F	■	■	■	■	▲	▲	▲	▲	■	■	■	■

▲	Martin
■	Evald
▲	Willem
■	Artur

FIGURE 6

Screenshot (meaning what is shown to the audience on the TV screens) from phase 3 of scene two, 21th of May 2015. Each member of the audience controls one square in the matrix.

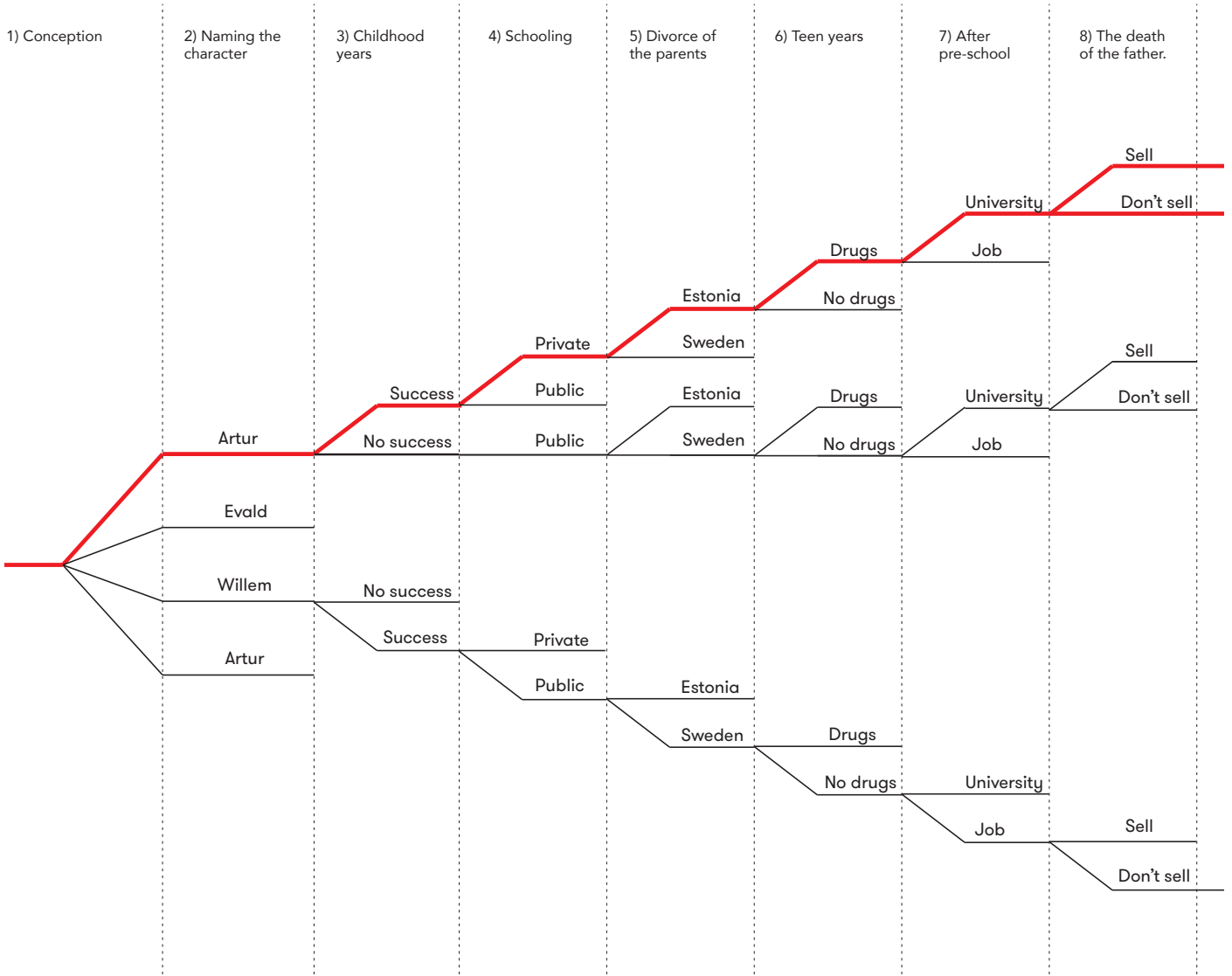
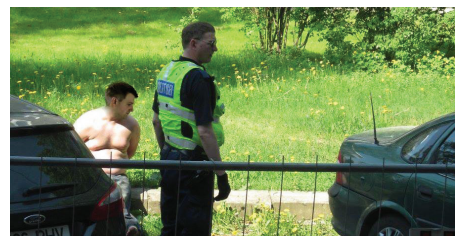


FIGURE 7

A schematic giving an overview of the play, its scenes and the decisions cross roads. In the scheme, two endings are illustrated to give the reader an idea of how the decisions affect the ending of the play.

Following the red line and selling the apartment; Artur will end up in an insurance fraud after the taxicompany fails.

Following the red line and not selling the apartment; Artur will end up being arrested for renting his fathers apartment out for pimping purposes



For each audience-decision a specific voting mechanism has been developed that imitates decision situations, such as rational, impulsive or informed. The anatomy of decisions are experienced by the audience through these different voting mechanics.

Each scene has four phases taking place on the different 'stages' that the play unfolds upon. The 'stages' are the following:

- 1) The physical stage (green screen): Where the actors perform. The physical stage contains minimal props, a table, a lamp holding the microphones, two chairs and the actors.
- 2) The virtual stage: The virtual stage is displayed on the TV-screens around the theatre hall.
- 3) The audience stage: This 'stage' consists of the audience seated in the theatre hall.

Phase 1) In the introduction to each scene a text is displayed on the virtual stage, the TV's. The text explains what happened since the last scene ended and the present moment of the story begins. While the text is displayed, the sound scape gives a clue to where and when the scene takes place, either by music, the sounds of a television set or radio. The backdrop

for this phase becomes the physical scene where the actors enter the stage and sit quietly; e.g. watching television.

Phase 2) The action of the actors: This action takes place on the physical stage with the virtual stage as backdrop. The actors are keyed into the virtual stage from three angles: full frame, actor one and actor two. See fig. 5. While this is happening, the sound scape from the introduction continues to play, but at a lower volume. The visuals of the virtual world appears realistic, blending in with the real actors on stage. This phase consists primarily of dialogue and a little action and leads the story to the third phase.

Phase 3) The interactive phase: The interface appears on the TVs. The visuals of the interface consist of simple geometrical elements, clearly separating itself from the realistic backdrop of the physical stage and immediately suggesting a new phase of the scene. The inputs of the participants, set via the tangible interfaces, are visualised on the same screen, as they collectively create the action of this phase, see fig. 6. The backdrop for this phase becomes the physical stage, where the actors continue to sit quietly. During

the third phase, the sound scape increases in volume again. The action happens in-between the audience in the real world and the interface that is part of the virtual world.

Phase 4) Finally, after the audience has made a decision, a 'meta' story is narrated as a transition between the scenes. This happens only on the physical scene where one of the actors, Joonas, reads a poem related to the kind of decision that has been made. There is nothing on the virtual stage. This phase happens outside of the fictional world, as the actor speaks directly to the audience, and is not accompanied by any virtual material. The other actors re-enter while the introduction to the next scene begins, and the phases repeat.

The narration shifts between these phases, point of views, realities and stages for each scene, which creates the overall pattern of the play. At the end of the play, each of the 64 possible endings are visualised as an image from the character's life. E.g., "the character, Martin, ends up in an insurance fraud as his taxi-company fails", as illustrated in fig. 7.

If following the decisions of the red line in fig. 7, the story will end up in

following situation for Artur at the time of his fathers death:

“Artur’s principals of going about his business didn’t change much during his university years. One thing he learned though: in parallel to his day-light sensitive financial ventures he needed to create a straight-forward legitimate business. After thorough consideration of what it should be, Artur acquired a car park of five machines and founded a company named *Star Taxi*. His girlfriend Kristi took the position of the taxi radio operator and a few of his less educated friends grabbed the steering wheels. Artur succeeded in connecting his suspicious businesses with the transportation business and Kristi worried less and less about the suspicious activities of her husband.” - Informal translation, Veski (personal communication, September 15, 2015).

The two images in Fig. 7, illustrate the two possible ways Artur’s life can end up at the time of his fathers death depending on weather or not he sells the apartment of his recently deceased father.

1.3 MOTIVATION

In the field of interaction design, IxD, we often sacrifice great user experi-

ences with more practical solutions.

In my view, a watch is better at telling the time than a smartphone. The watch sits on your wrist, letting you know the time even while having both hands full, e.g., while driving a bicycle or a car. This is not the case of the smartphone, which you probably need to get out of your pocket and unlock first, in order to know the time. However, having all of your utilities gathered in one device is definitely more practical when you are on the move. I am not saying that practicality is not part of the user experience, actually, in modern everyday life it is essential for the user experience. This being said, including multiple senses and bringing back tactile experiences in interaction design is one of my main interests.

Working in the context of theatre where the emphasis is exactly on creating interesting and unique experiences for the audience, was an interesting opportunity for me to create something where “being mobile, practical and cheap” was not part of the goal. The reason for writing the thesis is for me gain a new tool for understanding interaction design by viewing it through a the concept of *agency*, taken from the field *interactive narratives*.



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2. BACKGROUND STUDY

In the following I present the background study for the thesis in three parts, leading to my research questions. The research questions are in two parts, first part relates to the practical production while second part relates to the investigation of the work that was made. The theory presented in this background study frames the second part of my research questions.

The first part of the background study gives a brief introduction to interactive narratives by presenting other interactive narratives, to give the reader background information on existing ideas and concepts within the field.

The second part begins by defining the design fields that I am working within, specifically user experience design, interaction design and user interface design. By positioning the work in relation to these disciplines, I define the foundation of my investigation of the work.

In this section I also introduce the concept of affordance which frames the first part of my research questions for investigating the work.

In the third part, I introduce the concept of agency understood through Murray (1998), where after I discuss the problems of agency in multi-user settings. Finally a third view of agency is presented via a study (Ursu, et al., 2008) on the interactive TV series *Accidental Lovers* (Tuomola, 2006). The concept of agency frames the second part of my research questions for investigating the work.

Finally I present the research questions that I will answer in the following chapters.

2.1 INTERACTIVE NARRATIVES

Since the performance belongs to the category of interactive narratives, it is necessary to understand what an interactive narrative is, and especially interactivity in interactive narratives. In this section I will first present a definition of an interactive narrative, where after I give a brief overview of the history of the genre. Then I describe selected productions with focus on how the user interactivity is structured. This section aims at providing some background information of interactive narratives in order to contextualize the production AD.

The term, *Interactive narrative* has been used in relation to multiple media and forms, such as interactive art installations, card games and live action role-play. My understanding of the term *interactive narrative*, is clearly expressed in the definition made by Mark Meadow (2003, p. 62): "...a time-based representation of character and action in which a reader can affect, choose, or change the plot". I understand *reader* as the broader term *audience*, including both viewer, reader, listener and any imaginable receiver of a story in any form. In AD, the audience share the power of changing the plot within the boundaries of the given options (e.g. they can

only select the name from the choices of Willem, Artur, Evald or Martin).

The first form of (technology-based) interactive narratives was text-based hypertext, such as Michael Joyce's: *Afternoon, a story* (1987), which is considered to be the first interactive narrative. The hypertext narratives is a form made out of pieces of media which are hyper-linked, letting the viewer navigate through the media text in no specific or set order. These were derived from earlier experimental literature, such as James Joyce's *Ulysses* (1922) and *The Garden of Forking Paths* (Borges, 1948).

The hypertext narratives' way of structuring interactivity has later been applied to multimedia and video based interactive narrative systems. Examples of this are interactive youtube stories, such as *Choose a Different Ending* (London Metropolitan Police Service, 2009) and *The Time Machine* (Chad, Matt & Rob, 2008) and the first interactive movie *Kinoautomat* (Kalas, Činčera, Rohác, & Svitáček, 1967), which was presented in Expo Montreal, 1967, at the Czechoslovakian pavilion. A characteristic of these kinds of interactive narratives is that they consists of pre-made pieces of media where the viewer is asked to

interact at specific times throughout the piece. This decision determines which piece of media will be shown next. Later there has been developed more ways of structuring audience participation. E.g. as seen in *Sleep No More* (Nightingale, et al., 2001), which is an interactive theatre piece, produced by the British theatre company, Punchdrunk. In this, the audience is invited to walk around the set, a 3-story building, in which the actors are performing a re-interpretation of *Hamlet*. The audience is not influencing the actors' performance, who will perform their part no matter where the audience chooses to go. Instead the audience members are affecting the plot by arranging their own point of view in the story, thereby composing a unique arrangement of events which according to Aristotle (384 BC/1920) is the definition of a plot³. This way of structuring interaction is also called spatial narrative.

The Danish production *Switching* (2003) by Morten Schjødt, lets the viewer interfere at any point in the movie by pressing a button (in the DVD-version this button is the 'space-bar') which will make the movie jump

3 Aristotle defines plot as "the arrangement of the incidents" (384/1920, part IX)

to a new scene, supposedly one that has a connection with the previous. This continuous interaction does not offer the user any choices of what should happen. The randomness of pressing a button and the following cut feels a bit like playing a slot machine, each time you press, something more or less random happens.

In *Kinoautomat* (Kalas et al., 1967) the audience members are all equipped with a controller with a red and a green button, representing two possible actions. At specific time during the movie, the audience is asked to press one of these. The movie will then continue in a specific directions, depending on which button the majority of the audience pressed. However, there are rumours saying that there is only one ending, no matter which option the audience chooses. In that case, *Kinoautomat* (Kalas et al., 1967) can not be said to allow interactivity but only pseudo-interactivity, meaning that you only let the viewer think they have control of events even though in reality they do not.

Accidental Lovers (Tuomola, 2006), a Finnish interactive TV production, utilises SMS messaging to let the viewer communicate with the actors on the screen. This gives the viewer an

opportunity to write whatever comes to mind, rather than having viewers' communication with the narrative limited to pushing a button or selecting one out of a number of options. This production will be discussed further in section 2.3.4.

In the arts, multiple interactive systems have also been developed, e.g., *Alan01* (2009), which lets the viewer converse with the British mathematician Alan Turing through a tangible interface. The interaction is based on symbols referring to aspects of Alan Turing's life. When the viewer arranges the available symbols, the combination of these triggers a story from Turing's life.

The presented examples of interactive narratives are all based on forms that use databases of pre-recorded or pre-rehearsed material, excluding media-generating forms such as games, which is as genre less relevant for the thesis, as the actors of AD do not improvise or generate new material. Instead, all possible scenes have been written and rehearsed.

2.2 THE DESIGN FIELD

User experience design, UX, is defined in multiple ways. My favourite definition is found in Alben (1996, p.

12) "All the aspects of how people use an interactive product: the way it feels in their hands, how well they understand how it works, how they feel about it while they're using it, how well it serves their purposes, and how well it fits into the entire context in which they are using it." In the context of the theatre play, AD, the UX design includes all aspects of the show experience: the ticket purchase, the entrance, the theatre hall, the bar, the script, the actors performance, the sounds design ect. This thesis deals specifically with the interaction design that enables the audience to interfere with the performance and it's contribution to the user experience. Therefore I define the project as being specifically withing the field interaction design. However the IxD is created with a holistic user experience in mind.

In this section I want to introduce the design fields, IxD and tangible UI (TUI) and the concept affordance, which is a concept from within these fields.

2.2.1 INTERACTION DESIGN

The term *interaction design*, IxD, was coined by Bill Moggridge and Bill Verplank in the mid 1980s (Moggridge, 2007). The term was created to describe a new design discipline "...

dedicated to creating imaginative and attractive solutions in a virtual world” (Moggridge, 2007, p. 14).

The understanding of what interaction design is has through 30 years of discourse expanded from its original definition of human/computer interaction, to become used for both human-to-human and computer-to-computer communications.

A widely acknowledged definition of the term, found from Cooper, Reimann, Cronin and Cooper (2007), goes as follows: “the practice of designing interactive digital products, environments, systems, and services.” (p. 160).

According to this definition, interaction design deals with creating an environment that enables the users to interact. In this, the designer must anticipate possible reactions from the user to create appropriate feedback from the product. The definition describes a discipline of creating products. I do not disagree with the above definition, however, my approach to interaction design expands the field by focusing on interactions that emerges due to the environment created rather than on the product itself.

The term interaction design itself implies that we design interaction. In my view, we can not design interactions; we can only design an environment encouraging and enabling the user to behave and act in a certain way, the “interaction design” is this environment. The difference from seeing IxD as a practice of creating interactive products, and as a practice of creating an environment encouraging certain interactions, is that the focus of the design work expands from being on just the product, to include the entire context of the product. Furthermore, as the designed product becomes part of a social environment with multiple users it encourages or even enables human-to-human interactions. To understand these emerging interactions, it requires the designer to see the product in use before it can be understood what was created.

This approach to IxD is the starting point of this thesis, in which will try to investigate and understand the interaction and user behaviour that emerged from the IxD of AD. In this thesis, when the phrase “the interaction design for AD” is used, it refers to the design of the interfaces and audience interaction applications which are designed with consideration of the whole context.

2.2.2 TANGIBLE USER INTERFACES

A big part of Interaction design is user interface design or UI. The relation is that the interface is what mediates communication between the user and the interactive product. The shape of this interface obviously affects the interactions that emerge. In the case of AD, the interface belongs to the category of tangible interfaces, known as TUIs.

A tangible user interface, unlike a graphical one, is one that utilises multiple senses in its communication with the user. In most cases the TUI refers to the interface being graspable, letting the user physically manipulate the digital content.

In spring 2014, we (Taavi Varm and I) got the task of building twelve interfaces for the theatre hall. When we started ideating on this task, we became sure of one thing: the experience and feeling of these interfaces need to be something that does not remind the user of their everyday life. As it is part of a theatre, they should contribute to transporting the audience to a different world.

Tangible bits, a term coined by Ulmer and Ishii (1997) describes the vision of tangible user interfaces, or TUI's.

In contrast to *painted bits* (graphical user interfaces or GUI), *tangible bits*, as the name suggests, are tangible, in most cases graspable. The article *Tangible bits* was written as a critique of the graphical user interfaces in 1997. According to Ulmer and Ishii (1997) we rob ourselves of the possibilities that come with the tangible touch by settling for the flat screen. The GUI is a purely visual experience, while the tangible addresses multiple senses. In that sense, the TUI holds larger potential to engage and create an extraordinary experience compared to the GUI because of its employment of multiple senses in its communication with the user.

This vision describes the reason for choosing to work with TUIs in the context of the theatre hall.

2.2.3 AFFORDANCE

In this thesis the term affordance is used as a tool and systematic way of evaluating and understanding user behaviour.

One of the aims of the IxD is to create an environment that enables the users to discover and learn for themselves how to operate the TUI. The IxD aims for this in order to be accessible to all, meaning that all audience mem-

bers are able to use the TUI's during the performance without, or with a minimum of preliminary explanation, independent of previous knowledge, specific background, age or experience.

This section presents a framework for investigating how successfully the IxD reaches this goal through user observations.

The term *affordance* was originally coined by the perceptual psychologist Gibson in 1979 to describe all the possible actions that could happen between the world and an actor. In 1988, Donald Norman appropriated the term in the context of human-computer interaction, HCI, to refer to the actions an object invites the user to take. Norman's use of the term (1998) only refers to the actions that the object or interface let the user think he can do, the object's perceived affordances. Norman (1998)'s definition of (perceived) affordances makes the concept dependent, not only on the physical properties of the object and the capabilities of the user, but also on the user's intentions, cultural background, and past experiences with similar objects.

In relation to ease of use, Norman writes: "...Affordances provide strong clues to the operations of things. Plates are for pushing. Knobs are for turning. Slots are for inserting things into. Balls are for throwing or bouncing. When affordances are taken advantage of, the user knows what to do just by looking: no picture, label, or instruction needed." (1988, p. 9). Meaning that if an interface takes advantage of its perceived affordances the user will know exactly how to use the interface and what it does. This describes one of the goals of the IxD for AD.

In this thesis user behaviour is evaluated to determine how the interface mediating the interaction between the audience and the play takes advantage of its affordances and if it thereby reaches its goal of being simple and easy to use without requiring any preliminary knowledge or experience of the users.

2.3 AGENCY

The previous section deals with a framework for evaluating how easy the IxD is to use for the audience. However, being easy to use is not enough to create an interesting user experience; the interactions provided must also be meaningful and interest-

ing for the audience to engage with. In the following I present the concept of *agency* from the field of interactive narratives, and argue why this presents a reasonable theoretic framework for investigating meaningfulness in the interactions provided for the audience.

I will begin with a short argumentation for choosing agency, as a measurement of meaningfulness in IxD. Where after I discuss the concept and its appliance to AD in more detail via Murray (1998) and Ursu et al. (2008).

2.3.1 PRIMACY OF AGENCY

In Janet Murray's landmark piece, *Hamlet on the Holodeck* (1998), she proposes three phenomenological categories for the analysis of the user experience in interactive narratives. These are: transformation, immersion and agency. These, according to Murray (1998), are necessary elements of creating a meaningful experience for the user in an interactive narrative.

In the following I will shortly argue why I pick agency out of the three categories to be the main focus in the thesis.

The term transformation, as Murray (1998) writes, takes three forms, trans-

formation as variety, transformation as masquerade and finally transformation as a personal transformation of the viewer.

Transformation as variety means that the story offers varieties of the theme of the story. In the form of masquerade, *transformation* transforms the viewer into someone else for the duration of the play. Finally, *transformation* as a personal transformation of the viewer, will give the viewer a new perspective or understanding of a specific theme of the story.

In my view, all interactive narratives offer some variety of the stories they present, otherwise, the user can not have any impact on the story. Transformation as masquerade requires a first person view, which is not relevant for the play, and finally, I do not consider myself in a position to say if the play transforms any of the viewers beliefs or views on life. Therefore, I will not consider transformation in relation the IxD of the play.

Immersion is related to the term *willing suspension of disbelief* coined by Coleridge (1817). The term describes how an audience, or readers of a story, will suspend their disbelief in order to be immersed in a story. E.g.,

when we watch one of the various adaptations of the play *Peter Pan or The Boy Who Would Not Grow Up* (Barrie, 1904) we do not question why Peter Pan can fly. We believe that Peter Pan can fly, thereby willingly suspending our disbelief that people can not fly, in order to enjoy the story.

Immersion refers to how the story immerses the viewer, meaning that they forget the real world and are absorbed into the world of the story. Murray describes immersion as "... the experience of being transported to an elaborately simulated place" (1998, p. 98). When immersion is broken, the audience becomes aware of the fictional state of the story world and their own separation from this.

Immersion is a result of a carefully constructed story, a script, that does not reveal its fictional state to the audience and goes beyond the scope of this thesis and my design responsibilities in the production, and is therefore not included in the evaluation of the IxD for AD as is the topic of this thesis.

2.3.2 AGENCY

According to Murray (1998), agency is: "the satisfying power of taking meaningful action and see the results of our decisions and actions." (p. 126).

Murray (1998) begins the chapter on agency by arguing why previous styles of participatory entertainment do not offer any real agency, even though they do interact with the audience. E.g., in a participatory dinner theatre⁴, the story is written in such way that the audience's interactions with the performers, do not have any real influence on the story (Murray, 1998). Murray writes: "The slender story is designed to unfold in the same way no matter what individual audience members may do to join the fun" (1998, p. 127)

By this, Murray (1998) distinguishes the feeling of agency, with the possibility of interacting with a play. In Murray's definition of agency (1998), she uses the words "...meaningful interactions.." (p. 126), not just interactions. A meaningful (inter)action is understood by Murray (1998) as an action that has significant impact on the unfolding narrative, the plot, and furthermore corresponds to the user's intention. According to Murray (1998), such an action should result in the satisfying feeling, which is agency.

4 Dinner theatre is a form of theatre that combines dining with a staged play or musical. Participatory dinner theatre, the actors will come to the dining table and start interacting with the audience.

To exemplify the difference of interaction and agency: in a war movie, letting the viewer command the main character (a soldier) to either hide and survive, or attack the enemy and thereby getting killed, would have great effect on the plot. This would give the viewer agency. On the other hand, letting the user choose the hairstyle of the character, does not. The latter action is meaningless in the context of the plot, and therefore can not be said to give the viewer agency. Unless the hairstyle has some impact on the soldier's battling skills of course...

Agency is therefore only the meaningful interactions, that the designed environment affords the user. While Murray (1998) writes that the provided actions should be meaningful, she does not elaborate on which actions would be meaningful within the specific narrative, nor on the constraints of agency. Regarding this, an interesting view is found in Wardrip-Fruin, Mateas, Dow and Sali (2009): "Agency is not simply 'free will' or 'being able to do anything.' It is interacting with a system that suggests possibilities through the representation of a fictional world and the presentation of a set of materials for action. Designing experiences toward

the satisfactions of agency involves balancing the dramatic probabilities of the world with the actions it supports." (p. 7).

According to Wardrip-Fruin, et al. (2009), agency then, should not give the user full power of the plot (almost letting the user become the scriptwriter), only the power to change probable actions within that plot.

In this context 'Probable' actions are understood as probable events of drama according to Aristotle (384/1920). The probable actions in drama are the ones that are probable in the story. E.g. in Peter Pan, it is probable that Wendy will learn how to fly. On the other hand it is very unlikely in this story that Peter Pan suddenly loses his ability to fly. Aristotle (384/1920) differentiates probable and possible actions by saying that only probable ones are appropriate to the story and an impossible probable (Peter Pan can fly) is preferable to a possible improbable event (Peter Pan loses his ability to fly). This limits the actions the user should be able to perform to a set of actions that are appropriate to the story.

This is interesting to note, as it would otherwise seem as though agency is

only present if the user has full power of events. Wardrip-Fruin, et al. (2009) gives the scriptwriter the possibility of restricting the power of the users, if this is demanded by the plot. When discussing if agency is provided for the audience members at AD, this restriction formulated by Wardrip-Fruin, et al. (2009) is interesting to remember.

Concluding this section; interactivity does not necessarily provide agency in a narrative. You may be able to interact, as in pushing a button, even though that action is pointless. Agency then, becomes a measurement of meaningfulness within the IxD of AD. Although agency should give the user power to change the plot, that power must, according to Wardrip-Fruin et al. (2009) be restricted by the dramatic probabilities (Aristotle, 384/1920) of the story.

2.3.3 PROBLEMS OF AGENCY IN MULTIUSER SETTINGS

Of the interactive narratives mentioned in the beginning of this chapter, only three are constructed to facilitate multiple users simultaneously. These are *Kinoautomat* (Kalas et al., 1967), *Accidental Lovers* (Tuomola, 2006) and *Sleep No More* (Nightingale, et al., 2001). In the others, the

interaction happens in a one-to-one format, giving one user complete control of the how and when to interact. The most typical form of interactive narratives, such as the youtube stories, hypertext based and games are usually in a one-to-one format, only allowing one person to interact.

Of the three mentioned, the form of *Kinoautomat* (Kalas et al., 1967), presents an interesting issue related to the multiuser context. As there is only one thing to control, all of the individual viewers decision's can not be realised. Instead, the decision is made based on the majority's opinion, highly reducing the feeling of agency. The more audience members there are, the less control, or agency, the individual audience member has. As the play, AD, also facilitates multiple audience members collaboratively making one decision, the problem of reduced agency must be addressed in the IxD.

In the *Kinoautomat* (Kalas et al., 1967) there are two complications in relation to the individuals feeling of agency. First, the individuals vote is not represented anywhere, meaning that you do not understand your influence in the final decision. This makes your action appear insignificant in the

mass of votes from the collective. The audience's feeling of agency is based on their trust in the show being truly interactive and that there are alternate endings.

Secondly, the people voting for the less popular choice could feel like their action was completely meaningless. Combining the two, when the people who vote for the least popular choice, can not see their vote represented anywhere, it could potentially create a feeling that the show is 'cheating', by showing a predetermined option no matter what the majority decides, even if the show indeed is interactive and there are two possible outcomes.

For addressing this problem of reduced agency in the many-to-one format, the context of the AD has two crucial assets that the IxD must leverage. First of all, the participants are co-located in a space that allows them to communicate with each other. Secondly, the audience is a limited size of 72 people. The first advantage gives us the opportunity to leverage the potential of the co-located audience by creating inter-audience interactions and letting these become part of the show. The second advantage of the limited audience size, is giving us the

opportunity of letting each individual see their input in the collective decision.

2.3.4 MICRO/MACRO AGENCY

Accidental Lovers (Tuomola, 2006), introduced previously, lets the viewers affect the love relationship between 61-year-old cabaret singer Juulia and 30-year-old pop star Roope via text messages. The voiceover, music and plot are altered real-time according to these messages.

Every episode begins in the same way, but unfolds differently each time. Each viewer's messages do not alter the plot, instead, each message alters the mood of the scene by either adding a voiceover or background music. Finally the majority's opinion alters the plot at specific times during the episode. In a discussion on agency in the production *Accidental Lovers* (Tuomola, 2006), Ursu, et al. (2008) suggests that the show offers agency at two levels. Micro and macro level.

Micro level alters the mood of the story by adding voiceovers (characters internal thoughts) and music, however they do not alter the plot itself, which is altered by the macro-level agency. The micro-level interactions happens continuously throughout the story,

while the macro-level interferes at specific points in the story, altering the plot according to the majority's opinion.

Micro-agency can be understood as the arguments made leading to a plot-altering decision. Micro agency offers the participants an ability to affect the nuances of the story, such as music, sound or inner thought of the characters; while the characters can contemplate multiple actions, they can only execute one or the other. The thoughts of the characters in *Accidental Lovers* (Tuomola, 2006), as composed by the viewers, then ultimately leads to a plot-altering action by the character, the macro level agency.

In practice, text-messages encouraging the love affair, and those discouraging it, are counted, and the majority decides. This is illustrated live as the messages, either blue or red, float across the screen in the shape of small hearts, to the larger heart in the top-left corner.

Re-contemplating Meadow (2003, p 62)'s definition of in interactive narratives as presented earlier, the reader must be able to "...affect, choose, or change the plot". Following this, the micro level agency would not be

enough to let the narrative qualify as an interactive narrative. However in the case of *Accidental Lovers* (Tuomola, 2006), where plot changing events can not happen constantly or according to all viewers opinion, Ursu et al. (2008)'s suggested *micro level* introduces agency at a less "dramatic" level; the character's thoughts. This lets multiple users interfere and see a result of their actions however this micro level needs to be accompanied by the macro level (plot altering) events for the narrative to be *interactive* according to Meadow (2003)'s definition of interactive narratives.

Finally I want to clarify that neither micro-level nor macro-level agency equals to the agency defined by Murray (1998). First of all, even though macro-level agency happens at the level of the characters actions, and does alter the plot, Murray (1998) would argue that the macro level decision, is not influenced by any one individual, but as a sum of all viewers' actions, which does not give the individual any definite power of the unfolding events, the plot.

Secondly, micro-level agency, which only alters the mood of the story, can not be considered as equal to Murray (1998)'s agency, as it requires that the

action taken has significant impact on the unfolding narrative, the plot, which micro-level agency does not.

However, the micro and macro level agency as presented by Ursu et al. (2008) does offer a model that provides a different kind of agency for multiple users and tackles the issue of convincing the audience that the story does respond to their actions, unlike the explained risk of *Kinoautomat* (Kalas et al., 1967)'s way of structuring audience participation.

Taking advantage of these three levels of agency, gives an opportunity for solving the problem of delivering agency for multiple participants in a multiuser context and presents an interesting framework for understanding audience behaviour during the play AD as result of the IxD created and the agency this provides the audience members.

These three levels will be discussed further in chapter four.

2.4 RESEARCH QUESTIONS

The research questions are in two parts. The first one deals with the production of the design, while the second one is interested in investigating the interaction that emerged as result of the design. The questions that will be investigated in this thesis are as follows:

A. How can I design for audience participation in an interactive theatre play?

B. What behaviours emerge among the audience members due to the interaction design?

The second question is answered through two subquestions:

B1) How does the IxD succeed in its aim of being understandable for the audience, letting them know intuitively how to engage with the interface during the performance?

B2) How is agency provided to the multiple audience members of Anatomy of a Decision, and how does this affect the behaviour of the audience?

The first question is answered through an iterative design process which is described in the thesis. The second question is answered through an analysis of key findings derived from audience observations, questionnaires and an interview with one of the audience members.



**Designing tangible interfaces for collective
decision making in interactive theatre**

3. PRODUCTION

This chapter describes the production of the interaction design.

The foundation of the interaction design created for AD is the tangible user interfaces, which were built for the previous performance, *12 movements* (Veski, 2014). Therefore the production is described in two parts; 1) creating the interfaces and 2) creating the applications for the interfaces to be used in the play AD.

First section presents the success criteria formulated, in order to decide on what, and how to create the interface. Second section presents key findings from the entire design process that has shaped the success criteria for IxD of AD. In both cases, the success criteria work as guidelines and justification for the design decisions made.

Throughout the first part of the production, creating the interfaces, I was working with independent media artist and fellow Media Lab Student, Taavi Varm for Cabaret Rhizome at ETK. During the second part, creating the applications for the interfaces, I was working alone as freelancer for ETK.

3.1 CREATING THE INTERFACE

The interface was created with the aim of supporting audience interaction in the play *12 movements* (Veski, 2014) which premiered in May 2014. Previously, Cabaret Rhizome created the interactive play, *Rhizomedia* (Veski, 2013), utilising the social media platform Facebook for audience participation.

From a discussion with the director, Johannes Veski (personal communication, February 12, 2014), on the challenges and findings from their previous method for creating audience participation, and from our own (Taavi Varm and myself) experience with interaction design, following six success criteria for the interfaces were formed.

1) The interface must fit the context of the theatre hall

We wanted the interface to fit seamlessly into the theatre hall, in a way that it looks like it has always been there, and not something that was added later.

2) The interface must not distract the viewers attention from the scene

It is important that the viewer will be able to operate the interface, while

keeping their attention on the play. Therefore the interface should first of all not be something that requires the user to look while operating it, or secondly be something that might take their attention away from the play by being too complex to handle.

3) The interface must not make the viewer associate with his everyday life

To ensure that the user gets a unique experience of being transported into an other world, which is what theatre is about in our opinion, the interface should not be similar in any way to something from the users everyday life, like e.g. a touchscreen device or other regular used services, such as Facebook.

4) The interface must be shareable and accessible

First of all, the previous method of interaction, via Facebook, required the audience to use their personal smart devices, making the show unavailable to people who were not in possession of such. The idea was to create twelve interfaces to be permanently installed in the theatre hall, one interface for each table. Making twelve, and not seventy-two (one for each audience member), was due to affordability. To make sure that all of the audience

members seated around the table has equal access to the interface, it must be considered in the design. While e.g. a tablet can be used by four to six individuals, the format of the tablets is not shared by default, as the device is usually one used by only one person. We aimed to create an interface that is shared by default.

5) The interfaces must be versatile to support future events and plays

As the interfaces were to be permanently installed in the theatre hall, it was important that they could support other events and plays.

6) The interfaces must not require any preliminary knowledge or experience to control

The theatre is visited by various people of all ages and backgrounds. Therefore the interface must be simple and inviting for anyone to use.

3.1.1 SOLUTION

The solution was to integrate a 30x30 cm interactive square in the middle of each table, operated by round metallic objects, as seen in fig. 11. The metallic objects are named A, B, C, D, E and F.

Creating the interface as a part of the existing tables in the theatre hall

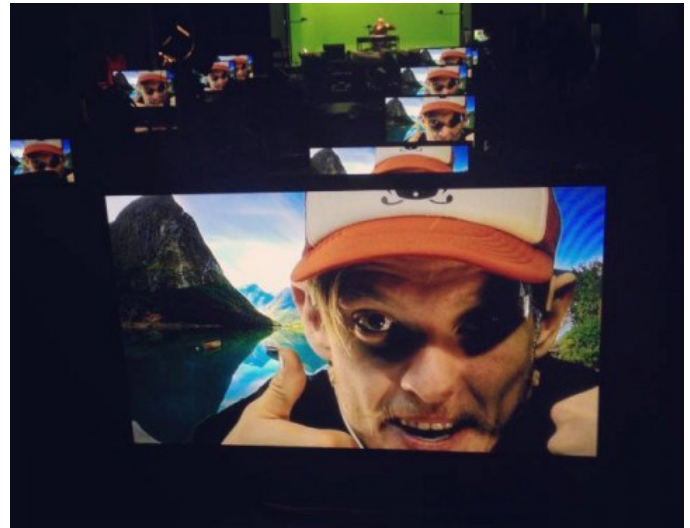


FIGURE 9

Images from the performance Rhizomedia (2013) by ETK. Images retrieved from <http://www.draamamaa.ee/productions/rhizomedia/> (2015).

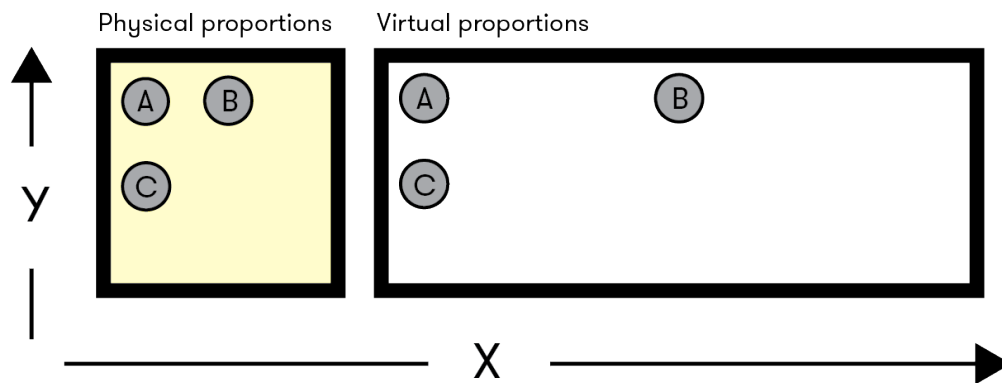


FIGURE 10

The image illustrates the mismatch between the dimensions of the physical interface and the tv-screens. The objects that are placed with equal spacing on the physical table are spread out, so the distance in x direction becomes larger than the distance in y direction.

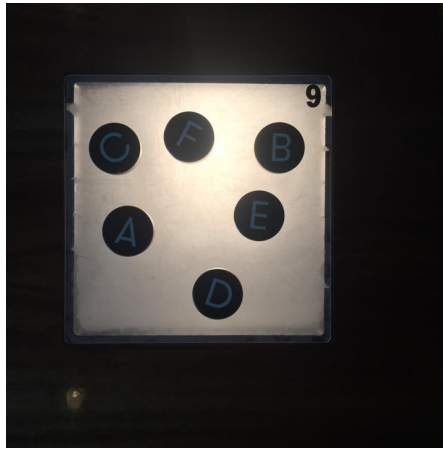
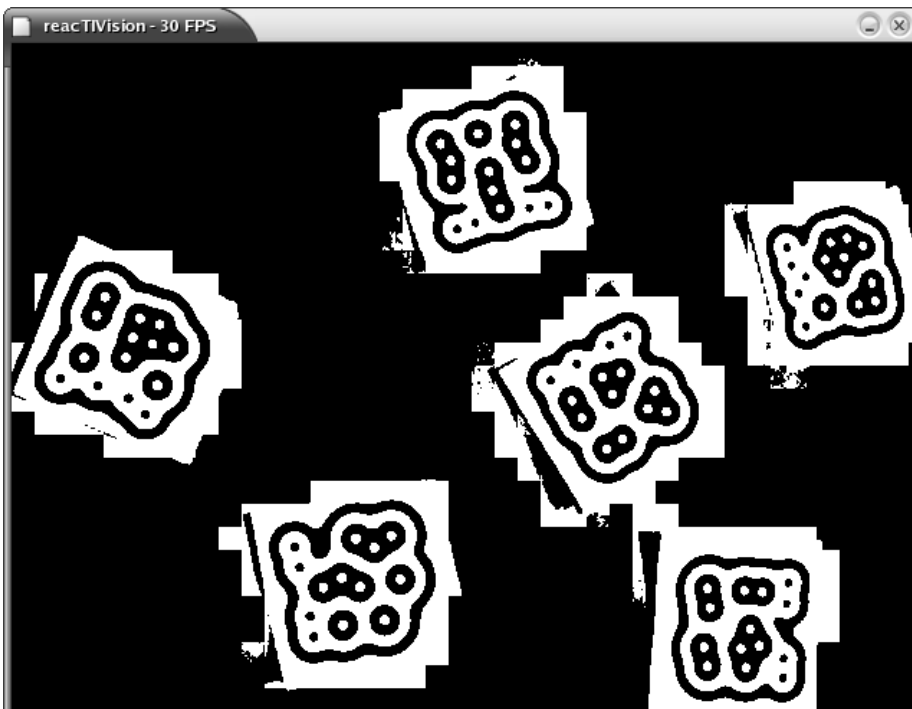


FIGURE 11

Tangible interface installed in existing tables and the 6 metallic objects, A-F. The round metal objects were chosen out of aesthetic reasons.

FIGURE 12

Screenshot from the application Reactivision. The application is recognising the six fiducial makers via a camera input.



integrates the interface seamlessly, without becoming an additional instrument. Furthermore, the table is, in itself, a shared surface by default.

The simple dimensions of the interface makes it versatile and usable for multiple applications. In cases where a visual feedback is required, the existing TV-screens are utilised where the action of the play is also typically shown so it does not diverting the user's attention from the action of the play. As the interface is tangible, it lets the user operate it without actually looking at the table, which, in itself, does not give any feedback other than the objects' position on the lit up surface of the table.

Finally, the custom made tangible interface is different in feel and look from anything of the users everyday life.

For these reasons, the decision to implement these interfaces is not regretted, despite technical complications and difficulties in implementing the solution.

In retrospect, creating the dimensions of the interfaces in the same dimensions as the TV-screens, would give a better user experience when the TV

screens are used as visual feedback. The reason for this is that there is a mismatch between how you move the objects on the 30x30 surface and where it is visualised on the wider TV-screen. See fig. 10.

3.1.2 IMPLEMENTATION

The system consists of twelve mini computers (Mini PC - Intel® NUC Kit DC53427HYE), twelve usb cameras (Logitech 960-000694 C270 USB 2.0 HD Webcam) and a main computer. The Intel NUC is a small computer, that plugs into a TV or monitor and uses standard keyboard and mouse. The specific hardware is not essential for creating the interface, any other computer and camera, able to process the used applications can be used.

To create the interface, we cut a 30x30 cm hole in each table surface and replaced this with a 30x30 cm piece of sandblasted plexiglass⁵. The mini computer and the camera is placed inside a wooden box, which

⁵ Since I have been working with a similar system before (<http://cargocollective.com/KarinaKorsgaard/Playing-Patterns>), I knew from experience that the glass should be sandblasted to avoid the lightbulb from creating reflections in the glass, thereby disabling the camera to see that area of the glass.

is attached underneath the plexiglass surface of the table. The computer is attached to a camera, via a USB cable, which is pointing up towards the surface of the table. In the wooden box there is also a lightbulb lighting up the surface from underneath, enabling the camera to "see" through the sandblasted glass. See fig 13.

Each of the twelve mini computers are running two applications, one is a vision engine called *Reactivision*⁶ developed for the project *Reactable* (Jordà, Geiger, Kaltenbrunner & Alonso, 2003). The other application is a *Pure Data* patch which receives information from the vision engine and sends it to the main computer. The vision engine, *Reactivision*, is a ready made application, while the *Pure Data* patch is constructed by myself, using *Pure Data* (developed by Puckette, 2013).

The vision engine recognises specific black and white patterns, called fiducials. When these fiducial markers are seen by the camera and recognised by the vision engine, it sends the

⁶ *Reactivision* is an open source standalone application, designed to process information from fiducial markers, as well as multitouch finger events, and send this via the TUIO protocol to any other TUIO enabled client application.

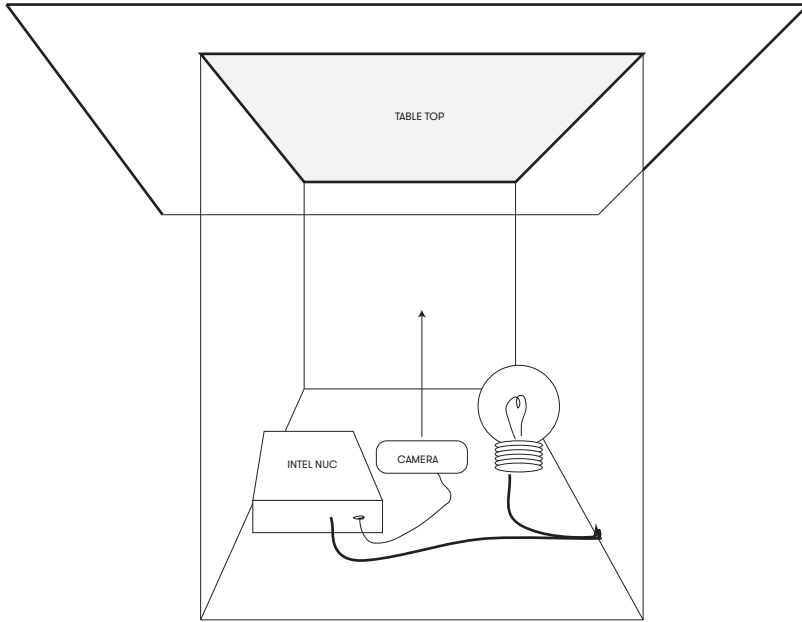


FIGURE 13
Schematic drawing of the physical construction of the table.

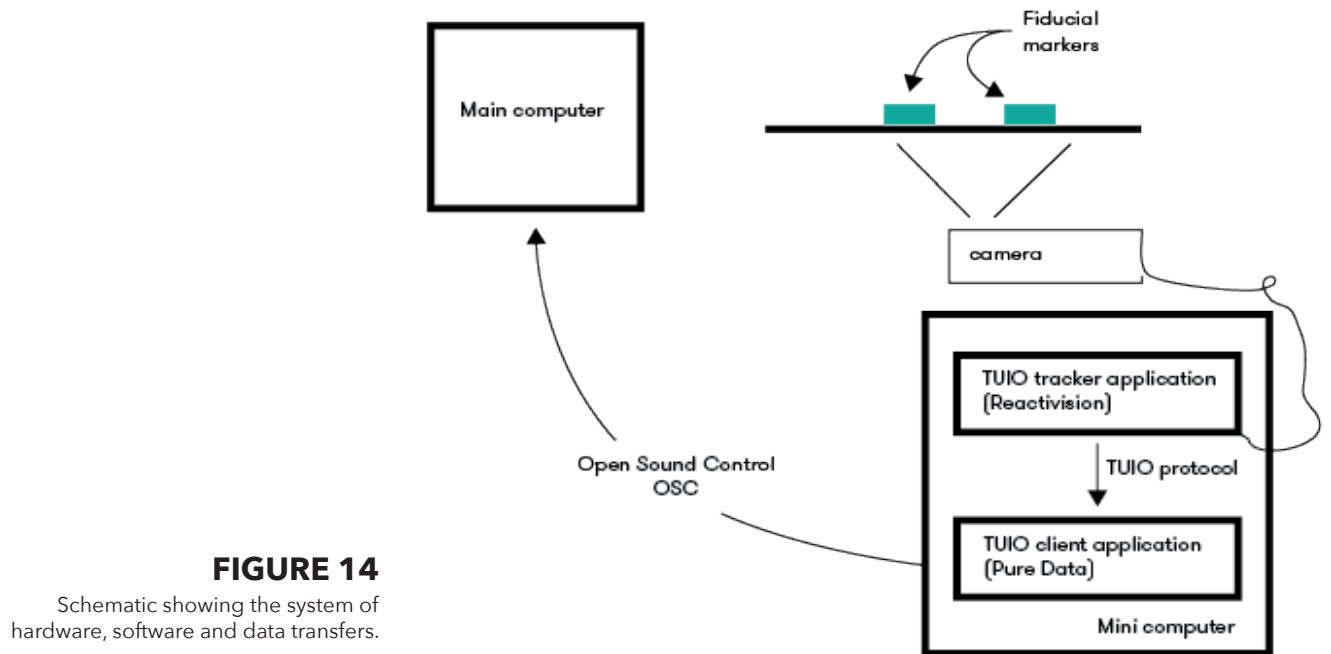


FIGURE 14

Schematic showing the system of hardware, software and data transfers.

information via the TUIO⁷ protocol to the pure data patch which processes that information and sends it via open sound control, OSC⁸, to the main computer. See fig 14.

The vision engine recognises three aspects of the fiducial markings: The unique ID number, the position x-y, and the orientation. The fiducial markings are attached to the metallic objects which the audience uses to control their input by placing them on top of the plexiglass surface, with the pattern facing down towards the camera. See fig. 14. Note that the fiducial markers could be attached to any object. We chose the round metal objects for aesthetic reasons.

The *Pure Data* patch is designed to process information from six fiducial markings, i.e. fiducial 0-5.

The *Pure Data* patches running on the mini computers from each table, send information from the fiducials and information on the table numbers

7 TUIO is a protocol for handling information from tangible multitouch surfaces, developed by Martin Kaltenbrunner (www.tuio.org), designed specifically for creating table-top tangible user interfaces.

8 "Open Sound Control (OSC) is a protocol for communication among computers, sound synthesisers, and other multimedia devices, optimised for modern networking technology." - <http://opensoundcontrol.org/introduction-osc> (2015)

themselves to the main computer. All data is sent via wireless connection on an internal network.

In the main computer an application built with *Open Frameworks*⁹ (open-source coding environment initiated and developed mainly by Lieberman, Watson and Castro) receives and handles the data from the tables.

Until September 2014, the main data handling was done via a *Pure Data* patch. The reason for choosing *Pure Data* as our main coding environment, was because we needed a language that we both (Taavi Varm and me) were familiar with. In September this patch was replaced with an application built with *Open Frameworks* due to stability issues.

These are the physical properties of the interface itself. How to use it, meaning what does the metallic object let the user control and how, was explored through the play *12 movements* (Veski, 2014) and AD. This is described in the following section of this chapter.

9 <http://openframeworks.cc/development/>

3.2 NINE+1 APPLICATIONS FOR AD

In this section key findings and developments from the design process are described. The outcome is nine applications utilising the TUIs for collective decision making and one application designed to introduce the interface to the audience through play. These are described systematically in Appendix I.

3.2.1 FRAMING THE SUCCESS CRITERIA

The success criteria for the final design of the IxD for AD, were informed by three parts:

- 1) Previous experiences and findings from the production *12 movements* (Veski, 2014), March-May 2014.
- 2) The tests and prototypes made in the first phase of the production, September 2014.
- 3) The concept and aim of the play, September 2014 - May 2015

The success criteria formulates six guides for how the IxD can reach its goal of being intuitive and easy to use, provide agency and create various interactions between audience members.

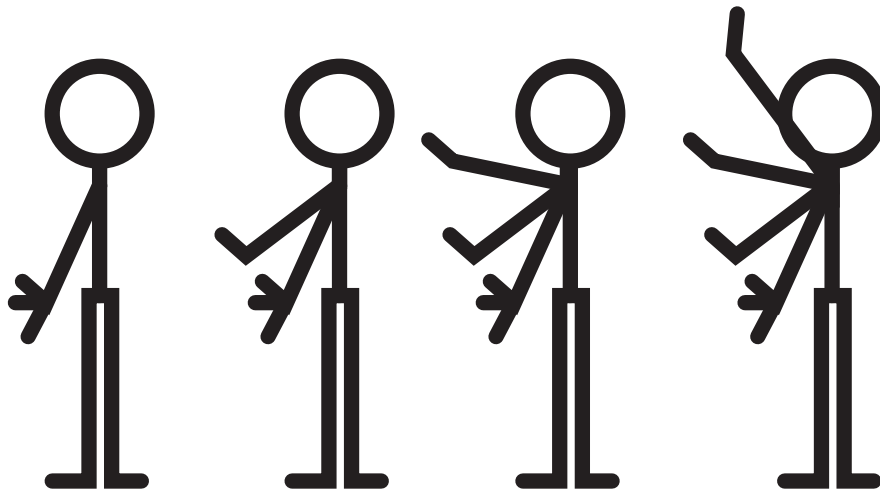


FIGURE 15

Illustrating four intensities of the classical greating movement; waving your hand. Intensity 1 - only moving your hand - intensity 4 - moving your arm above your head and waving.



FIGURE 16

Introduction game: Each table controlled one of the 12 elements on the screen, the letters and the white box. The task was for the audience to spell the name of the show, "12 movements (Veski, J. 2014)" and place it within the white box. The image is reconstructed, in a way so the reader can see all of the letters. In the original game, the background would be black, not letting the tables controlling the letters see their position, unless they entered the white area.

12 movements

The play, *12 movements* (Veski, 2014), is an experimental theatre piece about twelve *movements* of life, which, through twelve scenes, explores moments of action, such as *greeting, waiting, relaxing* or *growing*. Each scene presented one movement as a choreography, repeating the movement in its variations. Within each movement certain actions were controllable by the audience. E.g., *greeting* had four different actions presenting *greeting movements* of various cultures, such as “raising your hand and waving”. These movements were shown as a repetitive choreography displaying it in four tempos and four intensities. In this scene, four tables would each control one of the four actors, by placing the metallic objects on the table surface. These tables would decide for their actor which movement, which intensity it should be done with, and in which tempo. A small screen on the stage would let the actors know which choreography to perform. The variations of the *greeting* is illustrated in fig. 15.

While four tables were occupied with controlling the actors, another four tables were assigned to control the soundscape of the scene. The main application sent the information

from these sound-controlling tables to *Ableton Live*¹⁰ via MIDI¹¹, where various movements of the buttons had been mapped to specific sounds or sounds filters.

In a majority of the twelve scenes, the audience would control three aspects of the performance: the movement of the actors, the soundscape and the visual backdrop that the actors are keyed into, shown on the TV screens. The interaction was continuous throughout the scene, making the audience responsible for composing the elements and aesthetics of the scene.

The play received media coverage in Estonia for its use of interactive technologies, in combination with live performance, however, this was not entirely positive feedback.

While working with the production of *12 movements* (Veski, 2014), we discovered that the round metallic ob-

10 Ableton Live is a software music sequencer that lets various sound events or music tracks be controlled via incoming MIDI signals.

11 MIDI is short for Musical Instrument Digital Interface. It is another communication protocol, like OSC, designed to let various applications and instruments communicate. It was Standardized in 1983, and is maintained by the MIDI Manufacturers Association (MMA).

ject gives the possibility of four basic gestures on the table surface: placing it on or off on the surface, moving it in x-position (left-right), moving it in y-position (up-down) and rotating it on the surface. In *12 movements* (Veski, 2014), all of these gestures were used inconsistently. In almost each scene the behaviour of the objects and the feedback changed, e.g. the object that previously changed the sound by moving it up or down, now changes visual by rotating it or just placing it on the interactive surface.

Furthermore, all tables were not interactive in all scenes, e.g., table number one would only be interactive in scene two, controlling sound, scene five controlling visuals, and scene eight controlling actors movements. Table number two would be interactive in scene one, four, and seven and so on. The light in the table indicated when the table was interactive.

This way of structuring audience participation gave the audience three tasks: First, figuring out when they were supposed to interact. Second, what they were controlling, and third, how to control it (moving the button from side to side, rotating it, using one object or all four objects, ect.)

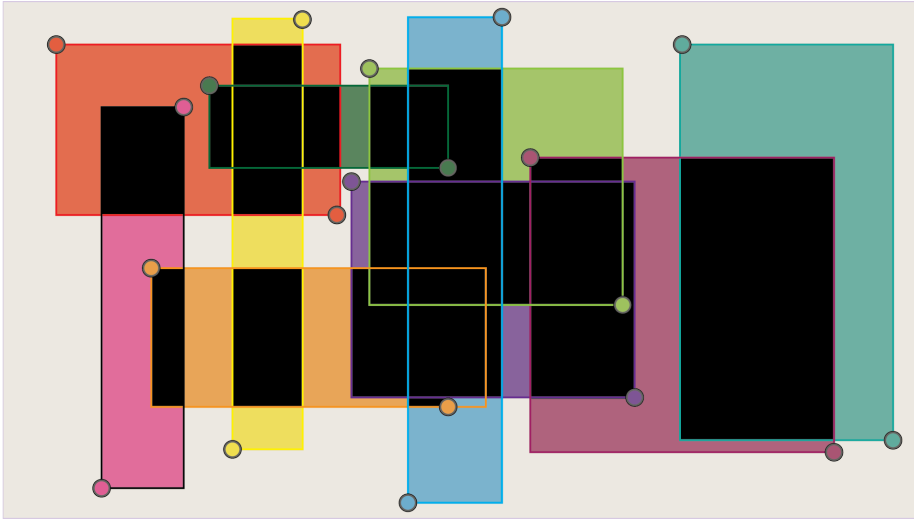
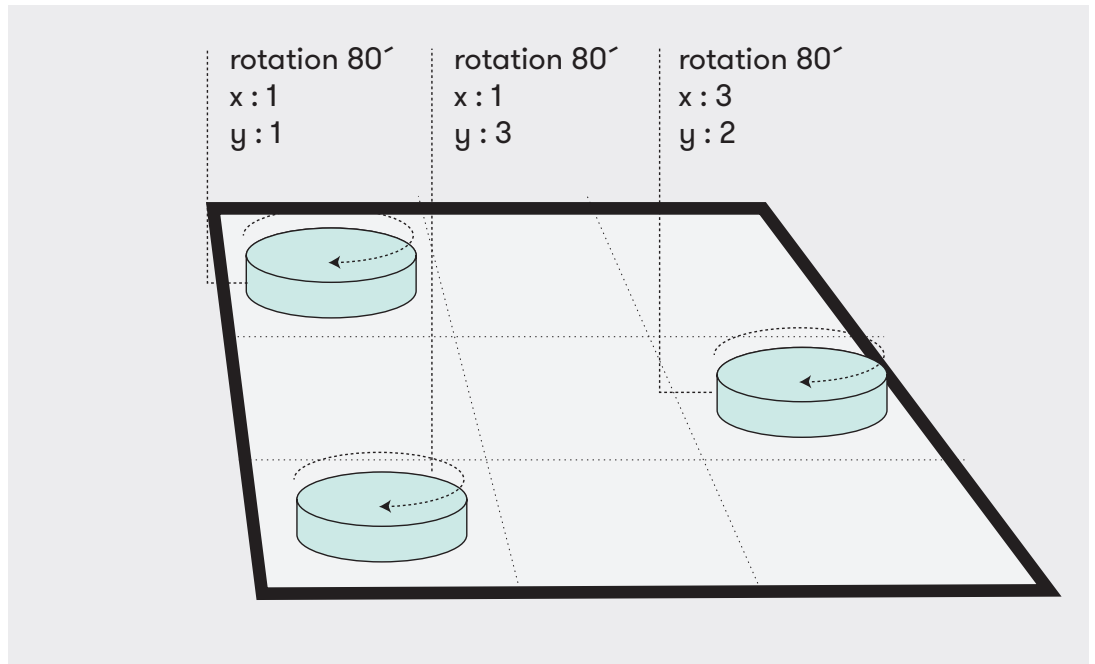


FIGURE 17

Each table controls one square of colour. The size and placement of that square is determined by the position of two objects on the table. All twelve tables are competing to conquer the biggest area of total area of the screen. When squares overlap, it turns black and no one wins that area. The image is a reconstruction of a screenshot from the game.

FIGURE 18

Illustrating the principle of all positions being different while the rotation values are the same.



This proved to be too much and disturbed the narrative flow of the play. The behaviour observed was the audience moving the metallic objects around randomly while trying to figure out what they were controlling. When nothing seemed to happen (due to the chaos of the scene itself) or because they could not identify their feedback (audio, visual or actor movement), they became frustrated and gave up. The importance of unifying the way of interacting (gestures) and the feedback, was the two first and most important findings from *12 movements* (Veski, 2014).

The third finding from *12 movements* (Veski, 2014) was derived from the two "training sessions" created to introduce the audience to the interface before the actual play started. The audience was supposed to learn a simple lesson: metallic object goes on the interactive surface of the table, pattern facing down. The outcome, however, was much more interesting than the audience learning this simple lesson. Of the whole play, these two sessions were almost the most successful in entertaining the audience. They both had aspects of collaboration and cross room coordination, forcing the audience members to communicate across the theatre

hall in order to solve a puzzle. The behaviours we observed was audience members beginning to talk and even shout across the room, booing when someone made "mistakes"¹². The mechanics of one of the sessions is illustrated and described in fig. 16.

To summarise, the three main learning outcomes from *12 movements* (Veski, 2014) was:

- 1) the interaction gesture should be unified, or only vary slightly, so there is the least information to be learned by the audience, and this should be learned and understood during the introduction.
- 2) the feedback must be unified, consistent and of the same character, e.g. audio, visual or other, throughout the play.
- 3) entertainment value of cross-room collaboration.

First phase of production

During September 2014, multiple ideas of how to create the audience interaction were explored. At this

¹² Making Estonians communicate and even shout at each other is quite an accomplishment (according to what I have been told).

time, we did not reflect on why the training sessions were a success. Instead we were focusing on how to enable the audience to make a collective decision.

In this period I was working more or less independently with the task of coming up with different applications to be used with the TUIs. These applications would then be tested by the team, or by guests coming to the theatre hall for other purposes such as meetings or events. The purpose was to generate ideas for audience participation styles and explore the possibilities of the TUI ending up with nine applications for collective decision making described later in this chapter.

Of the applications that were not taken further, I will only describe one as this lead to the first of this phase' five findings and therefore is more relevant to the thesis than other prototypes that created in this phase of the production.

The mentioned objective of the mentioned application is for each table to conquer as much of the a shared area as possible. All tables are able to produce a coloured square on the TV screen by using two of the objects.

When two squares overlap, they cancel each other and the shared space becomes black. The only way for all of the tables to win something is by sharing the surface equally, however, when this is done, one table can take over the whole screen, thereby cancelling the conquered areas of all other tables. Of course, the next thing that happens is that another table will do the same and cancel out the first tables colour. In most user testing sessions of this application, no one won anything. The application mechanism is illustrated in see fig. 17.

This mechanism made use realise how to use the collaborative or competitive elements, as explored in the training sessions of *12 movements* (Veski, 2014), for purposes where a winner can be found or some conclusion to a decision can be made. This is the first finding from this phase. E.g. if the audience are to chose if the main character goes to Sweden or stays in Estonia, the rule could be that if they manage to share, the “better” the character of AD is allowed to stay in Estonia and the winning (table that conquered the biggest area) gets additional power in next decision. How to use these kinds of applications for decision making is then dependent on the rules and parameters we

invent, that maps specific outcomes, such as “no one gets anything”, to the given choices of the decision. Like this, the game can be utilised as a decision making mechanism.

However, as I continued to prototype ideas, it became obvious that this mechanism was not compliant with the other findings described in the following, and for this reason, the application was discarded.

Second finding followed the realisation of the need for a visual feedback system to facilitate 72 people simultaneously, which was required by a majority of the created application prototypes. The interface itself has no visual feedback other than the position of the object in relation to the interactive square, therefore the visual feedback must be available via the TV screens. In *12 movements* (Veski, 2014) the feedback was constructed as sound, actors movements and visual feedback (via the TV screens), however, this never visualised input from all tables at the same time. In AD, we needed to facilitate feedback for all 72 objects simultaneously on the same screen without causing confusion. (although there are 12 TV screens in the theatre hall, the setup does not allows us to broadcast a

separate image for each of them). Experimenting with the layout, I came up with various methods for organising the audience’s input in a way that enables them to recognize their own, however, as we had decided that the (visual) feedback must be unified through all nine applications, the simplest solution became the final one; organising all 72 input by table number and object name in a 6x12 matrix . The final solution is explained further in section 3.3.

Third finding was regarding the interaction gesture. Through prototyping and testing I came to the conclusion that the most sensible interaction gesture was *rotation*. In contrast, if x-y position is used as interaction gesture and e.g., the answer *no* is selected by placing the object left right corner of the table there is a physical limit to how many objects that corner spatially fit. This would be a problem, as all six members of the audience should be able to select the same option, if this is what they wish. Rotation gives a 3rd dimension, meaning that all the objects on the table have the ability to select the same option. This principle is illustrated in fig. 18.

Fourth finding is more of a personal opinion formed by testing the various

prototypes; of all of the decision mechanisms 'majority decides' was the least interesting and in engaging, especially compared to systems similar to the one described earlier.

Finally, following the realisation that the voting mechanisms have potential for creating various audience behaviours, we decided that we should leverage this potential by creating different voting mechanism for each scene. This will also avoid the risk of letting the decision making phase become repetitive and uninteresting.

Summarising the five findings;

1) How to utilise elements of cross-room collaboration and competition in ways where a conclusion to a decision can be found by setting up rules and parameters that maps the outcome of such a session to the possible choices of a decision.

2) How to create a visual feedback for 72 people that allows the individuals to recognise their own input and that is versatile enough to be used through nine different applications.

3) Rotation allows for more flexibility and should be used as the interaction gesture.

4) 'Majority decides' was least interesting decision mechanisms.

5) Each scene should display a employ a different decision making mechanism in order to not become repetitive.

Concept and aim of the play

In our view, the story was only considered a tool to explore the real content of the play: the anatomy of a collaborative decision-making process.

The story of the play is about a boy and how his decisions shape his life. With the finding from the previous phase, that the voting mechanics must be different for each scene, the idea of mimicking the "kind" of decision being made via the system mechanics came. E.g. a child can not have two names and the parents can not disagree on the decision. The decision needs full consensus to be valid. "Naming a child" is the decision being mimicked, and the "consensus logic" is the system mechanics mimicking this decision.

The concept of the play made us rationalise to some extend, which decision mechanics should be used for which scenes, and imagine new

voting mechanisms for situations such as, "making a decision on whether or not to take drugs in the toilet of a nightclub" (scene six where the character finds himself in a toilet booth, contemplating on taking drugs)

The decision mechanisms' relations to the story is strictly our (the theatre team and myself) interpretation of the mechanics and does not suggest whether or not this was communicated successfully.

3.2.2 THE CRITERIA

From the three parts described above, findings from *12 movements* (Veski, 2014), the first phase exploring opportunities and the concept of the play, following six criteria for the applications were formulated.

1) The visual feedback of the nine applications must be the unified.

2) The interaction gesture must be the same throughout the play.

3) The collective's opinion should be easily decipherable.

4) It should be easy for the audience members to identify, read and change their individual input.

5) The nine applications should require different tactics or skills of the audience thereby encouraging various audience behaviours throughout the play.

6) The decision mechanics should relate to the decision and situation of the character on stage.

3.3 OUTCOME

This section describes the outcome and the design decisions leading to it.

The outcome is the nine applications that utilise the TUIs for collective decision making and one application introducing the interface to the audience.

Throughout the ten applications we created a rule of always using *rotation* as the interaction gesture combined with a 6x12 matrix to give the audience members a visual feedback of their input in a way that makes it easy for the individual to identify its own, see fig. 19.

The objects from the twelve tables are visualised in the matrix in following way. Each table has its own column. In this column the objects of that table (A, B, C, D, E or F) are organised accordingly, beginning with A in the top

row, and ending with F in the bottom row. Object "A" of table one will be in first column, first row. Object "B" from table one is the first column, second row, and so forth.

The 6x12 matrix proved, through prototyping, to be the most usable, both for identifying the individual's input and for getting an overview of the collective decision. The individual's input is represented as a colour, indicating this person's decision. The colour represents one choice of two possibilities, which are explained in the legend.

The colours were chosen to visualise the choices, as they were the best at communicating the collected outcome. With colours, it is easy to see which colour is dominating, without having to count each square of the matrix, thereby getting an overview of the collective opinion. However, in some cases, other visualisations such as graphics (application of scene two) or letters (application of scene nine) were used, simply because it made more sense for the specific mechanic.

In addition to the matrix, most visuals contain a *result bar*, visualising the collective result even clearer than the matrix, a timer (except the applica-

tions of scene one and two), counting down until the decision time is up, an explanation, explaining what the audience members are supposed to do, a legend, specifying which colour means what, and finally the question that the audience members are supposed to answer. These components are illustrated in fig 19.

All applications utilise this layout more or less except the application for scene one and scene three. Likewise, all applications use rotation as the interaction gesture, except the application for scene three.

During the first act, the audience goes through all nine applications by which they make collective decisions on behalf of the main character. In the last scene they decide from where the second act should begin. In the second act, the audience goes through the same decision mechanisms (except the very last, as they do not get to go back in time after second act), from the point they decide to go back to, with the opportunity of changing their decisions, to experience an alternative ending for the main character. In the second act, the audience has less time to decide in general.

The application introducing the

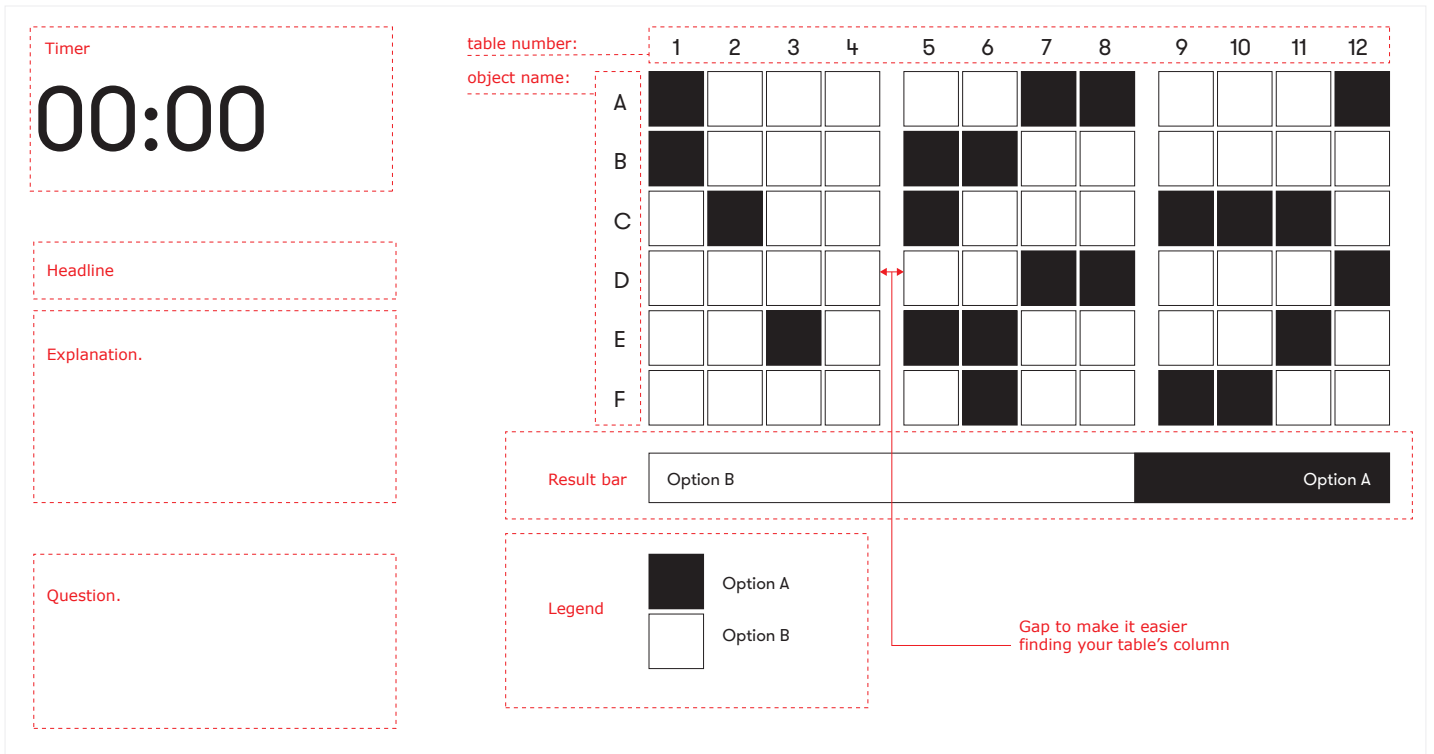


FIGURE 19

Schematic of the composition of the main visual feedback, in the text referred to as the 6x12 matrix

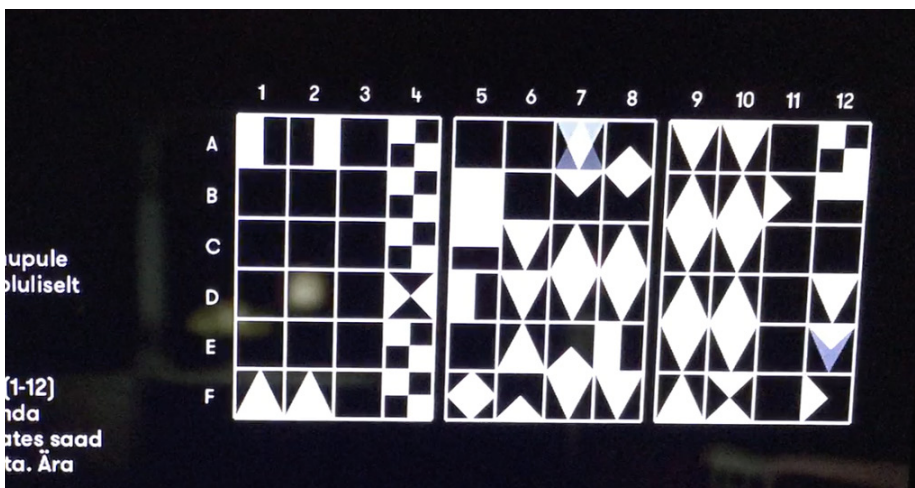


FIGURE 20

Introduction application. The audience are playing with the TUIs, creating patterns.

interface and the main visual feedback, invites the audience to interact before the play starts. In this introduction each object in the theatre hall is visualised as one of eight possible geometrical shapes in the matrix, together creating various patterns. Through this, the audience learns two things. First of all, it is learned how to identify ones input in the matrix, e.g., object "B" from table six is shown in the sixth column, second row. Secondly it is learned that by rotating the objects, something happens - their square of the matrix changes shape. See fig. 20.

The nine applications for collective decision making are described systematically in appendix I, which the reader can refer to later in the text if needed.

Here I only write a brief overview of the nine applications and the decision making mechanism it uses. Each mechanism is shown in the introduction movie seen via the link provided earlier.

In the first scene, the members of the audience need to race each other. The fastest person wins the race (who wins does not have any special influence on the story). The visuals are

highly connected to the story as they represent an egg being fertilized by a sperm cell (scene one is the conception of the main character). The second mechanism requires all members of the audience to reach consensus for the play to continue. In the third scene, each table controls one piece of a jigsaw puzzle they must solve before the time runs out, if they even want to solve it, that is. During these first three scenes, the audience has decided the characters name, and how he should be raised. In the following scene (four) the parents need to decide which school the character should go to, private or public. In this scene, the audience will first answer five quiz questions. The amount of right answers they get determines how much power they will have in the voting - the smartest persons decide. In scene five, the majority decides if the boy should go to Sweden or stay with his father in Estonia. In the sixth scene, the character is contemplating if he should try drugs or not. Through this decision mechanism, the last one that makes up his mind will drag everyone in his direction, the last decision made weighs heaviest in the voting. After this, scene six, each table has one vote in the decision on weather the boy should continue to university or not. To take advantage

of this vote, the members of each table must agree internally. In the last scene of the story, the father of the boy has died, and he needs to decide if he should sell his father's apartment or not. To enable the character of selling the apartment, the sum of each audience members input, 0-9, must equal a specific sum. Finally, the first act gives the audience the possibility of going back in time. Which scene they will go back to is decided by the majority. A screenshot from each application is seen in fig. 21

To summaries, the scenes and the name of the decision making mechanisms are listed in the following:

- Scene one: Race
- Scene two: Consensual decision
- Scene three: Puzzle
- Scene four: Quiz
- Scene five: Majority decides
- Scene six: Impulsive decision
- Scene seven: Table consensus
- Scene eight: Calculation
- Scene nine: Majority decides

In the following, the scene itself will be referred to by the name of the scene, e.g., "Childhood years" (scene three), while the decision making mechanism of that scene will be referred to by the name of the mechanism.

In the appendix each application is described via the following seven fields.

- 1) Name of decision making mechanism
- 2) Time
- 3) Influence the outcome of the decision
- 4) Visual feedback
- 5) Interaction gesture
- 6) Voting mechanism
- 7) Relation between this mechanism and story

The description the visual feedback is described in relation to the above explained visual feedback (6x12 matrix and result bar).

3.3.1 MECHANISMS CATEGORIES

To create a systematic way of understanding the IxD for AD, I divide the nine voting mechanisms into three categories: Discussion, collaboration and competition. The categories are based on how I understand the mechanisms, and which behaviour we intended to create among the audience via this.

Collaboration

This category includes mechanisms where the audience is asked to

achieve a certain goal by collaborating. The applications of scene two, three, seven and eight (consensual decision, puzzle, table consensus and calculation), belong to this category.

Competition

This category includes mechanisms where it is possible for the individual to get his opinion through by skill. The application of scene one, four and six (race, quiz, and the impulsive decision), belong to this category.

Discussion

This category does not require collaboration, nor is it possible to win by skill. This category only encourages discussion, however, it does not require it. The applications of scene five and nine (majority decides), belong to this category.

3.4 LEARNINGS FROM THE PROCESS

Since the production was an iterative process, changes and additions kept being made. Although this is the only way (in my opinion) to create good design, it is a challenge when it comes to producing code structure.

Being aware of the contrast between the iterative design process - developing, adding and testing the

design continuously throughout the process and the process of writing a code, which needs to be planned in advance to create structure, is one of the learnings from the project.

Although this contrast is not a problem that can be solved (or at least, I would not know how to), it is something that should instead be taken into account when producing a time schedule for a project. For each mayor change, or iteration in the design, time must be put aside for developing the code in order to test the design again. Minor changes can be made by overwriting things in the code, but once this had been done too many times, it becomes harder and harder to understand the code, thus harder to change, and harder to debug. In the production, this became a mayor challenge at the end as all iteration from the design was implemented by overwriting the existing code, due to lack of time.

Finally, testing with the users is essential and brings value to the ideation process. When creating systems requiring multiple users to collaborate through custom interfaces it is almost impossible to anticipate reactions and behaviours and it is exactly these that often inspire the next prototype.

FIGURE 21

Screenshot from each of the eight applications. Application of scene one in first row first collumn, two first row second collumn and so forth. Application number four is shown in two images, one from the quiz and one from the voting phase.

Looduslik valik:

Et tekiks uus elu, peab Pauli seemnerakk jõudma Tiiu munarakuni. Keera oma nuppu päripäeva, et Sinu juhitud seemnerakk sihtkoha poole teeale asuks. Kiireim seemnerakk võidab!

Igast sektorist (lauast) jätkab võistlust ülima eesmärgi nimel vaid kiireim sektorist väljuja.

Kui seemneraku ja tema piloodi vahel katkeb side (näiteks kui nupp laualt ära võtta või sellega liiga hullult rabistada), algab teekond algusest.

Konsensus:

Et Paul ja Tiiu oma lapsele nime saaksid panna, tuleb neil langetada konsensuslik otsus. Et Paul ja Tiiu konsensusliku otsuseni jõuaksid, peate ka teie saalis jõudma meie tulevase peategelase nime asjus täielikule üksmeelele.

00:44

Kaalutud hääl:

Vasta viktoriiniküsimustele õigesti ning Sinu hääl on Arturi saatuse üle rohkem kaalu.

Sinu mänguruudu sees olev number näitab Sinu punktisummat õigesti vastatud küsimuste eest. Iga punkt annab Sulle otsustamisel ühe hääle.

Milline nimetatud Eesti koolidest oli ajavahemikus 2005 - 2011 riigieksamite punktide põhjal koostatud pingereas igal aastal esikolmikus?

	1	2	3	4	5	6	7	8	9	10	11	12
A	1	1	0	0	1	1	1	0	0	0	1	0
B	1	0	0	0	1	1	1	0	0	1	1	0
C	0	0	0	1	1	0	0	0	0	0	1	0
D	0	0	1	0	1	1	0	0	0	1	1	0
E	0	0	0	0	0	0	0	0	0	0	1	1
F	0	1	0	0	1	0	0	1	1	1	0	0

- Gustav Adolfi Gümnaasium
- Viktor Kingissepa eragümnaasium
- Hugo Treffneri Gümnaasium
- Miina Härma gümnaasium

00:23

Kaalutud hääl:

Vasta viktoriiniküsimustele õigesti ning Sinu hääl on Arturi saatuse üle rohkem kaalu.

Kas Artur läheb õppima eliitkooli või jääb edasi tavakooli?

01:18

Grupeeritud üksmeel:

tulemusele omavad mõju vaid nende laudkondade hääl, mis saavutavad oma otsuses täieliku üksmeele

Kas Artur läheb ülikooli?

	1	2	3	4	5	6	7	8	9	10	11	12
A	1	1	1	1	1	1	1	1	1	1	1	1
B	1	1	1	1	1	1	1	1	1	1	1	1
C	1	1	1	1	1	1	1	1	1	1	1	1
D	1	1	1	1	1	1	1	1	1	1	1	1
E	1	1	1	1	1	1	1	1	1	1	1	1
F	1	1	1	1	1	1	1	1	1	1	1	1

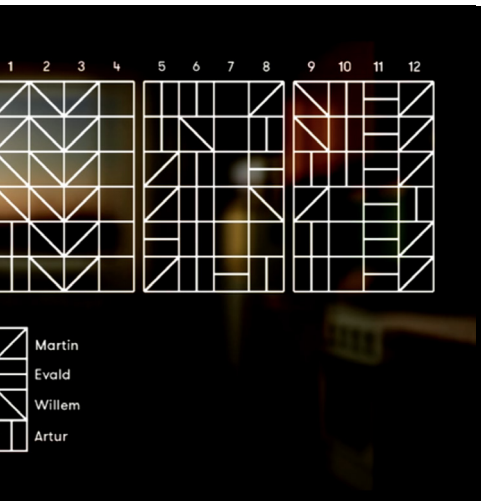
☒☒☒☒ ☒☒☒☒ ☒☒☒☒

- Jah
- Ei

01:32

Kalkulatsioon:

Et Artur oma korteri maha müüks, tuleb pisut arvutada. Oma nuppu pöörates saad määrata oma liidetava suurust. Kortermüük õnnestub juhul, kui kõikide liidetavate summaks tuleb 438



04:59

Kollektiivne probleem:

Kas Arturit peaks rohkem kasvatama, keelama ja käskima või laskma tal rohkem iseseisev olla? Iseseisvuse saavutamiseks tuleb Arturil endale ise kombinesoon õigesti selga saada.

Et Artur endale kombinesooni õigesti selga saaks, tuleb ette antud ajaraamis lahendada mosaiikmõistatus. Igas lauvas töötab vaid nupp A. Oma mosaiigitüki tunnud ära lauaumbri abil.

Arturi õnnestumisest sõltub, kas temast saab allaheitlik või iseteadlik inimene.





**Designing tangible interfaces for collective
decision making in interactive theatre**

4. DATA ANALYSIS

In this chapter I present and analyse the collected data from the performances, and via this, I evaluate the outcome of the design process described in previous chapter.

The chapter is in two parts: In the first part I present the findings from the collected data of the performances which consist of four parts: An interview with Taavi Varm, questionnaires answered by the audience of a performance, informal translation of three reviews of the play and my own observations made during two separate performances. In the second part I reflect on the findings from this data through the theoretic framework presented in the second chapter of the thesis.

The video clips of the observations can be seen via the links provided in the text and the questionnaires are found in appendix II.

4.1 QUESTIONNAIRES

The purpose of the questionnaires was to get insights into which of the scenes the audience found most or least interesting, and more importantly why.

After collecting the questionnaires, I made a table with all answers to see if I could find any patterns. The only finding from the questionnaires is that all, except one, stated that they understood "what to do" during the performance.

Since the questionnaires disturbed the performance and in my opinion did not give any valuable feedback, I decided on not making a second round of surveys.

4.2 INTERVIEW

The interviewee, Taavi Varm, saw the performance AD on 19th of March, 2015 and is interviewed as an audience member. The interview was conducted on 23rd of March, 2015.

Taavi Varm has been active in the Estonian theatre scene for years and has large reference knowledge on current productions and developments in this scene, which made him an interesting interview subject.

The topic of the interview was on which scenes the interviewee found most memorable, which applications was perceived as most interesting and why.

In the interview Varm (personal communication, April 23, 2015) stated that the most memorable aspect of the play, was that he found himself discussing decisions with strangers seated the table.

According to Varm (personal communication, April 23, 2015), the most interesting applications were the ones where the audience was asked to collaborate, such as the calculation or the puzzle (application of scene three and nine).

Varm (personal communication, April 23, 2015) found the first scene, the race, amusing, even though it had no impact on the actual story. The reason was that the race in itself was highly engaging and that the visuals were perceived as entertaining and relevant to the story. Regarding ease of use, Varm (personal communication, April 23, 2015) said that it was almost too easy, and we could perhaps have varied the visuals more, like the race.

4.3 REVIEWS

The three reviews were informally translated to me by the director, Johannes Veski, 20th May 2015. All references giving to the reviews in the text are from Veski (personal communication, May 20, 2015).

The first review, published on sirp.ee, was written by one of the most influential theatre critiques in Estonia, Ott Karulin, and multiple points made in this are repeated in the other reviews.

As I have been involved with the production of the performance, my observations may be biased. Furthermore, my observations were made during different performances and come from a production team member perspective.

The observations and interpretations made by the reviewers are interesting, as they illuminate how the performance was understood from an audience member perspective. Unlike the interview, the reviews are written after careful reflection and interpretation of the play. Therefore, they give feedback at a higher interpretational level than what was found from the interview.

4.3.1 REVIEW I

Sirp.ee is one of the most influential cultural papers in Estonia. Ott Karulin wrote a review of Anatomy of a Decision called *Rosimannuse katsepolügoon valijatele* meaning "Rosimannus playground" (Karulin, 2015).

Rosimannus is an Estonian right-wing politician who whit in Estonia, among certain people, has a reputation of being very conservative, stubborn and controlling. The headline is a pun, meaning that through the play you can learn the science of her ways and how public opinion is formed.

Rosimannus, or her "kind", is later in the review referred to as "little Napoleons" (Karulin, 2015).

In the review there is large emphasis on contextualising the play to current political affairs in Estonia. In the review, the play is not referred to as a theatre play, but as a workshop for collective decision making, and according to Karulin, (2015), a pleasure for the little Napoleons to take part of, as they can try to push their own opinions to the collective.

Karulin (2015) saw the play multiple times, and through these, developed a strategy for controlling both the

consensual and the impulsive decision (application of scene two and six). Karulin (2015) writes that in the consensual decision, we will align with the majority in order to reach consensus, and in the puzzle, we will try to solve it, even though we actually do not agree with the outcome of solving the puzzle (solving the puzzle results in the main character dressing himself without help from the mother). Karulin (2015) writes that in the consensual decision he intentionally pushed his opinion by sheer stubbornness, as the collective was more afraid of failing in making a consensual decision, than sticking to their first choice.

Regarding the story of the play, Karulin (2015) compares it to *Home and away* (Bateman, 1988), an Australian television soap opera, and determines the genre as a "kitchen synced drama". In Karulin's opinion, the story is only a tool for exploring the real meaning of the play, the collaborative decision making workshop (2015).

This view is repeated in the other reviews and aligns very well with our (production team) intention of the play.

Finally Karulin, (2015) points out with regret that in the second act, the audience will most certainly pick

the complete opposite of what was chosen in the first act, where he would have preferred to see how a more subtle change would affect the characters life.

4.3.2 REVIEW II

The second review, *Teatriendus, kus kõigi hääl loeb* by Ursula Nõu (2015) in Eesti Päevaleht, focuses on how the play forces the audience to take action. Nõu, writes "soon a bunch of strangers are sitting around the tables, forced to make a consensual decision. - forcing one person to take a leading role." (2015). Furthermore Nõu (2015) comments on how the play differs from normal non-interactive plays in the way the audience reacts with loud "boohing" or "shouting" when they do not agree with the way the play unfolds. According to Nõu, (2015), this is because the audience feels responsible for the actions happening in the play, unlike in a traditional non-interactive form.

4.3.3 REVIEW III

The third article, *Teater kui pehme kommunikatsioon*, written by Lisa Järjehoidja (2015) in Postimees Kultur, takes a slightly more negative stand regarding the interactivity. Järjehoidja (2015) starts off by comparing it to a phenomena of western culture where



CLIP 1

vimeo.com/139259884
Password: 409818



CLIP 4

vimeo.com/139259880
Password: 409818



CLIP 2

vimeo.com/139259881
Password: 409818



CLIP 5

vimeo.com/139259882
Password: 409818



CLIP 3

vimeo.com/139259878
Password: 409818



CLIP 6

vimeo.com/139259879
Password: 409818

everything is about choosing. Järjehoidja writes that: "deciding is one of the most important keywords of our times. You have to decide everywhere. People that are capable of making fast decision are distinguished from the others, who can't, who have to lay down for these." (2015) In other words, deciding is compulsory.

Järjehoidja, (2015) observed people's interest in acting as the architect of the main characters life, however she herself, was not interested in participating. To her, observing the others and the story acted out on the stage, was more interesting than interacting.

Similar to the first review, Järjehoidja (2015) comments on the simplicity of the story, calling it almost schematic, and concludes that the story is only a tool to talk about the method, collective decision making. According to Järjehoidja (2015) the point of the play is "how" (are decision made) and not "what" (decisions are made).

4.4 OBSERVATIONS

In this section, I describe significant observations made during the performances on 19th of March and 21st of May, 2015. All observations are numbered, and later referenced to by the number. Observations that deal with

specific incidents are documented as video clips, and can be found via the link or by scanning the QR code provided in the text.

1) In the first application, the race, the interaction gesture was rotation identical to the interaction gesture learned in the introduction. However, the visuals were completely different. Despite this, people seemed to immediately understand how to use the interface. See "Clip 1".

2) During the puzzle (scene three), the audience continued to rotate the object even though the visuals had changed. Eventually, the audience deciphered how to control their piece of the puzzle, despite the confusion. See clip 3.

3) Every audience member tried using the TUI, meaning that the appearance itself did not discourage anyone by being overly complicated. At one table it was observed that the members would let the youngest control the TUI. See fig 23.

4) The audience did not take ownership of one single object, instead it seemed that each table shared the six objects between them. In some cases, one or two dominant audience

members took control of all of the objects. However, discussion at the tables were observed and it seems as though the six objects in general were considered the table's shared votes. See fig 24.

5) Although not a typical observation, it was observed once, that a member of the audience turned the object upside down, pattern facing up. This was not observed by me, but by one of the production team members.

6) In the first scene, the race (21st May, 2015), people were highly engaged, trying to win. See fig. 25.

7) In the show on 21st of May, one person made everyone else change their decision from Willem to Artur by sheer stubbornness, using Ott Karulin's described method (Karulin, 2015). When nearly all had changed to Willem, another member tried, using the same "stubbornness-strategy", to change everyone back to Willem, however, this was unsuccessful, as he was pressured by claps and yells from other audience members to give up and go with Willem. Engagement was observed in three forms. First type of engagement is exemplified in the two who tried to dominate the decision. Second was the people who, out of impatience, started to shout at the

“stubborn” person. Third level of engagement was seen from the people observing the drama that played out among the audience members. See “Clip 2”.

8) In the fifth application, (majority decides), the audience members quickly gave their vote where after they leaned back and waited for the time to run out, so the play could continue. E.g. The audience members at table two, placed all of their objects on the table within one minute and then sat back and talked casually for the remaining 30 seconds. See “Clip 4”.

9) In application seven, table consensus, where the audience members at each table are supposed to agree on a decision in order to vote, we observed that the audience did not immediately place the object. Instead they started discussing which decision they should make. Almost all tables came to an agreement at the end (act one, 21st May, 2015).

10) In the second act (21st May, 2015), the audience had understood the mechanics of the impulsive decision and were using strategy to push their decision through. By taking the object on and off, your vote becomes the last one registered, and thereby drags ev-

eryone else in that direction. Originally, this function was not intended, but as we learned how the bug worked, we decided to keep it. During this application, most of the audience members were highly engaged, clip 5. 11) Finally we observed that in the second act, the audience would almost always choose the opposite of what was decided in the first act, (which was also noted by Karulin, O. 2015). In the screenshots of the applications in use (see fig. 22), first and second act, 21st of May 2015, it is seen that in the last scene of act two, calculation, some people were still trying to reach the sum. However, someone must have tried to disrupt the collective’s chance of success, as the audience did not manage to make the numbers equal the sum.

In application seven, table consensus, more tables disagreed in second act, however the majority decided that they wanted the character to not to continue to university, opposite of what was decided in act one (seen in the second row of screenshots).

4.5 ANALYSIS

In the analysis, I mainly focus on which behaviours were observed (emerging interaction due to the IxD) and reflect on these through two lenses, affor-

dance and agency, as presented in the background study.

4.5.1 AFFORDANCE

Two main findings regarding the affordance of the interface were found from the collected data. First of all, we assumed the understanding of how to use the objects was linked to the visual feedback, and consequentially if this changes, the audience would also understand that the interaction gesture changes. However, scene one, which has a radically different form of visual feedback compared to the main, the matrix, did not cause any confusion. Audience members immediately started rotating the objects, as learned through the introduction application. Likewise, the different visual in the application of scene three, the puzzle, did not cause the audience members to think that the interaction gesture had changed.

Following these observations the affordance of the interface must be linked to the physical properties of the TUI and not the visual feedback provided. Although it is possible as a property of the interface to utilise different gestures, it will cause confusion if gesture changes in the middle of a session, e.i. a theatre play. In my view, the main limitation of the TUI is that

00:06

Enamus:
Jähtub enamuse tahe

Kas Willem kolib ema ja Niklasega
Rootsi või jääb isaga Eestisse?

1	2	3	4	5	6	7	8	9	10	11	12
A	■	■	■	■	■	■	■	■	■	■	■
B	■	■	■	■	■	■	■	■	■	■	■
C	■	■	■	■	■	■	■	■	■	■	■
D	■	■	■	■	■	■	■	■	■	■	■
E	■	■	■	■	■	■	■	■	■	■	■
F	■	■	■	■	■	■	■	■	■	■	■

23 49

■ Rootsi
■ Eesti

03

Enamus:
Jähtub enamuse tahe

Kas kolib ema ja Niklasega
Rootsi või jääb isaga Eestisse?

1	2	3	4	5	6	7	8	9	10	11	12
A	■	■	■	■	■	■	■	■	■	■	■
B	■	■	■	■	■	■	■	■	■	■	■
C	■	■	■	■	■	■	■	■	■	■	■
D	■	■	■	■	■	■	■	■	■	■	■
E	■	■	■	■	■	■	■	■	■	■	■
F	■	■	■	■	■	■	■	■	■	■	■

59 13

■ Rootsi
■ Eesti

00:03

Crupeeritud üksmeel:
tulimusele omavad mõju vaid nende
laudkondade häälled, mis saavutavad oma
otsuse täieliku üksmeelse

Kas Willem läheb ülikooli?

1	2	3	4	5	6	7	8	9	10	11	12
A	■	■	■	■	■	■	■	■	■	■	■
B	■	■	■	■	■	■	■	■	■	■	■
C	■	■	■	■	■	■	■	■	■	■	■
D	■	■	■	■	■	■	■	■	■	■	■
E	■	■	■	■	■	■	■	■	■	■	■
F	■	■	■	■	■	■	■	■	■	■	■

■ Jah
■ Ei

01

Crupeeritud üksmeel:
tulimusele omavad mõju vaid nende
laudkondade häälled, mis saavutavad oma
otsuse täieliku üksmeelse

Kas läheb ülikooli?

1	2	3	4	5	6	7	8	9	10	11	12
A	■	■	■	■	■	■	■	■	■	■	■
B	■	■	■	■	■	■	■	■	■	■	■
C	■	■	■	■	■	■	■	■	■	■	■
D	■	■	■	■	■	■	■	■	■	■	■
E	■	■	■	■	■	■	■	■	■	■	■
F	■	■	■	■	■	■	■	■	■	■	■

■ Jah
■ Ei

00:06

Viimase hetke impuls:
Willem peab otsustama, kas
keelatud lüürid on tema jaoks.
Keera oma nuppu ning proovi
ilmsilutada tabletti sõnoma
või sellest hoopis keelduma.
Willem otsus on esimene sõltuv
nupust, mida liigutatakse saalis
viimasena. Viimase hetke impuls
ei mõnusa liigutatud nuppu
klüub endaga kaasa ka kõik teised.
Kas Willem paneb tabletti suhu?

1	2	3	4	5	6	7	8	9	10	11	12
A	■	■	■	■	■	■	■	■	■	■	■
B	■	■	■	■	■	■	■	■	■	■	■
C	■	■	■	■	■	■	■	■	■	■	■
D	■	■	■	■	■	■	■	■	■	■	■
E	■	■	■	■	■	■	■	■	■	■	■
F	■	■	■	■	■	■	■	■	■	■	■

■ Paneb
■ Ei pane

01

Viimase hetke impuls:
peab otsustama, kas
keelatud lüürid on tema jaoks.
Keera oma nuppu ning proovi
ilmsilutada tabletti sõnoma
või sellest hoopis keelduma.
Willem otsus on esimene sõltuv
nupust, mida liigutatakse saalis
viimasena. Viimase hetke impuls
ei mõnusa liigutatud nuppu
klüub endaga kaasa ka kõik teised.
Kas paneb tabletti suhu?

1	2	3	4	5	6	7	8	9	10	11	12
A	■	■	■	■	■	■	■	■	■	■	■
B	■	■	■	■	■	■	■	■	■	■	■
C	■	■	■	■	■	■	■	■	■	■	■
D	■	■	■	■	■	■	■	■	■	■	■
E	■	■	■	■	■	■	■	■	■	■	■
F	■	■	■	■	■	■	■	■	■	■	■

■ Paneb
■ Ei pane

01

Kalkulatsioon:
Et oma korteri maha
müües, tuleb piisavalt
Oma nuppu pöörates saad
mäbrata oma liidetava suurust.
Kõrreimäik areastub juhul, kui
kõikide liidetavate summaks
tulab 438

1	2	3	4	5	6	7	8	9	10	11	12
A	2	9	6	9	9	9	9	9	8	9	9
B	7	5	5	9	3	9	3	0	6	1	9
C	9	0	6	9	7	9	0	9	9	5	7
D	2	9	4	9	9	8	9	8	4	6	5
E	5	8	9	9	9	1	3	4	2	7	
F	9	8	4	9	7	9	5	1	9	9	9

=424

Kui Willem müüb korteri, saab ta lubatavaks. Kui ei müü, jääb ta Eestisse.

01:05

Kalkulatsioon:
Et Willem oma korteri maha
müües, tuleb piisavalt
Oma nuppu pöörates saad
mäbrata oma liidetava suurust.
Kõrreimäik areastub juhul, kui
kõikide liidetavate summaks
tulab 438

1	2	3	4	5	6	7	8	9	10	11	12
A	7	6	2	5	5	6	8	3	9	7	9
B	7	4	1	9	4	9	9	4	7	2	7
C	9	5	5	9	4	5	7	7	9	9	8
D	8	3	8	9	6	1	9	5	3	8	8
E	7	3	2	0	7	8	1	4	9	8	5
F	5	9	4	7	4	8	9	9	6	8	8

=438

Kui Willem müüb korteri, võtab ta aja maha ja läheb
õnnevalimisele. Kui ei müü, jääb ta piiratud
sõbraga.

FIGURE 22

Screenshots from the final moments of the decisions making phases from first and second act, 21st May, 2015. First act are seen in left column, second in second column.



FIGURE 23

Audience members let the child control their piece of the puzzle, May 21st 2015, scene three act one.



FIGURE 24

Audience members sharing the six objects for voting, application of scene seven. 19th of March 2015.



FIGURE 25

Audience members racing each other during the application of scene two act one March 19th 2015

we can not exploit the full potential, as we must have a unified way of interacting throughout a session. With a GUI, the affordance can not be linked to any physical property and must therefore depend on the visual feedback, which would be changeable in the middle of a session. The physicality of the TUI does not let us change the affordance of the interfaces once established in the introduction.

A solution could be to create differently shaped objects which would allow multiple gestures, one for each shape. E.g. a square-shaped object for x-y gesture based applications, and the round for rotation gesture based applications (the fiducial markers can easily be attached to any object, that could then be used on the tables). On a note, this is exactly the solution used to utilise multiple interaction gestures in the original appropriation of the technology used by the project *Reactable* (Jorda et al. 2003).

Secondly, we imagined that each participant would take ownership of one object, seeing that as their vote. However this did not happen. Rather the objects at the tables were in most cases considered to be shared between the audience members seated at that

table. The reason for using the tables to begin with, was the tables natural affordance of being a shared surface, which then also transferred to the objects of the interface. The interface then succeeded in being sharable as default, which unexpectedly extended to the objects at the tables. Although unexpected, this is not considered to be a problem in the context of the play. However, for further usage of the table interfaces, as e.g. a debate tool where the objective is to give each participant the possibility of expressing their opinion to give a democratic overview of the collective opinion (the point being that the mood of the collective is not dominated by the loudest participant), it is necessary to address this issue.

On a final note, from the questionnaires I can conclude that overall, most people did understand how to use the interface for all ten applications (nine voting application plus the introduction).

4.5.2 WHICH AGENCY?

In this section I will reflect on the agency provided. First I compare the observed behaviours from the applications of the three categories via the observations and statements from the interview and the reviews. Then I

argue which applications, according to Murray (1998), provide agency and which do not. After this, I compare aspects of *Accidental Lovers* (Tuomola, 2006) that, according to Ursu, et al. (2008) enables the micro and macro level agency in *Accidental Lovers* (Tuomola, 2006), with the IxD for AD.

These reflections of how and why some applications provide agency are compared with the observations and findings on audience behaviour. Through this I gain an understanding of which agency was provided, and more importantly how this manifests itself in the observed audience behaviour. Finally, I wrap up by comparing the necessary relationships between the different kinds of agency and user behaviour.

The decision of the name was ultimately unimportant for the story of the play. Despite this, people were following the development of the decision process, unlike during other voting mechanisms (e.g. majority vote), where they were just leaning back and talking, supposedly about unrelated things, illustrated in fig 26.

In majority voting (application of scene five and nine), the individual's action does not have any affect on the

collective. If someone votes for Sweden, there is nothing anyone can do about it other than voting for Estonia if they disagree.

Other mechanisms, such as consensual, calculation and puzzle, offers the individual the option of either collaborating or disrupting the collective's aim of success (reaching consensus, solving the puzzle or adding up to the sum). E.g. if someone moves their piece of the puzzle to a different corner, the other tables must react. This situation can be observed in clip 6. Likewise, if someone holds their vote on Willem, the rest must decide if they should cave in, or start shouting at that someone obstructing consensus. In these, the individual's action affects the collective's action and vice versa. As noted by Varm (2015), and observed in observations 6, 7 and 8, the most interesting and engaging decision mechanisms were the ones where the audience was asked to collaborate or compete, such as the calculation, the puzzle or the race.

Following these observations I conclude that applications where the individual is dependent on the collective's action and vice versa, were more interesting and engaging for the audience to participate in.

As written earlier, according to Murray (1998) agency is, "the satisfying power of taking meaningful action and see the results of our decisions and actions." (p. 126). Meaning that agency is only present when the user have control of their own actions, and these actions have meaningful influence on the unfolding events.

Viewing AD through Murray's definition of agency (1998), only the applications that allow the individual to affect the collective, provide agency for the individual as their actions does affect the collective and ultimately what decision will be made. These are the ones belonging to either of the categories *collaboration* or *competition*. Although not all can take control of the decision, each audience member has the possibility to dominate the decision. These applications creates a situation that is closer to a multiuser game environment, which according to Murray (1998) provides agency for all participant both looser and winner, exactly because each participant has the ability to win.

As previously concluded the application of the categories discussed here were also the ones creating the highest engagement and interest from the audience.

From this I conclude that the behavioural manifestation of Murray (1998)'s agency is a higher level of engagement from the audience, in relation to applications that does not give the individual that power Murray (1998)'s agency requires.

In *Accidental Lovers* (Tuomola, 2006), micro level agency is provided by visualising the individual viewers text messages and animating the words of these, via voiceover or sound. Macro level is only present at specific times during the show where the audience' collectively is given power over an plot-altering decision.

The macro level agency is present, like in *Accidental Lovers* (Tuomola, 2006), only at specific moments of the play, more specifically, when the time runs out and the audience has made their decision. At this moment, the direction of the plot is decided. This moment was noted by Nõu (2015) to differentiate itself from traditional non-interactive plays, as the audience members would cheer or 'booh at the plot altering decision.

In AD, an essential part of the IxD is to let the audience members see their own input in relation to the collective. In the time of the voting phase, the



FIGURE 26

Scene two, act one, 19th April 2015. Audience members are observing the decision making process unlike as seen in scene five, act one, 19th April, 2015. As seen, all the members at the visible table have put their vote already. Now they are waiting for the time to run out so the show can continue. The audience members are discussing something supposedly unrelated to the show.

audience gets a relation to the other members of the hall via this visual feedback. The audience would not be able to follow the decision process if the visual feedback had not been there. Consequentially, the observed behaviours would not have happened.

Unlike in *Accidental Lovers* (Tuomola, 2006), the individual audience input is not obviously linked to the story. In *Accidental Lovers* (Tuomola, 2006), the individual text messages generate the voiceover, expressing the internal thoughts of the characters. In AD, the characters are sitting passively on the stage while the audience are making the decision. The internal thoughts of the actors, as a result of the audience's input, is left for the imagination of the viewers...

In *Accidental Lovers* (Tuomola, 2006), the audience is not co-located, and their only interaction with the show goes through the text-messages. In the text messages they are allowed to write whatever comes into their mind. In AD, the co-location enables the audience to communicate and interact with each other. Through this interaction they have (micro)agency to say anything and do (almost) anything, definitely setting the mood of the

stage of the audience! However, their actual input to the performance is limited through the options available from the decision mechanism.

If the action of the play is only considered to be the action that happens on stage (between the actors, as in Tuomola (2006)'s *Accidental Lovers*), micro-agency can not be said to be present. However, In my view, the most interesting part of the action happens between the audience members in the decision making phase. If this is considered part of the action of the play itself, then the audience members definitely do have micro level agency as they first of all set the mood of the play, and secondly, because their input to the collective decision are visualised through the visual feedback of the applications illustrating the collectives 'mood'.

If micro agency can be said to be present in all scenes, it is clear that even the micro level, although it provides a kind of agency to all participants, does not engage people at the same level as when each participant are offered the possibility of influencing the collective's action, as previously discussed.

Nevertheless, the micro level agency does make all participants input relevant as it visualises the individuals contribution to the collective. Furthermore, without the visualisation, it would not be possible to provide Murray (1998)'s agency, as this visual feedback, in the case of all applications for AD, is essential for enabling both the collaborative and competitive elements of the application previously discussed. The visual feedback which is a requirement of the micro level agency is also essential for enabling Murray (1998)'s agency.

Likewise, the macro level agency, the collective's decision, is also a requirement for Murray (1998)'s agency. This follows by the fact that if there were no collective plot-altering decisions to be made, there is no agency for the collective, and therefore there can not be any for all individual either.

Summarising the above; the play provides agency of multiple kinds that each engage the audience at different levels. Micro level agency, as was present even in the majority-vote applications were the least engaging, however, the requirements for micro level agency are also essential for providing Murray (1998)'s kind of agency.

Macro level agency would be possible without micro-level agency. If all audience members in secret pushed a button or in some way placed their votes, the collective plot altering decision would be there without micro-level agency.

The macro level engages audience at the moment the action is executed, as the audience applause, 'booh' or cheer at the decision being made.

Finally, Murray (1998)'s agency is only present in the applications where the individual's action influences or is influenced by the collective. These applications proved to be the most successful in engaging the audience.

In the case of AD, micro level and macro-level agency are essential elements of providing Murray (1998)'s agency in a multiuser co-located environment, however, the presence of these, does not ensure it.



**Designing tangible interfaces for collective
decision making in interactive theatre**

5. CONCLUSIONS

The conclusions sum up all of the findings in the thesis and answers my research questions:

A. How can I design for audience participation in an interactive theatre play?

B. What behaviours emerge among the audience members due to the interaction design?

5.1 HOW TO DESIGN

The project gives insights into how to create an inclusive design that encourages communication between audience members via interconnected tangible user interfaces through various applications.

In the context of the theatre hall described in the introduction, there were three main reasons for creating a table-top TUI to mediate audience participation.

First, making the interface on a touch-screen device, would divide audience attention between the two screens (visual inputs), the stage and the touch-screen device. Instead, the tangible property of the input device enables the user to control it without looking at the interface itself and thereby disrupting the audience's attention on the stage. Second, the table-top TUI provides an interface that by default is a shared space, the table. Alternatively, either each room would have a touch-screen device (e.g., a tablet), possibly resulting in one person taking control, or each audience member would participate through personal devices, (e.g., their mobile phones) separating the audience members. The third reason is one only based on my personal opinion. The

TUIs creates a new experience for the audience, fitting of a theatre hall, by being unique. Thereby not reminding the audience members of any device from their everyday life.

Although the interface utilises an array of hardware and software to run, the appearance itself is very simplistic. The simplicity serves two purposes.

First of all, the simplicity of the interfaces' physical appearance, a square and six round metallic objects, makes them versatile enough to support various applications for future events at the theatre. Secondly, it ensures that the interface is inviting as it appears uncomplicated to use. However, as seen in *12 Movements* (Veski, 2014), even though they appear simple to use, that is not necessarily the case. It depends on which applications the TUIs are used with and in which context.

The collective visual feedback serves two purposes for the play. First of all, it lets the individual know, how their input influences the whole, and most importantly lets the audience members see the decision making process, encouraging them to discuss their decisions.

The TUIs and the visual feedback becomes a catalyst for inter-audience interaction. Changes in the visual feedback did not affect the audience's understanding of how to use the TUI. The two mechanisms, race and puzzle, has radically different visuals from the usual matrix, one you are supposed to rotate (race), the other you are not (puzzle). In both cases, the audience assumed they were supposed to rotate the objects, as they had learned through previous applications despite the changed visual feedback.

As seen in both the observations and in the findings from the previous play changing the interface's behaviour, the interaction gesture, causes confusion. As the physical properties of the interface do not change, it gives no clue to whether the interaction gesture has changed.

The different voting mechanics were uncomplicated to engage with as the interaction gesture remained the same through all applications, but the puzzle, which as observed, caused confusion.

The TUIs themselves are extremely versatile, as the fiducial markers can be attached to anything, and the interface itself can be used to run any

imaginable application. Therefore, the physical setup itself holds great potential for further explorations. The new of the project is having twelve interconnected TUIs, connecting people in smaller groups at one table and throughout the whole theatre hall via the TUIs.

5.2 EMERGING BEHAVIOURS

We observed different kinds of engagement from the audience. While some were highly engaged in the voting phase, trying to push their opinion through, others were more interested in observing the decision process.

In the view of Ursu, et al. (2008), the play does offer both micro and macro level agency similar to the TV series *Accidental Lovers* (Tuomola, 2006). The distinction is that the majority of the micro-level agency also occurs in-between audience members as discussion, due to the audience being co-located.

In the decision making phase the individual user has more control in the collaborative or competitive scenes, as they, in collaborative applications, can choose to either collaborate or disrupt the collective's pursuit of success, and in the competitive, to win through skill. We observed a higher

level of engagement during these applications, and as noted my Varm (2015), these types of applications were also perceived as the most interesting.

Viewing AD through Murray's definition of agency (1998), only the applications that allow the individual to affect the collective, provide agency for the individual. These are the ones belonging to either of the categories "collaboration" or "competition".

From this I conclude that the applications where the individual's action is influenced, or influences, the collective's, and thereby provide a higher level of agency, also created a higher level of engagement and in the end were perceived as more interesting.

In relation to the discussion in the beginning on the reduced agency in the many-to-one context, the IxD succeeds in the way that this play would actually not be interesting at all if it was watched by only one person. Therefore, the IxD, in my opinion, leverages the potential of the co-located audience by creating mechanisms that, in contrast to the other shows described, is ultimately better because multiple people are participating. If there would only be one

audience member, the performance would be pointless.

The most important success of the IxD for AD was its ability to encourage different behaviours from the audience; from collaboration, competition to discussion. By this, the voting mechanisms added a layer to the story by shaping the audience behaviour and experience of the play.

5.3 FUTURE PERSPECTIVES

Currently I am developing an application on the basis of the findings from the play, enabling the theatre team to create and customise an application sequence themselves for other purposes. E.g., to mediate a debate regarding the schooling system in Estonia where the members of the debate will use the TUIs to assess which values of the schooling system they regard being of highest importance. This gives the participant possibility of expressing their views on the matter, thereby not letting the mood of the audience be set by the loudest participant. As mentioned, the issue of making each participant take ownership of one object is something that will be addressed in the future for these kinds of usages. One solution is to hand out the objects to the participants as they enter the theatre hall, and following seating them at their table.

This application enables the theatre group Cabaret Rhizome to use the findings on audience behaviour for purposes beyond the scope of the play AD.

5.4 MAIN LEARNING

The thesis gives insights into how to design for multiple participant, how to engage a larger audience and how different kinds of decision mechanism can be explored for developing an audience participation form that facilitates and leverages the potential of multiple co-located audience members in the context of interactive theatre. Understanding interactions through the concept of agency gives me an interesting tool to assess user engagement with various applications. In the context of creating interesting user experiences, agency can be understood as the feeling the user gets when he is able to perform meaningful actions in the designed environment. To create a meaningful user experience via interaction design letting the user being able to interact is not enough.

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Appendix I

NAME

TIME

**INFLUENCE ON THE
OUTCOME OF THE DE-
CISION**

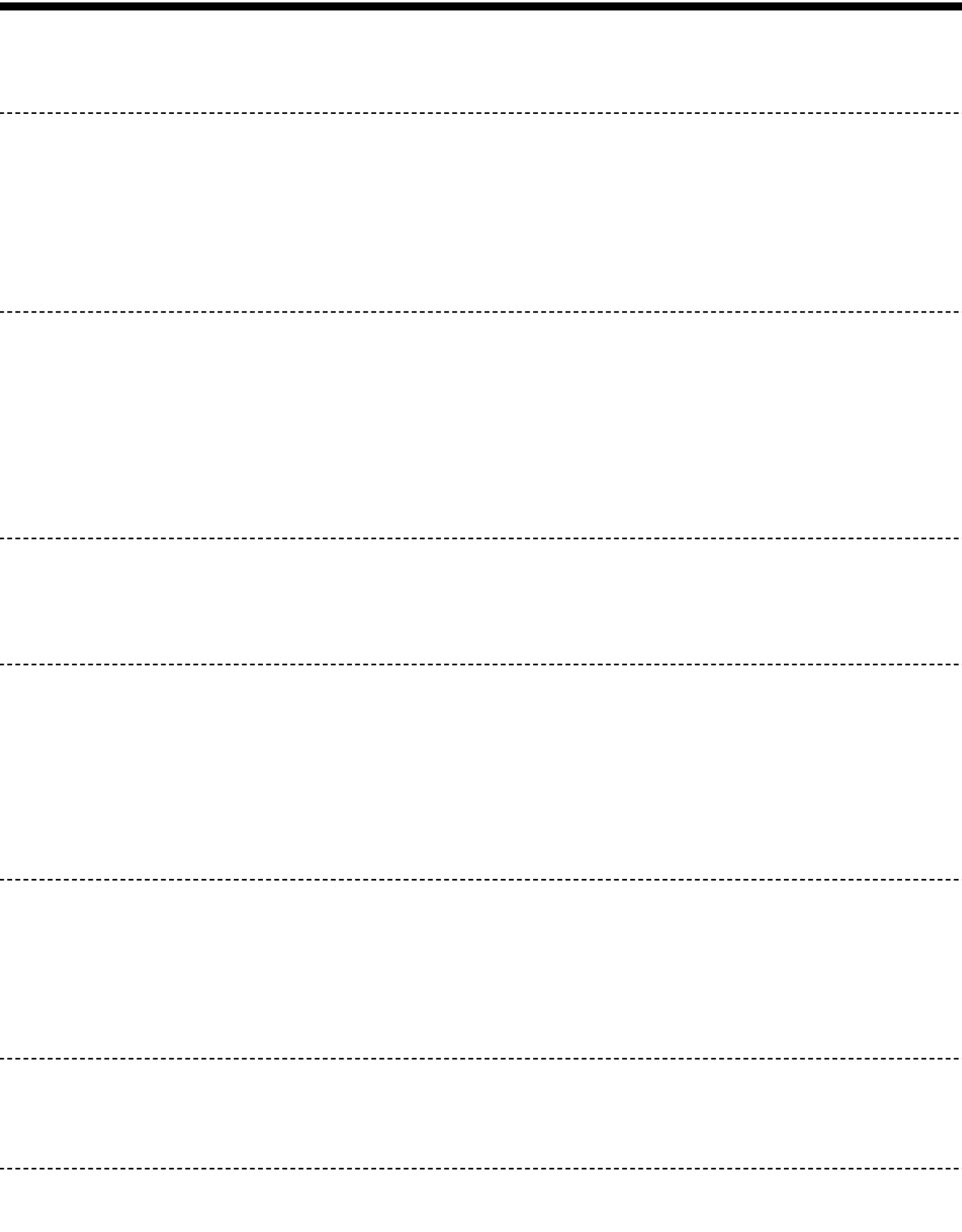
VISUAL FEEDBACK

INTERACTION GESTURE

VOTING MECHANISM

**RELATION BETWEEN
THIS MECHANISM AND
STORY**

LINK



**CONCEPTION:
THE RACE**

**NAMING
CONSENSUAL**

**UPBRINGING
THE PUZZLE**

Unlimited time

Unlimited time

5 minutes

Whichever sperm cell reaches the centre of the egg wins the race. This has no influence on the rest of the play.

The outcome decides the characters name. In practice, the name does not have influence on the story other than setting the name of the character.

The audience "decides" whether or not the boy will be allowed to put on his jumpsuit by himself, or if the mother will do it for him, influencing the characters ability to be independent later in life.

The visuals consists of seventy-two X and Y "sperm cells" and circles representing an egg.

The visual consists of the matrix, using lines instead of colours.

The visuals consists of a twelve geometrical puzzle pieces and a frame.

Rotation, all objects

Rotation, all objects

Moving object "A" in both x and y direction

Each participant races with their sperm cell towards the centre. In the first part of the race they compete internally at the table, next part the winners from each table races each other to the centre. The mechanics are made so that only Y has the potential to win

The decision is only final when all the lines are parallel, meaning everyone agrees on a name. The lines makes it easier, compared to colours, to see when there is full consensus.

Each table controls one piece of the puzzle. They must solve the puzzle, fit all the pieces inside the frame, before the time runs out.

The visuals of the scene strongly suggest a link to the story, by visualising the fertilisation of an egg.

Naming a child is usually a consensual decision, made between the parents, therefore the audience must agree.

The audiences ability to solve the puzzle visualises the logic of the boy, as he must prove himself worthy of making his own decisions.

**CHOOSING SCHOOL
THE QUIZ**

**DIVORCE OF THE PARENTS
MAJORITY DECIDES**

45 sec for each question, 1 minute for the final vote.

1 minute and 30 seconds

The outcome decides whether the boy will go to public or private school. This decision has two parts, the quiz and the decision.

The outcome decides if the boy should move to Sweden with his mother and the new boyfriend, or stay in Estonia with his father.

During the first part, the quiz, each participants square is visualised by a number, showing how many points they have gathered in the quiz, and a colour, showing their answer to the quiz question. Second part, their power (the amount of points) is shown as the size of the coloured part of their squares. The colour visualises their decision. The second part visualises the collective decision by making the most powerful ones visually most dominant in the matrix.

The visuals consists of the matrix and the results bar.

Rotation, all objects

Rotation, all objects

The audience first answer five questions that determines their power in the decision. In the second part, they use that power to influence the collective decision.

The majority decides the outcome.

The decision is taken on behalf of the parents, influenced by the opinion of the most knowledgeable one, the teacher.

The decision is taken on behalf of the main character, as a logical decision, where the character would list pros and cons and make a decision based on the lists.

**TEEN YEARS
IMPULSIVE DECISION**

**PRE-SCHOOL
TABLE CONSENSUS**

**DEATH OF THE FATHER
CALCULATION**

1 minute

1 minute and 30 seconds

2 minutes

The outcome of the scene decides if the boy should take drugs or not.

The outcome decides if the boy should continue to university or get a job.

The outcome decides if the main character should sell his, recently deceased, fathers apartment or not.

The visuals consists of the matrix and the results bar. The colours of the squares in the matrix are picked from a gradient between orange and blue with an outline of clear orange or blue.

The visuals consists of the matrix. The result bar consists of twelve squares that are either blue, red or empty.

The visuals consists of the matrix and the result bar, however each square has a number not a colour. The result bar has one static line and one moving line. The moving line shows the sum of the numbers in the matrix.

Rotation, all objects

Rotation, all objects

Rotation, all objects

The mechanics of the scene lets the one who changed his vote last, drag all others in his direction (blue or orange, meaning yes or no). The inner square, the gradient colour, shows how much they have been dragged towards the other side, the outline shows the participants original answer.

Each table has a vote in the decision, however, for the table to give a vote, all participants at the table must agree. If they agree, the square below their row in the matrix will be filled with either red or blue colour, depending on their decision.

The audience must make all their numbers add up to a given sum. The result bar gives feedback on how close they are at reaching the goal via the two lines.

The mechanics represents an impulsive decision made in stressful environment, where the last thought that enters your mind will determine your action.

It is a well informed and carefully considered decision, therefore, we ask the tables to discuss the decision internally, so they will have reasonable argument for their decision before voting.

The audience need to succeed so the main character will be able to sell his fathers apartment and fulfil his dream.

REWIND MAJORITY DECIDES

1 minutes

The outcome decides when in the life of the character, the second act will begin.

The visuals consist of the matrix with letters instead of colours. Each letter represents one of the previous scenes.

Rotation, all objects

The scene, or letter, that gets the most votes, will be the one where the second act starts from.

The letters A-G suggests a hierarchy. "A" represents going back to the beginning

Appendix II

QUESTIONNAIRE OSTUSE ANATOOMIA

Hi, my name is Karina Jensen and I am currently writing my thesis at Aalto University on the participation design of Otsuse Anatomia. It would be a great help for me if you would fill out following questionnaire regarding your experience of the play.

YOUR ROLE IN THE STORY

Which table were you seated at? _____

Did you participate actively in the votings?

- Yes
- No
- Sometimes
- I did not understand what I was supposed to do
If no, why not? _____

Overall, did you agree with the decisions made?

- Yes
- No

Did you consider your role in the story significant?

- Yes
- No
- Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
- The puzzle
- Private or Public school
- Moving to Sweden or Estonia
- Doing drugs or not
- Going to university or not
- Selling the apartment or not
- Selecting how far back you want to go back

What was interesting about this decision?

- It was a fun challenge
 - It was an interesting choice
 - The choice was significant to the story
- Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
- The puzzle
- Private or Public school
- Moving to Sweden or Estonia
- Doing drugs or not
- Going to university or not
- Selling the apartment or not
- Selecting how far back you want to go back

What was un-interesting about this decision?

- I did not feel like I had any influence on the outcome
 - I could guess the outcome
 - The choice was in-significant to the story
- Something else: _____

If you would be interested in giving an interview regarding your experience of the play, please write you email, and I will contact you, thank you very much!

QUESTIONNAIRE OSTUSE ANATOOMIA

Hi, my name is Karina Jensen and I am currently writing a thesis at Aalto University on the participation design of Ostuse Anatomia. It would be a great help for me if you could fill in the following questionnaire regarding your experience of the

YOUR ROLE IN THE STORY

Which table were you seated at? 1

Did you participate actively in the votings?

- Yes
- No
- Sometimes
- I did not understand what I was supposed to do if no, why not? _____

Overall, did you agree with the decisions made?

- Yes
- No

Did you consider your role in the story significant?

- Yes
- No
- Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
- The puzzle
- Private or Public school
- Moving to Sweden or Estonia
- Doing drugs or not
- Going to university or not
- Selling the apartment or not
- Selecting how far back you want to go back

What was interesting about this decision?

- It was a fun challenge
- It was an interesting choice
- The choice was significant to the story
- Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
- The puzzle
- Private or Public school
- Moving to Sweden or Estonia
- Doing drugs or not
- Going to university or not
- Selling the apartment or not
- Selecting how far back you want to go back

What was un-interesting about this decision?

- I did not feel like I had any influence on the outcome
- I could guess the outcome
- The choice was in-significant to the story
- Something else: _____

If you would be interested in giving an interview regarding your experience of the play, please write your email, and I will contact you, thank you very much!

QUESTIONNAIRE OSTUSE ANATOOMIA

Hi, my name is Karina Jensen and I am currently writing a thesis at Aalto University on the participation design of Ostuse Anatomia. It would be a great help for me if you could fill in the following questionnaire regarding your experience of the

YOUR ROLE IN THE STORY

Which table were you seated at? 1

Did you participate actively in the votings?

- Yes
- No
- Sometimes
- I did not understand what I was supposed to do if no, why not? _____

Overall, did you agree with the decisions made?

- Yes
- No

Did you consider your role in the story significant?

- Yes
- No
- Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
- The puzzle
- Private or Public school
- Moving to Sweden or Estonia
- Doing drugs or not
- Going to university or not
- Selling the apartment or not
- Selecting how far back you want to go back

What was interesting about this decision?

- It was a fun challenge
- It was an interesting choice
- The choice was significant to the story
- Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
- The puzzle
- Private or Public school
- Moving to Sweden or Estonia
- Doing drugs or not
- Going to university or not
- Selling the apartment or not
- Selecting how far back you want to go back

What was un-interesting about this decision?

- I did not feel like I had any influence on the outcome
- I could guess the outcome
- The choice was in-significant to the story
- Something else: _____

If you would be interested in giving an interview regarding your experience of the play, please write your email, and I will contact you, thank you very much!

Hi, my name is Karina Jensen and I am currently a thesis student at Aalto University on the participation design of Ostuse Anatomia. It would be a great help for me if you would fill in the following questionnaire regarding your experience of the play.

QUESTIONNAIRE OSTUSE ANATOOMIA

YOUR ROLE IN THE STORY

Which table were you seated at? 13

Did you participate actively in the votings?

- Yes
 No
 Sometimes
 I did not understand what I was supposed to do
 If no, why not? _____

Overall, did you agree with the decisions made?

- Yes
 No

Did you consider your role in the story significant?

- Yes
 No
 Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was interesting about this decision?

- It was a fun challenge
 It was an interesting choice
 The choice was significant to the story
 Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was un-interesting about this decision?

- I did not feel like I had any influence on the outcome
 I could guess the outcome
 The choice was in-significant to the story
 Something else: _____

If you would be interested in giving an interview regarding your experience of the play, please write your email, and I will contact you, thank you very much!

QUESTIONNAIRE OSTUSE ANATOOMIA

YOUR ROLE IN THE STORY

Which table were you seated at? 5

Did you participate actively in the votings?

- Yes
 No
 Sometimes
 I did not understand what I was supposed to do
 If no, why not? _____

Overall, did you agree with the decisions made?

- Yes
 No

Did you consider your role in the story significant?

- Yes
 No
 Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was interesting about this decision?

- It was a fun challenge
 It was an interesting choice
 The choice was significant to the story
 Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was un-interesting about this decision?

- I did not feel like I had any influence on the outcome
 I could guess the outcome
 The choice was in-significant to the story
 Something else: _____

If you would be interested in giving an interview regarding your experience of the play, please write your email, and I will contact you, thank you very much!

Hi, my name is Karina Jensen and I am currently writing a thesis at Aalto University on the participation design of Ostuse Anatomia. It would be a great help for me if you would fill in the following questionnaire regarding your experience of the play.

Hi, my name is Karina Jensen and I am currently writing my thesis at Aalto University on the participation design of Ostuse Anatomia. It would be a great help for me if you would fill out following questionnaire regarding your experience of the play.

QUESTIONNAIRE OSTUSE ANATOOMIA

YOUR ROLE IN THE STORY

Which table were you seated at? 6

Did you participate actively in the votings?

- Yes
 No
 Sometimes

I did not understand what I was supposed to do if no, why not? _____

Overall, did you agree with the decisions made?

- Yes
 No

Did you consider your role in the story significant?

- Yes
 No
 Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was interesting about this decision?

- It was a fun challenge
 It was an interesting choice
 The choice was significant to the story
Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was un-interesting about this decision?

- I did not feel like I had any influence on the outcome
 I could guess the outcome
 The choice was in-significant to the story
Something else: _____

If you would be interested in giving an interview regarding your experience of the play, please write you email, and I will contact you, thank you very much!

QUESTIONNAIRE OSTUSE ANATOOMIA

Hi, my name is Karina Jensen and I am currently writing my thesis at Aalto University on the participation design of Ostuse Anatomia. It would be a great help for me if you would fill out following questionnaire regarding your experience of the play.

YOUR ROLE IN THE STORY

Which table were you seated at? 10

Did you participate actively in the votings?

- Yes
 No
 Sometimes

I did not understand what I was supposed to do if no, why not? _____

Overall, did you agree with the decisions made?

- Yes
 No

Did you consider your role in the story significant?

- Yes
 No
 Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was interesting about this decision?

- It was a fun challenge
 It was an interesting choice
 The choice was significant to the story
Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was un-interesting about this decision?

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 I could guess the outcome
 The choice was in-significant to the story
Something else: _____

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NO

QUESTIONNAIRE OSTUSE ANATOOMIA

thesis at Aalto University on the participation design
Anatoomia. It would be a great help for me if you
following questionnaire regarding your experience

YOUR ROLE IN THE STORY

Which table were you seated at? 4

Did you participate actively in the votings?

- Yes
 No
 Sometimes

I did not understand what I was supposed to do

if no, why not? difficult to understand

Overall, did you agree with the decisions made?

- Yes
 No

Did you consider your role in the story significant?

- Yes
 No
 Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was interesting about this decision?

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 It was an interesting choice
 The choice was significant to the story
Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

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following questionnaire regarding your experience

YOUR ROLE IN THE STORY

Which table were you seated at? 12

Did you participate actively in the votings?

- Yes
 No
 Sometimes

I did not understand what I was supposed to do
if no, why not? _____

Overall, did you agree with the decisions made?

- Yes
 No

Did you consider your role in the story significant?

- Yes
 No
 Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
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 Selecting how far back you want to go back

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Something else: _____

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 The puzzle
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 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

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your experience of the play, please write you email, and I
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QUESTIONNAIRE OSTUSE ANATOOMIA

Hi, my name is Karina Jensen and I am currently writing a thesis at Aalto University on the participation design of Ostuse Anatoomia. It would be a great help for me if you would fill out the following questionnaire regarding your experience of the

YOUR ROLE IN THE STORY

Which table were you seated at? 3

Did you participate actively in the votings?

- Yes
 No
 Sometimes
 I did not understand what I was supposed to do if no, why not? _____

Overall, did you agree with the decisions made?

- Yes
 No

Did you consider your role in the story significant?

- Yes
 No
 Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was interesting about this decision?

- It was a fun challenge
 It was an interesting choice
 The choice was significant to the story
Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was un-interesting about this decision?

- I did not feel like I had any influence on the outcome
 I could guess the outcome
 The choice was in-significant to the story
Something else: _____

If you would be interested in giving an interview regarding your experience of the play, please write your email, and I will contact you, thank you very much!

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YOUR ROLE IN THE STORY

Which table were you seated at? 2

Did you participate actively in the votings?

- Yes
 No
 Sometimes
 I did not understand what I was supposed to do if no, why not? _____

Overall, did you agree with the decisions made?

- Yes
 No

Did you consider your role in the story significant?

- Yes
 No
 Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was interesting about this decision?

- It was a fun challenge
 It was an interesting choice
 The choice was significant to the story
Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was un-interesting about this decision?

- I did not feel like I had any influence on the outcome
 I could guess the outcome
 The choice was in-significant to the story
Something else: _____

If you would be interested in giving an interview regarding your experience of the play, please write your email, and I will contact you, thank you very much!

Hi, my name is Karina Jensen and I am currently working on my master's thesis at Aalto University on the participation in the play Anatomia. It would be a great help for me if you could complete the following questionnaire regarding your experience of the play.

QUESTIONNAIRE OSTUSE ANATOOMIA

YOUR ROLE IN THE STORY

Which table were you seated at? 3

Did you participate actively in the votings?

- Yes
 - No
 - Sometimes
 - I did not understand what I was supposed to do
- If no, why not? _____

Overall, did you agree with the decisions made?

- Yes
- No

Did you consider your role in the story significant?

- Yes
- No
- Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
- The puzzle
- Private or Public school
- Moving to Sweden or Estonia
- Doing drugs or not
- Going to university or not
- Selling the apartment or not
- Selecting how far back you want to go back

What was interesting about this decision?

- It was a fun challenge
 - It was an interesting choice
 - The choice was significant to the story
- Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
- The puzzle
- Private or Public school
- Moving to Sweden or Estonia
- Doing drugs or not
- Going to university or not
- Selling the apartment or not
- Selecting how far back you want to go back

What was un-interesting about this decision?

- I did not feel like I had any influence on the outcome
 - I could guess the outcome
 - The choice was in-significant to the story
- Something else: _____

If you would be interested in giving an interview regarding your experience of the play, please write your email, and I will contact you, thank you very much!

Hi, my name is Karina Jensen and I am currently working on my master's thesis at Aalto University on the participation in the play Anatomia. It would be a great help for me if you could complete the following questionnaire regarding your experience of the play.

QUESTIONNAIRE OSTUSE ANATOOMIA

YOUR ROLE IN THE STORY

Which table were you seated at? 5

Did you participate actively in the votings?

- Yes
 - No
 - Sometimes
 - I did not understand what I was supposed to do
- If no, why not? _____

Overall, did you agree with the decisions made?

- Yes
- No

Did you consider your role in the story significant?

- Yes
- No
- Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
- The puzzle
- Private or Public school
- Moving to Sweden or Estonia
- Doing drugs or not
- Going to university or not
- Selling the apartment or not
- Selecting how far back you want to go back

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 - It was an interesting choice
 - The choice was significant to the story
- Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
- The puzzle
- Private or Public school
- Moving to Sweden or Estonia
- Doing drugs or not
- Going to university or not
- Selling the apartment or not
- Selecting how far back you want to go back

What was un-interesting about this decision?

- I did not feel like I had any influence on the outcome
 - I could guess the outcome
 - The choice was in-significant to the story
- Something else: _____

If you would be interested in giving an interview regarding your experience of the play, please write your email, and I will contact you, thank you very much!

QUESTIONNAIRE OSTUSE ANATOOMIA

Hi, my name is Karina Jensen and I am currently writing my thesis at Aalto University on the participation design of Ostuse Anatoomia. It would be a great help for me if you would fill out the following questionnaire regarding your experience of the play.

YOUR ROLE IN THE STORY

Which table were you seated at? A

Did you participate actively in the votings?

- Yes
 No
 Sometimes
 I did not understand what I was supposed to do if no, why not? _____

Overall, did you agree with the decisions made?

- Yes
 No

Did you consider your role in the story significant?

- Yes
 No
 Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was interesting about this decision?

- It was a fun challenge
 It was an interesting choice
 The choice was significant to the story
Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was un-interesting about this decision?

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 I could guess the outcome
 The choice was in-significant to the story
Something else: _____

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YOUR ROLE IN THE STORY

Which table were you seated at? B

Did you participate actively in the votings?

- Yes
 No
 Sometimes
 I did not understand what I was supposed to do if no, why not? _____

Overall, did you agree with the decisions made?

- Yes
 No

Did you consider your role in the story significant?

- Yes
 No
 Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was interesting about this decision?

- It was a fun challenge
 It was an interesting choice
 The choice was significant to the story
Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was un-interesting about this decision?

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 The choice was in-significant to the story
Something else: _____

If you would be interested in giving an interview regarding your experience of the play, please write your email, and I will contact you, thank you very much!

QUESTIONNAIRE OSTUSE ANATOOMIA

thesis at Aalto University on the participation design
Anatoomia. It would be a great help for me if you wo
following questionnaire regarding your experience c

YOUR ROLE IN THE STORY

Which table were you seated at? 10

Did you participate actively in the votings?

- Yes
 No
 Sometimes
 I did not understand what I was supposed to do
if no, why not? _____

Overall, did you agree with the decisions made?

- Yes
 No

Did you consider your role in the story significant?

- Yes
 No
 Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

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 It was an interesting choice
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Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
 The puzzle
 Private or Public school
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 Selecting how far back you want to go back

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QUESTIONNAIRE OSTUSE ANATOOMIA

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thesis at Aalto University on the participation des
Anatoomia. It would be a great help for me if you
following questionnaire regarding your experien

YOUR ROLE IN THE STORY

Which table were you seated at? 6

Did you participate actively in the votings?

- Yes
 No
 Sometimes
 I did not understand what I was supposed to do
if no, why not? _____

Overall, did you agree with the decisions made?

- Yes
 No

Did you consider your role in the story significant?

- Yes
 No
 Sometimes

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was interesting about this decision?

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 It was an interesting choice
 The choice was significant to the story
Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

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QUESTIONNAIRE OSTUSE ANATOOMIA

Hi, my name is Karina Jensen and I am currently writing my thesis at Aalto University on the participation design of Ostuse Anatomia. It would be a great help for me if you would fill out following questionnaire regarding your experience of the play.

YOUR ROLE IN THE STORY

Which table were you seated at? 2

Did you participate actively in the votings?

- Yes
 No
 Sometimes

Did you consider your role in the story significant?
 Yes
 No
 Sometimes

If no, why not? _____

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was interesting about this decision?

- It was a fun challenge
 It was an interesting choice
 The choice was significant to the story
Something else: _____

Which decisions do you remember as least interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was un-interesting about this decision?

- I did not feel like I had any influence on the outcome
 I could guess the outcome
 The choice was in-significant to the story
Something else: _____

IT WAS THE LAST DECISION
IN THE STORY

If you would be interested in giving an interview regarding your experience of the play, please write your email, and I will contact you, thank you very much!

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Hi, my name is Karina Jensen and I am currently writing my thesis at Aalto University on the participation design of Ostuse Anatomia. It would be a great help for me if you would fill out following questionnaire regarding your experience of the play.

YOUR ROLE IN THE STORY

Which table were you seated at? _____

Did you participate actively in the votings?

- Yes
 No
 Sometimes

Did you consider your role in the story significant?
 Yes
 No
 Sometimes

If no, why not? _____

MOST AND LEAST INTERESTING DECISIONS

Which decisions do you remember as most interesting?

- Naming the character
 The puzzle
 Private or Public school
 Moving to Sweden or Estonia
 Doing drugs or not
 Going to university or not
 Selling the apartment or not
 Selecting how far back you want to go back

What was interesting about this decision?

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 It was an interesting choice
 The choice was significant to the story
Something else: _____

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- Naming the character
 The puzzle
 Private or Public school
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