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Nya begrepp för verktyg för rapportering av känslor och aktiviteter i pervasiva spel

Colors, Faces and Illustrations

New concepts for tools for reporting emotion and activity in a pervasive game

Zeynep Ahmet

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Hans Holmgren

Informatik/Systemvetenskapliga programmet
Institutionen för ekonomisk och industriell utveckling

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Zeynep Ahmet

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Supervisor
Hans Holmgren

Linköpings universitet

The Institution of Economics and Industrial Development

Abstract

Players of video games often find themselves at a set location, in a room or a game hall, playing alone, with family or friends, even both, or maybe with strangers over the Internet. The game becomes intense when the player reaches a crucial moment or event. Such moments might be when the player has reached a new level, received a new piece of equipment, found the last hidden key or is about to kill the last “boss” in the game to win a war. The emotional state of the player changes as the game proceeds, where excitement can be closely followed by frustration or surprise. Studying players of such games has become easier when new technology give us the opportunity to study them closely. By the use of biosensors, cameras and close observations, observers can collect a rich amount of quantitative and qualitative data.

But the complexity increases when the players are players of a *pervasive game*. Pervasive games are games that expand socially, spatially and temporally. They are lived experiences, where players might experience the more (or less) intense moments in the game when they e.g. find themselves in a dark alley chasing a fictional character in the streets of Sheffield (UK), on a bike recording memories and thoughts in a “hidden” location outside central London (UK) or running around downtown, trying to map places of interference on the Internet in Düsseldorf (Germany). The players are more or less on the loose, which minimizes the chances to carry out close observations.

In this thesis I will report on a design project focusing on finding new concepts in capturing different aspects of the game experiences. By focusing on game play experience, I have chosen to go beyond the traditional usability evaluation methods used in present CHI practice and focus on representations for different aspects of the game experience. I will describe the design rationale and process in choosing concepts as well as presenting the resulting design proposals for two hand-held tools for self-reporting. The designs for the tools will be based on findings from a conducted user study, where representations for game play experiences will be tested by potential users. At the end of this thesis I will discuss the results from my design process as well as lessons learnt from the project.

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"What is important is to keep learning, to enjoy challenge, and to tolerate ambiguity. In the end there are no certain answers"

- Martina Horner

Chapter 1

In this chapter I will introduce the background and aim for my thesis, as well as the problem formulation and research questions I have. I will also present the methods I have used and the approach I have had when working with my project.

1 INTRODUCTION

Pervasive games are games that extend beyond a given time and place and set of players to merge with real life. They are typically played in vastly distributed areas in the physical world, and they can sometimes extend over long periods of time. Pervasive games have a variety in player participation such as individual games (single-player mobile phone games) to massive multi player games, engaging thousands of players around the world simultaneously. They also differ in aesthetic, ranging from reality fiction and performing arts to being more artistic and political. Some games can be played at any time of the day for the sake of killing a few minutes, while others last for several days or even months. Some of the games use high-end technology, whilst others use no technology at all. The games differ in aesthetic, style and duration depending on the levels of *spatial*, *temporal* and *social* expansion. A pervasive game that is spatially expanded has no restrictions to the playground. The playground can be on the streets, in cyberspace or across the globe. Typically for spatially expanded games is the use of technology to keep track of the players, as well as infusing a feeling of an alternate reality. Temporally expanded games are games that become available to players in their everyday lives, to some extent controlling when the act of play occurs. Some games can be played at any time of the day, while others demand the players' attention whenever the game changes state (Montola et al, 2009). Socially expanded games are games that invite players and bystanders to participate in the game in fixed or rather ambiguous manner. A typical way of inviting players is through the use of *rabbit hole invitations*, where players might find an "invitation" to the game in the form of strange clues on a website or in a flyer handed out on the streets (Montola & Waern, 2006).

The gameplay experience from such games can thus be defined as a combination of the player's sensations, thoughts, feelings, actions and meaning making in a gameplay setting. It is not a result of specific elements in a game, but something that emerges in the interaction between the game and the player. Players not only engage in ready-made gameplay, but also actively take part in constructing the experience as they bring with them their desires, anticipations, and previous experiences and interpret and reflect the experience in that light. Experience in this manner is also largely context dependent, as the same activity can be highly pleasant in some contexts, but unattractive in other settings (Ermi & Mäyrä, 2005). Evaluating such experiences in a pervasive gameplay setting is far from simple. In a pervasive game, the players are more or less on the loose, which minimizes the chances to carry out close observations. Furthermore, pervasive games are typically not web services or applications running on a computer or mobile phone. If the game technology supports some but not all of the game related activities, technology logs are not sufficient to capture what players actually do. If players move over large areas it becomes difficult to capture their activities on video or audio. Furthermore, the long duration of game sessions can make it hard for players to even remember what they felt and did early on in the game.

Evaluation methods typically used with traditional HCI (Human – Computer Interaction) have a cognitive science of psychology and human factors aspects of evaluation, including evaluation methods such as interviews, questionnaires and close observations. These types of methods however don't suffice enough when it comes to evaluating actual experiences during game play (Mandryk et al, 2006). With the emergence of new technology that is ubiquitous and available as a part of our everyday lives, it becomes even more important to understand user experiences (McCarthy & Wright, 2004). It has been of importance even within the entertainment industry, where new evaluation methods for entertainment technology lie in the interest of e.g. game

developers for understanding and guidance in their designs (Mandryk et al, 2006). What is important, besides evaluating the game as such, is the understanding of how players perceive the game, as well as how they experience the game play emotionally. Typical methods that have been used is by collecting physiological responses from players and combining them with close observations and interviews. Physiological responses refers to collecting galvanic skin response (GSR), heart rate (HR) and inter-beat interval (IBI), electromyography (EMG) of the jaw, respiration rate (RRate) and respiration amplitude (Ramp). The proposed combination (physiological responses and subjective reports) would, according to Mandryk, give designers and evaluators a rich amount of data to inform their design and evaluate decisions (Mandryk, 2004).

Most pervasive game studies have employed methods similar to those of computer games. Previous studies focus on logging player activities primarily by computer logs, complemented by post-game interviews and surveys (Jurgelionis et al, 2007). Some game studies have tapped into the in-game communication between players ([Benford et al. 2004], [Flintham et al, 2007]) and between players and game masters (Stenros et al, 2007). This gives better insights into the actual game experience than activity logs do, but it is only possible in games where communication can be monitored and logged. Installing fixed or mobile surveillance equipment in the game is more rarely used and faces ethical, legal and technical difficulties, while still failing to capture the subjective experience of players (Stenros et al. 2007). Jonsson et al report that in-game diaries is a valuable resource in detecting periods of confusion, boredom or stress that were difficult to uncover using post-game interviews. However, this method is only available to slow- paced games with long duration (Jonsson et al, 2006).

In this thesis I will present a design project focusing on finding new concepts[1] in capturing different aspects of game play experiences. I will describe the design rationale and process in choosing concepts and presenting a design proposal for two hand-held tools for self-reporting. At the end of this thesis I will discuss the results from my design process as well as future work.

1.1 PROBLEM FORMULATION

Players of pervasive games are not situated at one set location during the entire game, especially when the game has multiple players and have the duration of several hours. I therefore don't have the advantage to capture any video sequences of the players' actions to combine with audio recordings of the players' conversations in order to receive any glimpse of their emotional states during game play, or having an outside observer following the players (which would hamper the game experience for the players if spotted by them). I further on have limited opportunities in gaining any subjective data from the players in situ with methods available for evaluation purposes. This means that I need to develop concepts for a new method in capturing the game play experiences in such ways that give the players as little disturbance as possible and that provides me with relevant information which can be used in post-game interviews at the same time.

1.2 AIM

The aim of this thesis is to develop new concepts for self-reporting tools, aimed at capturing players' experiences when playing a pervasive game. The focus will be on developing concepts that

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[1] The word "concept" is referred to as "an abstract idea; a general notion, ORIGIN mid 16th cent. (in the sense 'thought, frame of mind, imagination'): from Latin conceptum 'something conceived' (The New Oxford American Dictionary, second edition. Ed. Erin McKean)

facilitate self-report, as well as simplifying the action taken by the player when self-reporting. As the games might be fast-paced and demand great amount of the player's attention, the concepts and proposed design must give as minimal disturbance to the players as possible. To do this I need to know in before hand *what kind* of information I want from the players, as well as *how* I can gather the data on what the players *do* and *experience* while playing.

The aim is not to have concepts that will give me the exact and absolute truth of what the players are doing and experiencing, but *close enough* to what the players are doing and experiencing. The reason is that the data I want to collect will be used during post-game interviews, where the players as well as interviewers will be able to cover questions of what the players felt and did during game play. I have the interest in understanding *the emotional state* of the players, but also how they *perceive* their game situation. In the latter, I am interested in their understanding and interpretation of what they are *doing* in the game. And so I decided early on in the design process to come up with concepts for two separate self-reporting tools, which are directed to capture different aspects of the game play experience.

1.3 RESEARCH QUESTIONS

My first and overarching question in this thesis is:

What would be the appropriate concepts for the self-reporting tools?

This question is followed by several sub questions:
How should the operation method be set to reach relevant results?
What would the concepts consist of?
How do I simplify the actions taken by players when self-reporting?
What difficulties are there to address?
What has been done in previous research attempts?

These questions will be addressed continuously in the thesis, where I will go through the questions thoroughly at the end of the thesis and discuss them further.

1.4 DELIMITATIONS

In this project I have the opportunity to test ideas for concepts with users in a user study. I also have the possibility to simulate a typical use-scenario "at the table", to test whether my ideas work well or not. I have however not taken into account cultural, age or gender differences when planning or conducting my study, and therefore the results from the study are seen as the overall results of testing my ideas.

1.5 TARGET AUDIENCE

The primary target audience for this thesis is the people at the Game Studio at Mobile Life in Kista, Sweden, as they are the stakeholders and clients for this project. The secondary target audience is the students at the SVP program at the University in Linköping, with a specific interest in methods for experience evaluation. My hope is also that students and researchers with an interest in experience evaluation, especially with a focus on game experience of pervasive game players, will find interest and value in my work. It is advantageous for the reader to have pre-knowledge in

typical methods for evaluation within *traditional CHI*, as well as a familiarity with the term *experience-centered* evaluation.

1.6 PROJECT CONTEXT

The aim and goals for this thesis were formed within a project that was originally a part of the IPerG project, an EU-FP6 project on Pervasive Gaming - games that integrate the technical approaches of computer gaming with emerging interface, wireless and positioning technologies, to create game experiences that combine both virtual and physical game elements. *Interference* was one of the games developed within the project project by a research team in collaboration with partners at SICS (Swedish Institute of Computer Science) at the Interactive Institute in Kista. Interference is one of 18 pervasive games (divided in different genres), which so far is a demo game.[2]

There was a testing of the game 2008 in the streets of Kista (Sweden) and Düsseldorf (Germany), where the game was evaluated before and after game play (by using questionnaires and post-game interviews). IPerG was completed and the work and Interference became a part of the project "Socially Expanded Games" at Mobile Life.

The evaluation of Interference did not include any capturing of the live experience among the players during the game play. This was perceived as a common problem for experimental game studies, where there is a great emphasis on post-game interviews and surveys but very little attempt at capturing the game experience during game play. I therefore need new concepts for self-reporting tools for evaluation purposes, which would give players the opportunity to report their game experiences in future pervasive games.

2 http://www.iperg.org/ (20090315)

2 METHOD

2.1 DESIGN THEORY

Design, and designers working with design are, according to McCullagh, working with a type of knowledge that is called tacit knowledge. Tacit knowledge is knowledge derived from experience, experimentation and to a large extent indifferent to theory.[3] The difference in working with design as a designer, compared to a researcher, is the way of working with problem solving and experimenting with solutions, without recource to any theories. McCullagh argues however that design processes that can be framed in an appropriate context are more likely to be efficient and the resulting design more fitting. In questioning what *design research is*, a look into traditional academic research gives an idea of what it *is not*.

Within research, a researcher conducts research within a theoretical framework, in which the researcher clarifies the relationship between the proposition in question and the broad context of theory and previous research. Designers working with a design space on the contrary rely on intuition and strategic planning, to some extent knowing how to act and react in a design process based on experience. However, for a designer to claim that the knowledge he/she has gives no understanding or mapping of any processes for e.g. a client. McCullagh therefore argues that there is a need to create a scheme of ideas, in order to explain the practice of design (McCullagh, 2000).

Lawson has identified several actions and skills, which he finds important and commonly found in successful design, as a way of creating a general model for design practice. He has grouped the actions and skills as several steps, which he has named *formulating*, *moving*, *representing*, *evaluating* and *reflecting*. The aim of creating such a model is to give designers the necessary means to negotiate, understand the problems and solutions, as well as give clients and users workable and imaginative designs. Yet Lawson has no specific name, limits or boundaries for this model, on the contrary it's more of a guidance to the designer (Lawson, 2006). While Lawson defines actions and skills deriving from a practicing designer, McCullagh argues for discourse between practitioners (designers) and theoreticians (researchers), in which real advances in design can be made. The reason to blend the different perspectives is the presence of design in various disciplines. A media designer's work has become digital to a larger extent, which has made their work easily transferable between disciplines. The disciplines where traditional design activities tend to get mixed with other competences in collaboration are interaction design, information design, transport etc. (McCullagh).

Hevner et al discuss a different approach to what they call a design-science paradigm. Within the design research of information systems, the approach is towards designing artifacts based on the needs of an organization. They present a set of guidelines that define the qualities of the design process and guide the designer to work with designs that have defined requirements and organizational benefits, which gives answers to unsolved problems in the design space (Hevner et al, 2004). Broberg discusses this further in her doctoral thesis, where she presents two main quality aspects of this framework which she identifies as *relevance* and *rigorous*. The first part is concerned with defining methods and creating the artifact, and the second with evaluating the artifact primarily by the usability aspects of the artifact (Broberg, 2009).

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[3] McCullagh, K "Designers' perception of development – development's perception of design", chapter 8 in "Becoming Designers", p41

The role in which design has had an important part within interaction design is the iterative design process aimed at producing not only well functioning interactive systems, but also aesthetically pleasuring products that are easy and efficient to use. Benyon et al define design as the creative process of specifying something new and the representations *that are produced during the process*.[4] In a design process, the problems and solutions evolve during the design work, giving the possibility to specify the work only when the work is done. Working especially with interaction design, the work becomes a middle ground between engineering design (such as design of bridges, buildings, cars etc) and creative arts (including innovation, imagination and conceptual ideas). Being human- centered when working with design, especially with design of technology that people use to undertake activity in certain contexts, gives an advantage. Observing, talking and discussing with people during the design process, according to Benyon et al, gives several advantages, which in the end leads to safe, effective and ethical designs (Benyon et al, 2007).

2.2 DESIGN STRATEGY AND DESIGN METHODS

Having a design strategy gives an answer to the question of *what* needs to be done in a design project. Choosing between design strategies not only gives the opportunity to define the activities to carry out, but also to plan them within given time and resource constraints. Design methods answer the question of *how* it should be done. By having methods to formalize the procedures and techniques to be used, the designer has the opportunity to work explicitly when externalizing thoughts and ideas (Branham & Tiritoglu, 1997).

In this thesis I have chosen to use an iterative design process with a qualitative approach as my strategy, which has had an influence on the design methods I have chosen to use for this design project. The reason for choosing an iterative design process is the possibilities in improving the design with several iterations before final testing (Nielsen, 1993). I have chosen a qualitative research approach as this approach might give me more direct answers to the questions I have regarding how well my ideas and concepts will be accepted by potential users of the self-reporting tools, as argued by Hazzan et al (Hazzan et al, 2006). The design methods I have chosen are a result of my choice of strategy and research analysis approach.

Sketching is one of the methods I have applied in my work, where I have been sketching and keeping the sketches “recorded” in a “design diary”, a diary with simple sketches and drawings with comments and dates for every time I have drawn, re-drawn or tested new ideas. Semi-structured interviews is an interview technique I have used several times in this project, where the interviews have been an additional method conducted during each user study setup.

2.3 DESIGN PROCESS

2.3.1 User studies

According to Wilson, the term “user studies” is a term that covers research attempts in a wide area, from analyzing user’s meaning making when using an IT-system to make the choices of which books to choose in a library etc. It is therefore not necessarily the case that a user study includes one method, but might include several methods and models. Within a user study, a formulation of the hypothesis can be made, a plan for data collection be set and a hypothesis be tested in one set

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[4] Benyon et al “Designing Interactive Systems: A fusion of skills”, chapter 1 in “Human-Computer Interaction, p17

(Wilson, 2000). According to Banwell and Coulson, user studies are by definition about people, behavior and contexts. They argue that, in order to analyze, triangulate and validate data, there needs to be a mix of qualitative and quantitative methods in the study. User studies might even produce a model which other practitioners can use as guide lines when conducting similar research (Banwell & Coulson, 2004).

2.3.2 Iterative design

According to Nielsen, an iterative design process is recommended when designing user interfaces (Nielsen, 1993). The typical cycle of an iteration consists of roughly four parts; prototyping, testing, analyzing and refinement. During testing, concepts as well as GUIs can be tested, revised or elected after an analysis of the results from a completed iteration. Decisions are thereby based on the experience of the concepts or prototypes (from the users perspectives) in progress. As Zimmerman points out, the process becomes a dialogue between the designer, the design and the users testing the design (Zimmerman, 2004). There is no specific limit for the number of iterations that are suitable in a process, since it's entirely dependent on the type and complexity of the system, but a recommended number of iterations are estimated to three.

When working with small test setups and with few test subjects, it might not be necessary to collect quantitative data (Nielsen, 1993). But with this methodology, there also comes challenges that need to be addressed. Bailey argues that there are three major difficulties in working with iterations. One is the ability to recognize mistakes and flaws identified during iteration. The second is to find a way to fix the problems. And the third is to decide if a concept is worth working with, before doing any iterations, since it might be a bad idea from the start to try to attain any kinds of "quality" in a certain design idea. Even though an iterative process gives the opportunity to improve a design, Bailey argues that the success of the final outcome of several iterations is a result of the person making the changes to choose "a good way" of improving the problems and flaws with the design, but also to know how the problems can be fixed without creating new problems (Bailey, 1993).

2.3.3 Qualitative approach

The qualitative approach has been used within Participatory Design (PD) in Scandinavia since the late 1970s, where the methods focused on user involvement and keeping an ongoing communication between users and developers (Kensing & Munk-Madsen, 1993). A qualitative approach not only has an influence on the choice of methods, but also the execution of the method. As qualitative approaches have been used within ethnographic studies, observations have been moved to the users' normal settings, with video recordings and interviews conducted on the spot. According to Wixon, a qualitative approach gives the answer to questions regarding what users do; when they do it; what the intention is behind the work and how users think about their work (Wixon, 1995). But the extent to which a qualitative approach is used can vary depending on the intended use. The study by Hazzan et al shows that just by using a qualitative approach when interviewing participants will influence the outcome of the results and give a deeper understanding of the findings. This being said, they don't argue that using qualitative methods will give better results, but might be more appropriate in certain contexts (Hazzan et al, 2006).

2.4 DESIGN METHODS

2.4.1 Sketching in a “design diary”

Sketching has proven to be a usable method in various contexts, such as within product design disciplines, mechanical design processes (see Ullman et al, 1990), in activity- centered design processes (see Yang & James, 2008) and task-centered processes (see Van der Veer & Van Weile, 2000). According to Baskinger, sketching can be a powerful method to externalize ideas, events, sequences, systems and objects Sketching can also serve as a method for thinking, reasoning and exploring opportunities in a collaborative process. Not only do sketches serve as a good way of communicating ideas to others, but also primarily as a medium for discussing ideas with oneself before presenting them. One of the explicit goals for sketching or drawing is to externalize and convey the process of thinking, which basically means a way of discussing ideas directly on paper. Since sketches and drawings have little demands for completeness or perfection, one can draw several ideas, switch between the degree of detail, use different viewpoints and with written thoughts and comments next to the drawings. According to Baskinger, one of the most powerful advantages with sketching is the ability to document the idea generating process (Baskinger, 2008).

2.4.2 Prototyping

The use of prototypes, in paper form or as more or less working systems, is a method used in product design, web site design as well as in human centered research (see [Grady, 2000]; [Spool et al, 1997]; [Keinonen et al, 2008]). The role of prototypes in the design process (and paper prototypes especially) is to evaluate early design ideas with potential users. The benefits of using paper prototypes early in the design process, compared to electronic prototypes, is the ability to create prototypes of a system with no functionality behind it, minimizing the time needed for programming. A paper prototype is also simply made; labels, buttons and menus can be made by simple office supplies such as markers, index cards, transparent film etc. Using a finger or a pen to simulate a mouse marker, the user can “clicking” on buttons and links or write directly on in text-boxes. Instead of a system responding to the input, a moderator “acting” as the system reacts to users input by changing elements in the paper prototype (Spool et al, 1997). The process in which paper prototypes are commonly used is iterative, where a prototype is tested, re-designed, tested again, re-designed again and then a final testing to check for further problems if present.

The reason of conducting small and multiple tests with potential users are the benefits of collecting input as the design process goes on, increasing the possibility of receiving deeper insight on how the design is perceived and used by users (Nielsen, 2000). Collecting user data by using paper prototypes also give information on how well a design concept is communicated to users (Nielsen, 2003). Lim et al argue however that prototypes not only should be used as a means of evaluating design ideas, but also to enable designers to reflect on their design activities when exploring a design space. Instead of perceiving prototypes as a means to identify and satisfy requirements, it can be a method for simulating reflections, using the prototypes for framing, refining and discovering possibilities in a design space (Lim et al, 2008).

2.4.3 Semi-structured interview

According to the description on FAO:s website, a semi-structured interview is a *fairly open framework, which allows for focused, conversational two-way communication*.[5] The interviewer decides the focus on the interview, allowing the respondents to discuss their opinions on the particular topic of interest. The objective of this type of interviews if to *understand* the respondent's point of view. The interview usually begins with the interviewer asking an open-ended question, allowing the respondents to freely talk about the topic. The interview is very much alike a typical conversation, where the interviewer can shift between questions of interest depending on the outcome of the interview as the interview proceeds. The interviewer may also come up with new questions that the he or she finds of interest to the subject and appropriate to ask the respondents. This type of interview technique has several strengths. It is an efficient and practical way of obtaining data about things that are difficult to observe, such as subjective experiences (e.g. feelings and emotions). Respondents are able to talk more freely about certain topics, discuss complex situations and the interview is easy to record. Not only is this a way of avoiding generalization to users' behaviors to certain topics and pre-judging what is important information. Having a few open-ended questions also allows the respondents to talk about and around topics, deciding what is important to discuss.[6]

2.5 USE OF METHODS IN PRACTICE

I have chosen to structure my design process as follows:
The process is divided into thee phases.
In the first phase, I will be *sketching* and *drawing* ideas for the concept for both tools, as part of my idea generation phase.
In the second phase, I will have decided upon the details for the concepts for each self- reporting tool. Potential users in a user study will then test the concepts, where I will be using additional methods such as *observation* and *semi-structured interview*s.
In the third phase, I will go further with the results and propose a design for each self- reporting tool based on the study findings.

2.6 TOOL FOR DESIGN - PHOTOSHOP CS

When drawing, editing and managing illustrations for the concepts and prototypes, Photoshop has been the primary tool (besides pen and paper). Photoshop is a graphics editing program developed by Adobe Systems, and is used by professionals working with media editing, animation and authoring.[7] The version of Photoshop I have used is from Adobe Creative Suite 4 (CS 4). Adobe Creative Suite is a collection of graphic design, video editing and web development applications.[8]

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[5] *"Semi-structured Interviews"* http://www.fao.org/docrep/x5307e/z5307e08.htm (20090317)

[6] *"Focused (Semi-structured) Interviews"* www.sociology.org.uk/methfi.pdf (20090317)

[7] Adobe Photoshop http://en.wikipedia.org/wiki/Photoshop (20090424)

[8] Adobe Creative Suite http://en.wikipedia.org/wiki/Adobe_Creative_Suite_4 (20090424)

2.7 STRUCTURE OF THESIS

The remainder of this thesis is structured into three additional chapters:
The second chapter consists of the theoretical background for my research, where I will present the research and literature related to my work.
The third chapter consists of an iteration divided into three separate design phases. This part of the thesis is structured as follows:
In the first phase, I will present and argue for the ideas behind the concept for both tools individually. I will also present the different ideas that came about during the idea generation phase, and the choice of concepts, which will lead the design work into the nest iteration.
In the second phase, I will draw the details for both concepts, creating simple paper prototypes. The concepts will then be tested in a user study, where the details for both concepts will be tested, followed by a testing of the concepts as simple paper prototypes.
In the final third phase, I present a design proposal for both self-reporting tools, based on the results from the user study. There will be a final discussion of the tools in use and how they worked in their intended context.
In the fourth chapter I will sum up the results collected throughout this project and discuss them. I will also discuss the lessons learnt, findings from the collected data and future work.

Chapter 2

In this chapter I will go through the theoretical background for this thesis. I will reflect upon the differences in approach between traditional HCI compared to experience-centered design, present the basics of cognition related to the concept *experience,* and discuss play and pervasive games in particular. I will also present the research and literature related to my work.

3 TASK-ORIENTED VS. EXPERIENCE

3.1 TRADITIONAL CHI

Zimmerman et al argue that *design* within traditional HCI usually meant usability engineering, where usability engineering imply on *the process of modeling users* and systems and specifying system behavior such that it fitted the user's tasks, was efficient, easy to use and easy to learn.[9] According to this definition, the desired system to be designed should focus on the interaction between the user and the system, and therefore focus on the tasks the user might perform when using the system to reach goals. This task-oriented approach is imbedded in several approaches, including task analysis, participatory design and contextual design. Some practitioners have continued on activity, such as Activity-theory, an approach that focus on the activities that users might undertake to reach goals based on users motives. (Kaptelinin et al, 1999). Others have continued on usability engineering when for example developing and designing user interfaces (Nielsen, 1994). Activity-theory on the one hand is being tested and applied within research projects, while usability engineering is somewhat evolving within the industry, and in general within system development.

3.1.1 System development models

Traditionally, system development projects within IT-companies have been performed with guidance from several system development models (SDM). The SMD:s[10] differ in their approaches towards the operation (the company), the scope of the project and which parts of the Lifecycle model they include. The Lifecycle model is a model over the different phases in a system development project. A simplified example of the Lifecycle model as suggested by Andersen is illustrated in fig.1[11]

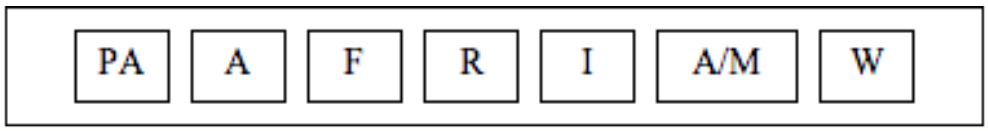

Fig. 1 The Lifecycle Model

The letters in the boxes stand for:
Pre-**A**nalysis, **A**nalysis, **F**ormation, **R**ealization, **I**mplementation, **A**dministration & **M**anagement and **W**inding-up.
The different phases in the illustration are in general present in (but not limited to) almost all system development projects independent of SDM. The phases give a guidance in how to structure the system development project, but it is the perspective and process within a SMD:s which set the rules for documentation, responsibility divided between the people involved in the project, and what needs to be done and produced in each phase. The Lifecycle model has an activity and event-oriented perspective, where the typical activities, events and the information flow derived from them (within an organization) lie as the main source for requirements for the system (to be

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[9] J Zimmerman, J Forlizzi, S Evenson *"Research Through Design as a Method for Interaction Design Research in HCI"* p495

[10] The models referred to in this text are system development models common within the Scandinavian system development tradition

[11] E Andersen "Systemutveckling – principer, metoder och tekniker" p 48

developed). This differs from e.g. data-oriented perspectives, where the main concern of the developers is the data presented in e.g. documents and databases jointly for the whole organization (Andersen, 1994). The Spiral model on the other hand present a object-oriented perspective, where the organization structure and information flow is described as objects and classes and the relations between them. The Lifecycle model and the Spiral model not only differ in perspective, but also in process.

3.1.2 Sequential vs. Iterative

The lifecycle model promotes a sequential development process, where each phase in the development process is a separate entity and where the results from each phase lead the work in the next. While the model promotes a sequential process[12], Boehm argues that such processes are inefficient for good software development. The main argument he presents is the results of unstructured a non-coherent codes that come from a step-wise method. The fact that the success of the outcome relies on the actions, documentations and codes derived from the first phase to be absolute flawless makes the whole process precarious. An iterative process, and in this case the Spiral model, divides the general actions to be taken during development (software requirements, requirements validation, development plan, risk analysis, prototype, concept of operation) and loop the actions until a complete system is developed and is according to customers demands. Each set of actions (software requirements etc.) are defined as *iterations*. The advantage here is the possibility to correct mistakes made during earlier iterations by collecting feedback from customers (or end users), while the system is still under development (Boehm, 1988). While the Spiral model promotes an object-oriented perspective, it is not limited to it. In fact, the iterative process in it self gives the opportunity to apply various methods in the process with different perspectives.

3.1.3 Evaluation methods

During the early eighties (80's), scientists and cognitive psychologist brought forth the field of human-computer interaction as we know of as *traditional HCI*. According to Kaptelinin and Nardi, HCI adopted the information-processing paradigm from computer science as the model for human cognition.[13] Researchers within the HCI community began to create user models, conducted experiments to study factors underlying efficient use of the user interface and emphasized usability (Kaptelinin & Nardi, 2006). While system development within IT companies have a given complexity, products such as battleships, airplanes and rockets created challenges for developers and designers in using applicable methods that were more predictive and collaborative. The design research communities began discussing the use of design methods that were both scientific and reflective in practice.[14] During the late eighties (80's) and nineties (90's), designer working with scientists spent time and effort in working with scientific methods integrated with creative design in order to develop not only attractive, but useful technology. The combining of developers and designers from various fields set the direction for the HCI community towards "design-oriented research" (Zimmerman, Forlizzi & Evenson, 2007). During the early nineties (90's), the use of analytical and empirical quantitative methods such as log analysis, lab studies, measuring time

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[12] A sequential process indicate a "step-wise" process, where the work from first a previous phase lies as the basis for the continued work in the next phase

[13] Kaptelinin, V., Nardi, B. A *"Acting with Technology: Activity Theory and Interaction Design"* p 28

[14] Reflecting practice refers to designers reflecting on the actions taken to improve design methodology

completion, error rates and surveys were commonly used for evaluation of technology. Qualitative methods such as cognitive walkthroughs, heuristic evaluations and interviews were also applied (in evaluation studies), though quantitative methods were still the most common types of evaluation methods used. By the mid nineties (90's), quantitative evaluation methods had become a core part within both HCI research and industry as a tool for validation. The use of quantitative methods have especially been used in collaboration projects or when evaluating new products. The approach however changed during the twenty-first century (2000), where qualitative empirical evaluations were used more frequently. Barkhuus and Rode report that the change of trend is a result of a change of technology that is being evaluated (Barkhuus & Rode, 2007).

3.2 EXPERIENCE-CENTERED DESIGN

"We don't just use technology; we live with it. Much more deeply than ever before, we are aware that interacting with technology involves us emotionally, intellectually, and sensually."[15]

This citation is from the book "Technology as Experience" by McCarthy and Wright, where the authors take a stand towards a new aspect of technology in our everyday life. As technology is everywhere in our surroundings, in our homes, in our schools, at work, during leisure activities and at locations in between, we find ourselves in many different contexts where technology is used or close by for use if needed. The authors argue of the importance in understanding the *users experience* with technology within the mentioned contexts, but also to see technology in a new perspective. Technology not only has its functionality, interaction with technology can also involve *creative, open and relational and as participating in felt experience.* The aim of using technology and the context in which the interaction is placed, may have a difference, for example technology in scientific or military sense, than a elementary school teacher using technology for information and/or communication. The importance lies in technology that enhance information retrieval and communication is the type of tasks regularly used by typical users, and of interest in experience-centered design (McCarthy, Wright 2004).

It is not only a change of attitude within research practitioners within the area of experience-centered design who has adopted this new approach, but also within sales and marketing business. When you surf on the Internet and check out the latest mobile phones, the sales company might promise the user not only the ability to perform all necessary tasks with the mobile phone, but also to get a new or different experience when using their product. On Nokia's Swedish website, they have an advertisement for the mobile phone "Nokia E71", selected as the Mobile of The Year by Wired magazine. On the advertisement they claim that this mobile phone is *a mobile phone created for our mobile way of working*, where this phone is called an *intelligent beauty*.

[15] J McCarthy & P Wright "Technology as Experience" Preface introduction

Fig. 2 Nokia E71[16]

The mobile phone is promised to give the possibility in calling, surfing on the Internet, listening to music and much more, with simplicity and a nice design and graphics.[17] This being said, there is a change of direction in bringing forth not only functionality but also aesthetic in technology. McCarthy and Wright cites Ben Shneiderman in his book "Leonardo's Laptop", referring to the first pages where Shneiderman has written;

"The old computing was about what the computers could do; the new computing is about what users can do. Successful technologies are those in harmony with user's needs. They must support relationships and activities that enrich the user's experiences"[18]

Not only is technology meant to support our everyday work or leisure related tasks, but also to enhance a new or improved experience in easier functionality, design, ergonomics and such. Even though Shneiderman's approach, as well as McCarthy among others advocates a new perspective on technology, this perspective has been present within the field of ubiquitous computing for some time. Within this field, the focus has not only been to study how users actually use technology and how technology affects the user, but also how technology can be present.

3.2.1 Ubiquitous computing

Ubiquitous computing started of as a new field when researchers at Xerox PARC adapted the term ubiquitous computing to define the concept and approach to which their new ideas come from. They explained the new approach to be;

"…first envisioned only as a radical answer to what was wrong with the personal computer: too complex and hard to use; too demanding of attention; too isolating from other people and activities; and too dominating as it colonized our desktops and our lives." [19]

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[16] The pictures and illustrations following are best seen in colored print

[17] http://www.nokia.se/hitta-produkter/produkter/nokia-e71 (20090314)

[18] J McCarthy & P Wright "Technology as Experience" p3

[19] M Weiser, R Gold, J S Brown "The origins of ubiquitous computing research at PARC in the late 1980s" IBS Systems Journal Vol 38, No 4, 1999

The vision is that of computing to be non-intrusive, close by and out of our way, with no demands of attention from the user. Weiser argue that *the most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it*. Not any particularly new technology, but technology in general. That means that the basic PC at home doesn't suffice to handle or adapt to the everyday activities.[20] When introducing large scale technology in our homes and at our offices in a "invisible manner", embodied virtuality will make individuals more aware of people on the other ends of their network links, where users focus more on their actual tasks that the tools (the technology) permitting the tasks to be done. A requirement for the vision of ubiquitous computing to become a reality is for the technology to be context-aware.

3.2.2 Context-aware computing

Context-aware computing is a term commonly used within ubiquitous computing. Moran & Dourish define the term context as *the physical and social situation in which computational devices are embedded*. The goal within context-aware computing is to design devices to act and give information to the user by the use of context-dependent information such as location, time, the presence of other devices etc by the use of sensors (Moran & Dourish, 2001). Abowd and Mynatt discuss the possibility for devices to be context-aware, and that is with context fusion. Context fusion is when sensing responses from various sources combine and give a more coherent information of the context which gives relevant and more adequate information to the device. The device can in turn use this information and act upon it (Abowd & Mynatt, 2000). In order for the future ubiquitous computing to be able to take in, understand and take action based on the users emotional states, future computing need to have a human- centered designs, rather than computer-centered designs. Instead of having technology to understand the possible actions taken by a user in a specific context, which is a common approach within the HCI-community, the technology need to be able to understand the users affective states and what motivates them (Zeng et al, 2007). A way of doing this is for developers of technology to understand the user's affective states, by evaluating their experiences with technology.

3.2.3 Experience evaluation

Our *experiences* with technology might derive from different aspects such as culture and individual. Though the range of psychological processes experience could consist of derives from perception, cognition, memory, emotion, behavior and psychology (Westerink et al, 2008). Some of the most commonly used methods for evaluation of technology within HCI has been cognitive walkthrough, usability heuristics etc, though Vyas & Van der Veer argue that these methods don't suffice when it comes to e.g. the entertainment related effectiveness of the technology. Citing McCarthy & Wright, they argue that using such methods yield difficulties to users when they are told to step back from an experience in order to observe it separately. In their perspective, experience occurs *through the interaction of subject and an object and they both contribute towards the quality of an experience in a timely episode that has a beginning and an end*.[21] They also argue that experience with technology doesn't come about in isolation, but in a context, which shapes the experience with given social, political or cultural significance (Vyas & Van der Veer, 2006).

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[20] M Weiser "The Computer for the 21st Century
http://nano.xerox.com/hypertext/weiser/SciAmDraft3.html (20090314)

[21] Vyas, D., Van der Veer, G. C "Evaluations of Entertainment Experience: Bridging the Interpretational Gap" p138

In recent studies, several researchers have reported on different methods used to capture some of the user's experiences in situ, in order to receive some information of the user's emotional states and understanding. In cases where users explicit input has not been an option because of the need to give user's minimal disturbance during exploration, a documentation of the user's discourse, facial expressions, gestures and heart rate has been used instead (Zeng et a, 2007). This type of documentation, aimed at capturing physiological changes within a participants to determine the intensity and quality of an individual's internal affective states (Shami et al, 2008). Yet this category of evaluation methods are typically complemented by traditional quantitative or/and qualitative methods such as interviews to capture not only indications of internal changes, but meaning-making and individual interpretations of the experience (Vyas & Van der Veer, 2006).

3.3 COGNITION

3.3.1 Perception

In our surrounding environment we have a large amount of physical energies formed into objects (stimuli), which we interpret and, more or less, respond to. In a shop window we might see a poster for the latest released CD by an artist we recognize. The ability we have in using what we know (our pre-knowledge of who the artist is and what the artist looks like), to interact with what we see (the poster), is called perception. Our perception is what makes sense of stimuli. Zimbardo & Gerri defines our perceptual processes as *what extract meaning from the continuously changing, often chaotic, sensory input from external energy sources and organize it into stable, orderly percepts. Percepts in turn are defined as the phenomenological, or experienced, outcome of the process of perception*.[22] Our perceptual process refers to the overall process of sensing, organization the sensing and identification of what has been sensed in order to respond to it if necessary.

The perceptual process is divided in three stages: *sensation*, *perceptual organization* and *identification/recognition of objects*. Sensation refers to the awareness and recognition of physical energy in our surrounding. It is what gives us a representation of basic facts of our visible field. Perceptual organization refers to the step where the internal representations of the physical energies are formed and a percept is developed. It becomes a description or the perceiver's external environment. Identification and recognition refers to the final step where our percepts are assigned meaning. It is in this stage where e.g. circular objects become "baseball", "coins", "clock" etc. In order to identify and recognize the name, physical appearance and the proper respond to a certain object, a higher level of cognitive process is involved. This is where our theories, memories, values, beliefs and attitudes concerning the object take part in the formation of the identification (Zimbardo & Gerri, 2002).

3.3.2 Memory

Our memories, and our ability to keep and make use of our memories are what help us keep in mind that we were on a vacation three weeks ago, ate stake for dinner yesterday, or being assured we locked the door when leaving home this morning. Memory can be divided into two types, where we have short-term memory and long-term memory. Short- term memory is the type of memory we use when we need to hold some information in mind for a few minutes. In example when we need to keep in mind what we are going to say next in a conversation. Long-term memory is the type of

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[22] Zimbardo, P. G., Gerri, R. J "*Perception*" Chapter 7 in "*Foundations of Cognitive Psychology: Core Readings*", p133

memory we use when we remember events that happen a few moments ago or a lifetime ago. It might be the image of your first own room, the sound of an airplane or the Latin word for swordfish that you learned in biology class. There is though a distinction between memory retrieval and memory storage. Levitin argue that the sole purpose of our memories is to preserve details of different experiences we've had. Even though most of us aren't able to remember every detail of past conversations or events, we might remember the topic and conclusions of the discussions or the purposes of the events.Since we encounter many details in our every day life, it is nearly impossible to remember all details, though we are able to access information at an appropriate level (Levitin, 2002).

Emotion is a factor shown to have an effect on our memories and memory retrieval. Eichman argue that, depending on our mood and a task ahead of us, our memories might be effected in such that we bring about memories depending on our felt emotions at the moment. When discussing memory, and whether memory is mood dependent, different studies have shown different results, though Eichman presents two different scenarios in which this specific topic is addressed. In the first scenario, two individuals – one happy, one sad – are asked to describe a rose. The object, the rose, is simply a rose independent of a spectator's emotional state. The encoding of the rose will therefore be unrelated to the individuals' mood, and so the description from both is about the same. In the second scenario, the individuals are asked to recall a memory that the object, the rose, brings to mind. This task forces the individuals to engage in internal mental processes, a sort of elaborative and associative processes. Even though object itself is affectively neutral, one individual might recall a dozen roses from a secret admirer, while the other one might recall a funeral. The association then is strongly influenced by the individual's mood that specific moment. Such scenarios typically derive from tests made by researchers comparing moods such as sad/happiness. Though when individuals have been asked to recall any events from his or her past by looking at different objects, it is argued that a happy person will recall more positive memories than a sad person, even though they might associate e.g. a rose to a funeral (Eichman, 2000).

3.3.3 Emotion and Affect

The question of why and how feelings and emotions can affect our memories, thoughts and judgments has been asked by philosophers, writers and artist for a long time. Though the common assumption within psychology research is that affect, cognition and conation can be studied as separate, independent features of the human mind. (Bower & Forgas, 2000). While some theorists argue that affect and cognition are interdependent, others argue that they are dependent but interacting. Before one can argue of the effects of emotions and affect, the terms must first be defined. Scherere argue that the difference between the term *feeling* and *emotion* is that *feeling* is the term for the subjective emotional experience component of emotion (emotional experience), presumed to have an important monitoring and regulation function. *Emotion* is a term that comprehends all five components constituting our human subsystems, which are;

- Cognitive components (appraisal)
- Neurophysiological components (bodily symptoms)
- Motivational components (action tendencies)
- Motor expression components (facial and vocal expression)
- Subjective feeling components (emotional experience)

(Scherere, 2005).

Tran on the other hand define emotion as *a dynamic process triggered by a specific object or event, during an interaction with the environment or with others, limited in its duration, and having specific action tendencies, and behavioral consequences, which may vary depending on the intensity of the emotion felt.*[23] In other word, emotions are event and/or object specific and has usually a definite cause and cognitive content. Tran distinguished emotions from affect and mood, as he argues that affect and mood are affective constructs. Mood is defined as *a diffuse affective state, low in intensity, relatively long-lasting, often without any particular object or focus, with even an unknown antecedent source.*[24] Emotion on the other hand is episodic, a dynamic process which has a beginning and an end, and with a brief duration (Tran, 2004).

3.3.4 Expressing emotions - culture, context and individuality

Whether or not it can be stated exactly how and to what extent our emotional state affect our experiences and memory retrieval, there are theories that address these questions. It is stated early on within the study of expressions that emotional expressivity is culture dependent. Studies have shown that there are similarities in the way people express emotions with facial expressions, tone of voice and choice of music, based on their cultural belongings. However, Keltner & Ekman argue that while expressing emotions, factors other than culture influence the way we send out signals to our surroundings. Context is one factor that influences emotional expressivity greatly. We select the signals we send depending on physical context, such as distance between individuals, the relations between them, situations and disturbance from the surrounding. Individuality also influences our emotional expressivity, as we differ in facial expressions and tone of voice. Expressions also have a central role in social life, as our ways of expressing our selves have important social outcomes and bear consequences for our temperament and personality (Keltner & Ekman, 2002).

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[23] Tran, V "The influence of emotions on decision-making processes in management teams", p7

[24] Tran, V "The influence of emotions on decision-making processes in management teams", p5

4 GAMES

4.1 THE DEFINITION OF PLAY

Johan Huizinga in his book Homo Ludens (Man the Player) introduced a new perspective on play. Play, Huizinga argue, is deeply embedded and characterized in culture. It is even older than culture, and an activity that engages man and animals alike. And so, we should consider ourselves being playful creatures, where play is an essential part of our lives. By his definition, play is:

"...a free activity standing quite consciously outside "ordinary" life as being "not serious", but at the same time absorbing the player intensely and utterly. It is an activity connected with no material interest, and no profit can be gained by it. It proceeds within its own proper boundaries of time and space according to fixed rules and in an orderly manner. It promotes the formation of social groupings which tend to surround themselves with secrecy and to stress their difference from the common world by disguise or other means."[25]

Play is free, spontaneous and careless. It *lies outside the reasonableness of practical life* and *has noting to do with necessity of utility, duty or truth.* When playing, the player 'steps out' of his or her ordinary life into a *temporary sphere* that has a nature of its own with rules and structures. The rules in turn *determine what holds in the temporary world circumscribed by play.* The game is played within, as defined by Huizinga, *the magic circle.* The magic circle merely points out that the act of playing occurs on a specific and fixed location, where the set of rules for the act of playing come about *(Huizinga, 1955).*

4.1.1 Play and the classification of games

In his book *Man, Play and Games* Cailloise initially points out that Huizinga never specified any classifications of games which may exist (since games respond to the same psychological attitude). He gives a similar definition of play, where he argues that play is:

1. F*ree:* in which playing is not obligatory; if it were, it would at once lose its attractive and joyous quality as diversion;
2. Separate, circumscribed within limits of space and time, defined and fixed in advance;
3. U*ncertain*, the course of which cannot be determined, nor the result attained beforehand, and some latitude for innovations being left to the player's initiative;
4. *Unproductive*, creating neither goods, nor wealth, nor new elements of any kind; and, except for the change of property among the players, ending in a situation identical to that prevailing at the beginning of the game;
5. *Governed by rules*, under conventions that suspend ordinary laws; and for the moment establish new legislation, which alone counts;
6. *Make-believe*, accompanied by a special awareness of a second reality or a free unreality, as against real life.[26]

He follows up his definition by presenting a classification of games where he divides the different types of games in four classes (of which he argues involve play). The classes, which he has named *agôn*, *alea*, *mimicry* and *ilinx*, represent different characteristics typical for the type of games they represent, respectively. Agôn include games such as boxing, billiards, fencing, checkers and sports in general with a focus on competition and skills in order to demonstrate superiority. Alea include games such as roulette and betting, with a focus on independency from any skills and

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[25] Huizinga, J "Homo Ludens – A study of the play-element in culture", p13

[26] Cailloise, R "Man, Play and Games", p9-10

control but purely on chance. Mimicry include games within theatre and spectacle in general, where the game involve taking on a character and so behaving as a form of make-believe. Ilinx include games such as skiing, mountain climbing and tightrope walking, which are based on *the pursuit of vertigo and inflict a kind of voluptuous panic upon an otherwise lucid mind* (Cailloise, 2001). Since the publication of Cailloise's work, the discussion of play and games, and the classifications of games have continued, e.g. [Walther, 2003]; [Alvarez et al, 2006]; [Lewis et al, 2007], [Halverson et al, 2006] and [J Juul, 2001]. In contrast to Cailloise's wide perspective on games, recent publications have a strong emphasis on game studies and the classifications of games with a focus on online gaming and console games.

4.2 PERVASIVE GAMES

In order to understand the difference between computer games and console games alike, and pervasive games, it might be necessary to understand the differences in game design, but also how they differ when discussing *the act* of playing. Pervasive games are games played outside in our everyday environment, engaging players in an alternate reality. The phenomenon pervasive games is described on the IPerG website as follows:

"A pervasive game is a game that has one or more salient features that expand the contractual magic circle of play socially, spatially or temporally." "[27]

Spatially expanded games are games that have no restriction or limits to the playground. The playground can be on the streets, in cyberspace or across the globe. These games can be played in various settings and contexts, giving players a challenge in identifying objects or places that might have a relevance to the game. There are no restrictions to the amount of technical equipment a pervasive game can have, though the use of mobile devices and internet technology are commonly used in games that are spatially expanded. The reasons are both for game masters to keep track on the players, as well as using the technology to create virtual overlays by infusing magical interpretations of the real world (Montola et al, 2009).

The game *Interference* is a game takes player on a journey of problem solving, family drama and in the end a final moral choice, to decide which character in the game that should be sacrificed. In the game the players take on the role of technicians working for Kung, the CEO of the company Danske Data. Kung informs the player that there is chaos in the world because of Internet falling apart. The players are given a "magic lens", a device that will help them map places of interference in the network by placing the device over marks scattered around down town. They are also later on in the game handed a doll and a flute as part of the storyline of the game, which will helps them close the places of interference, the gates, by playing on the flute to the doll. The lens is in reality an AR device that gives 3D visuals of the spots of interference when placed over a mark (tags). The doll and the flute include advanced technical parts embedded in them as well as GPS trackers. The game not only include elements to give players an impression of a second "magical" reality, but also technical support to help game masters to keep track of the players (Bichard & Waern, 2008).

[27] http://www.iperg.org/ (2009-04-09)

Fig. 3 The Magic Lens

Fig. 4 Players mapping out their location

The technology can also be used to enhance the game experience further without including a fixed story line.

The game *Rider Spoke* is a game that takes players on a bicycle ride around the central and urban areas of London. The players are given a device and the instruction to explore new routes, streets and alleys. During specific moments in the game, the device encourages the player to stop at a location somewhere near by. The device then ask a question, such as:

"*I want you to tell me about a party. Perhaps one when you were a teenager, or maybe a bit later. I'd like you to talk about a party where it got a bit out of control, where everything got a bit blurry for a while. Perhaps you did something you shouldn't. Then again you could have been on the outside looking in. Then find a place to tell me about it. Take your time to run through the options: it needn't be dramatic, just a party that was important to you for some reason."*

The player records an answer and is given a choice. The player can choose to answer a second question, or choose to search for answers recorded by other players have by the help of a map on the interface of the device, where recordings close by are marked. The game is designed to give players the feeling of isolation, as they are not connected in real time. Instead, all recordings made by players from previous setups are selected and stored in the devices in beforehand. The game is arranged in several setups, with different players playing for about one hour. In Rider Spoke, the technology is present to enhance the experience of sharing memories and thoughts anonymously with the surroundings and other players.

Fig. 5 A player listening to a recording

Fig. 5 A player listening to a recording

During the game event that was set up at the Barbican Centre in London in October 2007, a total of 538 players participated in the event that was held for eight (8) days (Chamberlain et al, 2008).

Games that are spatially expanded can thus be played by a single player on a mobile phone or by multiple players on the streets, over the Internet or both in collaboration. In the game Uncle Roy All Around You, players on the streets and players over the Internet collaborate by searching for clues and participating in a mixture of digital game and live performance with a close interaction to the surrounding environment, in order to reveal a mysterious character called *Uncle Roy* (Benford et al, 2006).

Temporally expanded games are games that become available for players in their everyday lives, but also control when the act of play occurs. There are different styles of temporal expansion as well, such as *dormant, ambient, asynchronous* and *temporally seamless games*. In the *dormant* mobile phone game BotFighters, players take on the roles of battle robots with the objective of killing as many battle robots as possible. The game is run through the mobile phone with the use of SMS to generate commands. A player can see other players locations by the position of their mobile phones, whereby players are constantly aware of being potential targets for other players and need to be prepared to defend him/her self when that happens at any time of the day. While in the *temporally seamless* pervasive larp Momentum, players are invited to play in what they are told, “is not a game”, while the game is entirely merging with the players' ordinary lives for 36 days (Montola et al, 2009). The game shifts between low and high pace, with the free choice for players to participate actively during the whole 36 days of game play, or only during the high paced moments set on three (3) weekends (Stenros et al, 2007).

Socially expanded games are games that involve (and might invite) non-players to take a role in a game as spectator or a non-playing participant (being the girlfriend or boyfriend of a player). The games also include bystanders, unaware of the fact that a game is taking place and making the game more complex (Montola et al, 2009). There are varied ways of inviting bystanders of participants to play. The game can offer active participants to play in an ambiguous manner, where participants or spectators are somewhat aware of an event taking place, without knowing the specifics. In similar

ways, some pervasive games offer non-players to take part in game evens, such as in the game Whirling Dervishes, where bystanders were invited to take part in a on-street dance session as part of the players task (to attract as many participants as possible). Invitation can also be done in a seamless manner through a *rabbit hole invitation*. In The A.I. Game (also called The Beast by its players) players picked up a strange clue after watching a movie trailer. When searching for information through via Google, the players found mysterious websites and information, dated sometime in the future. It became clear to the players later on that they were taking part in solving a pre-planned fictional mystery (Montola & Waern, 2006).

4.2.1 The pervasive play experience

Looking into the history of computer games study, computer games have been subjects of study since the early eighties (80's), though studying the game experience as such is a new phenomenon. It has become a new phenomenon within the recent trends in human- computer interaction to move away from traditional usability evaluations to evaluating user experiences (McCarthy & Wright, 2004). Being intrinsically motivated, games can be seen as pure experiences. Digital games need to be usable, but at the same time they should give a challenge, as the risk of failing is an essential part of playing. Csikszentmihalyi conducted a study with the aim in understanding the core of enjoyable experiences, which he called *flow*, and his theory, which he has named the Flow theory. Flow is a state of concentration, or complete absorption, it is the optimal state of intrinsic motivation, where a person experiencing flow is fully immersed with the activity at hand and the given situation (Csikszentmihalyi, 1990). The Flow theory is a concept that also is central to the act of play. Jennet et al, citing an interview conducted by Csikszentmihalyi with a chess player, illustrating the flow concept:

"When the game is exciting [chess], I don't seem to hear anything. The world seems to be cut off from me and all there is to think about is my game."[28]

The fact that pervasive games are centered on absorption as well as activity creates a challenge for studying them. Many pervasive games require full attention from their players while the players are e.g. running, which include often most of their motor skills. When evaluating game experiences in pervasive games, it might be problematic to step in to the game and ask the players what they are experiencing and why they chose to act in certain ways, as this would break the game experience. Methods for evaluation, such as interviews and surveys that are carried out after a game session are influenced by how the game ended. Experiences of confusion, frustration and stress can be redeemed by the fact that the players eventually succeed, and so they might be de-emphasized or left out from post-game interviews. Because of the different levels of spatial, temporal and social expansion in the game, and in some cases including technology-supported activities in the real world (that may rely on a mix of devices, programs and special-built technology), the empirical study of pervasive games faces even more methodological problems ([Montola, 2005], [Staffan et al, 2006], [Stenros et al, 2007]).

4.2.2 Immersion and flow

Measuring *flow* in the sense to capture game experiences would obviously be desirable. Sweetser and Wyeth have developed a model of *gameflow* as a set of salient features for flow experiences in games (Sweetser & Wyeth 2005). Their model and analysis has been modified for pervasive games

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[28] Jennet et al "Measuring and Defining the Experience of Immersion in Games", p5

by Jegers (Jegers, 2007). These models are well suited as a basis for post-game interviews and surveys, but require a level of reflection that is difficult to obtain during an ongoing game session. The concept of 'immersion'; a concept that often is used in layman discussions of games and for this reason could be used directly to elicit player feedback. Jennet et al have developed a model for measuring immersion in games based on the analysis by Brown and Cairns ([Jennet et al, 2008], [Brown & Cairns, 2004]). Their model is closely related to that of *cognitive absorption* as a state of deep involvement with software described by Agarwal and Karahana and to some extent also to the notion of *presence* in virtual reality research described by Slater et al ([Slater et al. 1999], [Agarwal & Karahana, 2000]). But the concept of immersion also faces challenges when recast into a self-reporting tool to be used while gaming, as it is measured on a scale from little to complete immersion. The problem is that the more immersed a player becomes, the more difficult it becomes to break off from the game in order to report the current experience. It is likely that players will report less often as they get more immersed into the game.

There is however more to immersion than just a scale. Based on an analysis of the vastly different preferences that people show towards digital games, Ermi and Mäyrä provide a candidate model that focuses on qualitative differences between different types of game play experiences. They argue that;

"…in order to understand what games and playing fundamentally are, we need to be able to make qualitative distinctions between the key components of the game play experience; and also relate them to various characteristics of games and players"[29]

Ermi and Mäyrä suggest a multi-dimensional model of immersion consisting of *sensory immersion, challenge-based immersion,* and *imaginative immersion*. Sensory immersion is closely related to the concept of presence, whereas challenge-based immersion is closely related to the Csikszentmihalyi concept of flow. Imaginative immersion has no obvious counterpart in previous literature on immersion. The model proposed by Ermi and Mäyrä was developed for digital games and their concepts do not immediately transfer to pervasive games. In particular, the concept of sensory immersion becomes problematic, as pervasive games are played in the real world and the distinction between sensory immersion in the game and the real world disappears (Ermi & Mäyrä, 2005). However, the tabletop game-playing community developed a very similar model, the *three-fold model of game-play*, already in the early nineties. This model distinguishes between games focused on story, challenge, and world simulation. As this model relates to the overall group contract (or design) of a game-playing game session, it needs to be slightly modified to reflect the individual players' activity (Kim, 1998). Bockman gives the model a slight twist by applying it to the ways in which an individual player can engage in a game-playing game: through addressing a challenge, participating in a story, or pretending to be a person in an imaginary full world (Bockman, 2003).

4.3 WHAT HAS BEEN DONE ALREADY?

4.3.1 Game experience evaluation

Mandryk et al argue that game development and console game market has continued to grow rapidly. Even though interactive play environments, present in computer and console games, are common and widely studied, there are few methods at hand for evaluating players' emotional states when exposed to such stimuli. Evaluating players' emotional states when playing computer (or

[29] Ermi, L., Mäyrä, F "Fundamental Components of the Gameplay Experience: Analyzing Immersion" p5

console) games have traditionally been done by self-reporting, with the use of surveys and questionnaires, as well as conducting observational analysis, interviews and focus groups. These methods are however regarded as insufficient, as questionnaires, surveys and subjective techniques may not correspond to the actual experience. Conducting close observations, such as analyzing gestures, body language, facial expressions and verbalizations not only require time commitment in analyzing the data, but also might disturb the player when playing (Mandryk et al, 2006). Instead Mandryk propose to use objective evaluations by physiological responses from players during play, in combination with subjective reports and game events. Physiological responses refers to collect galvanic skin response (GSR), heart rate (HR) and inter-beat interval (IBI), electromyography (EMG) of the jaw, respiration rate (RRate) and respiration amplitude (Ramp). The proposed combination (physiological responses and subjective reports) would, according to Mandryk, give designers and evaluators rich amount of data to inform their design and evaluate decisions (Mandryk, 2004). Mandryk's propose of methods to use in game evaluation is one of many; game evaluations have involved several methods and approaches in scientific contributions recently (Bernhaupt et al, 2008). Desurvire et al have adapted the heuristic evaluation criteria's to evaluate playability in games. Evaluating playability as proposed by Desurvire does however not include players, but evaluation experts. Even though participants to their study actually played a game and were closely observed, evaluators went through the heuristics after the study and identified playability problems based on the participants' survey responses, logs, comments and video recording (Desurvire et al, 2004).

Most pervasive game studies have employed methods similar to those of computer games. Previous studies focus on logging player activities primarily by computer logs, complemented by post-game interviews and surveys (Jurgelionis et al, 20007). Some game studies have tapped into the in-game communication between players ([Benford et al. 2004], [Flintham et al, 2007]) and between players and game masters (Stenros et al, 2007). This gives better insights into the actual game experience than activity logs do, but it is only possible in games where communication can be monitored and logged. Installing fixed or mobile surveillance equipment into the game is more rarely used and faces ethical, legal and technical difficulties, while still failing to capture the subjective experience of players (Stenros et al. 2007). Jonsson et al report that in-game diaries is a valuable resource in detecting periods of confusion, boredom or stress that were difficult to uncover using post-game interviews. However, this method is only available to slow- paced games with long duration (Jonsson et al, 2006).

4.3.2 Affective self-report

Within the HCI community, there have been attempts to go beyond the more cognitive approach to understand and explore alternative ways of handling emotion. Boehner et al report on different ways of visualizing and presenting emotions, non-verbally. With the Miro installation, users in a office setting could give an input through different entry stations whereby the system collected and presented the overall emotional state at the office, represented as colors and objects on a large display (Boehner et al, 2005). With the Sensory Evaluation Instrument, users were asked to show their affective responses to a set of pictures by choosing between a set of objects with varied sizes and shapes (Laaksolahti, 2008).

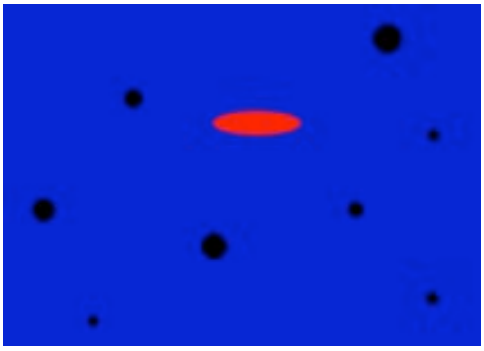

Fig. 7 Miro

Fig. 8 The Sensual Evaluation Instruments

A commonly used approach in marketing is the usage of SAM, the "Self Assessment Manikin". In SAM, each emotion is expressed using an iconic face with an emotional expression. The scale consists of nine (9) points in three (3) levels. For pleasure, SAM ranges from a smiling happy face to a frowning unhappy face; for arousal SAM ranges from a sleepy face with closed eyes to an excited expression with open eyes; for dominance SAM ranges from a small figure (representing the feeling of being controlled) to a large figure (representing being in full control). The purpose of SAM is to give customers (young and old) the possibility to express their emotional response to advertisements with the use of a visually clear and easy representation (Morris, 1995).

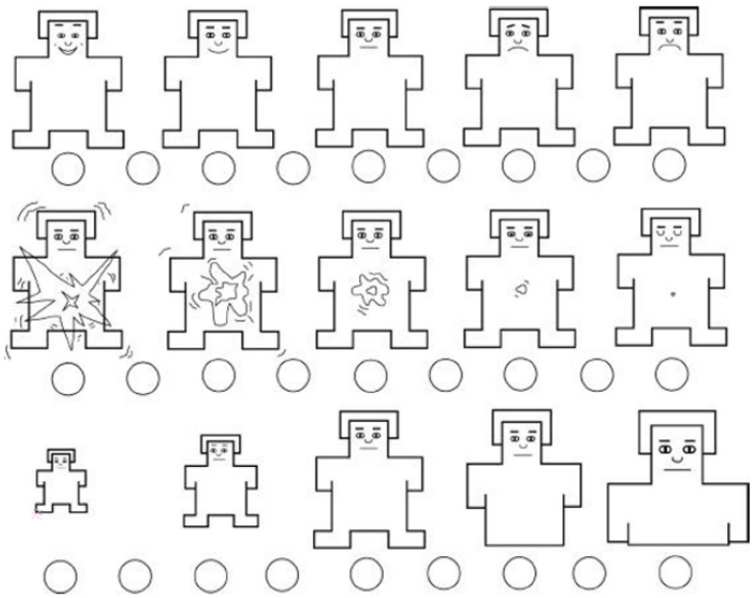

Fig. 9 SAM

In the Emoto -study abstract representations such as colors, shapes and movements are used instead to express emotions. In Emoto, the natural color wheel is mapped against Russell's circumplex model so that blue and green colors correspond to lower arousal whereas red and yellow correspond to high arousal, and yellow and green colors are interpreted as more positive than blue and red, as shown in figure 10 and 11 below.[30]

[30] See appendix A1 and A2 for enlarged images

Fig. 10 Graphical expression in Emoto

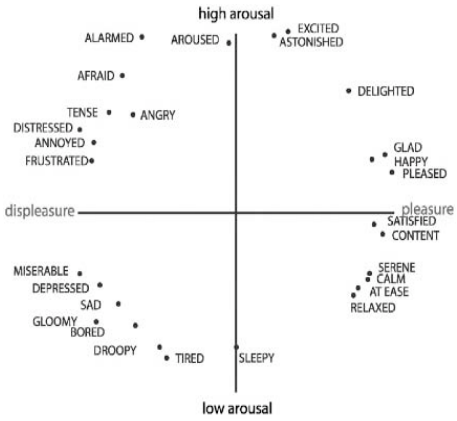

Fig. 11 Russell's circumplex model of affect

This mapping is of course not unambiguous, and the emotional valuation of colors varies both with culture and person. However, the Emoto studies show that there is a surprising amount of correspondence in how different people interpret the different colors ([Ståhl 2005] , [Sundström et al, 2007]).

With the Subtle Stone, Alsmeyer et al present a novel interface for pupils to self-report on their affective states during class, which can be viewed by the teacher simultaneously. The pupils choose to define seven (7) colors that represent a specific emotion. When the pupil wants to report on his/ her affective state, the pupil presses the Subtle Stone until the wanted color appears.

Fig. 12 The Subtle Stone

Fig. 13 A pupil using a Subtle Stone

The Subtle Stone study showed that the users (the pupils and teachers) found it easier to associate colors to emotions than the words they had chosen to represent each color (Alsmeyer et al, 2008).

Chapter 3

In this chapter I will go through the design process. I will present the idea generation phase, the conceptual study I conducted and the results derived from it. I will further present a design proposal for both tools, based on the results from the conceptual study.

5 DESIGN PROCESS

5.1 DESIGN PHASE I

5.1.1 Primary design considerations

The project group decided from the start that the self-reporting tools would be complemented with a post-game interview, where the data collected from the tools would be used as a basis for discussion with the players. As previously discussed, I decided to bring forth concepts for interfaces for two separate self-reporting tools, aimed to capture different aspects of the game experiences. One is an emotional-reporting tool and the second an activity-reporting tool.

5.1.2 Choice of device

The project group chose the 3G IPhone as the device to implement the system in. The device offers a large touch screen, enabling manipulation of the interface directly on the screen. An advantage this gives us is the ability to strap the IPhone on the players arm, for instant access to the device. The IPhone also gives the opportunity to constant access to data communication, which will give us the possibility to receive reports from the players in real-time.

5.1.3 Model of interaction

Since the IPhone offers a touch-based interaction, I felt it to be a natural choice to allow players touch-and-drag visible objects on the device screen. I also wanted the tools to be similar in design, as the tools also have similar requirements.

5.1.4 Design requirements

The context in which the tools are to be used imposes several requirements on the design. The players, involved in a fast-paced game which requires not only physical activities, but as also both hands, will give players limited time to self-report. Self-reporting will require the players to step back from the immediate game experience and will therefore always be to some extent distracting from the game experience. In order to give players minimal disturbance and draw as little attention from the game as possible, the tools need to be easy to learn and use. They should preferably offer simple and fast interaction, be available at a brief glance and with immediate feedback from the interface.

5.1.4.1 Tool 1

For the emotion-reporting tool I need a concept that allows users to give reports on information that match their emotional states. Therefore, the interface should give this opportunity without the user giving any additional input. As there are several implicit requirements for this tool. The most important ones define the need for the tool to:

- Give the user the possibility to express emotional states in situ
- Demand as little attention as possible
- Have few steps in interaction

- Have an interface based on few details
- Be intuitive
- Be context and user background independent

5.1.4.2 Tool 2

For the activity-reporting tool, I need a concept that allows users to give reports on information that match their current activities in the game. The implicit requirements for this tool are about the same as for the previous one:

- Give the user the possibility to express the type of activity carried out in situ
- Demand as little attention as possible
- Have few steps in interaction
- An interface based on few details
- Intuitive
- Be context and user background independent

5.1.5 The design space

Because of the context in which the tools are to be used and of the requirements I have for both tools, I need to work with representations for the concepts that are clear in design, that take as little attention as possible from the players and a design of the interaction that can give users necessary feedback when using the tools. I have no need to “re-invent” the wheel for this project, as the sole purpose is to test concepts for evaluation and work with re-designs if necessary. I therefore have the opportunity to seek inspiration and ideas for concepts from various sources where representations for emotions and activities are used. Though I still need to focus on representations that match my aims.

5.1.6 Conceptual pre-study

When I started the initial idea generation for the concepts for each tools, I also studied the background literature at the same time. I studied several cases where self -report has been used in various contexts to mediate attitudes and affect, and so this has shaped my ideas and the core of my decisions for the concepts along the way. I will go through the idea generation process for each tool separately, where I present the ideas and decisions that led to the final choice of representations for the concepts.

5.1.7 Idea generation - The emotion-reporting tool

5.1.7.1 Sketching and re-sketching

Every idea that came across my mind has more or less been documented on paper. Next to each and every idea, I have listed possibilities, benefits and drawbacks, represented as (+), (-) and (!), as to evaluate every idea separately and to leave the ideas as open suggestions if I chose to return back to any of them.

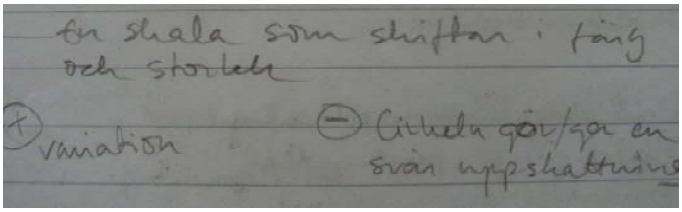

Fig. 14 Discussing the idea of using colored scales

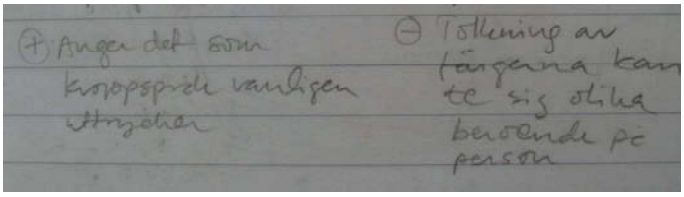

Fig. 15 Discussing the idea of using colors as representation for emotion

As a first step I sought for representations that could represent basic emotions. Using shapes and pre-defined scales was the first ideas that came across my mind, as shapes and scales have been a common approach when mediating emotions. I also tested the idea of combining shape and scale, where I had a shape that changed size and form depending on where one was placed on the scale. After while, I stepped back and thought of different ways there are to express something, going from audio recordings and music to static expressions.

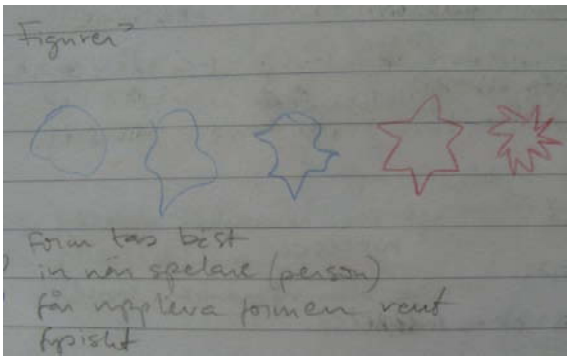

Fig. 16 Using shapes

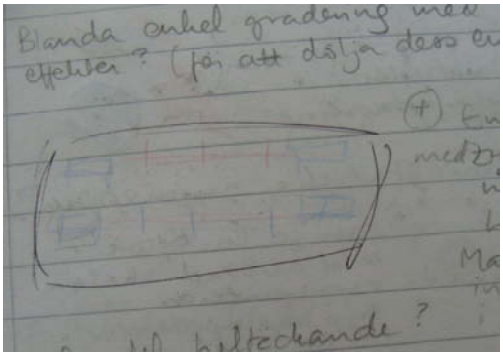

Fig. 17 Colored scales

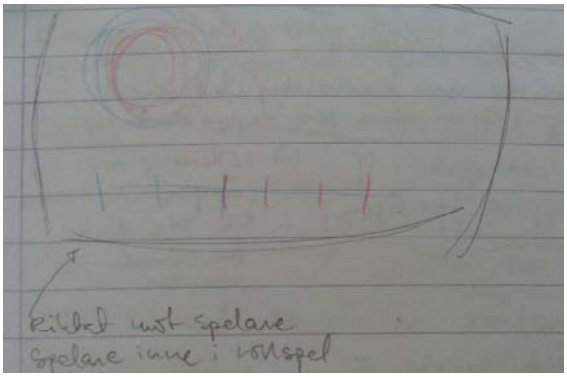

Fig. 18 Scales and abstract shapes

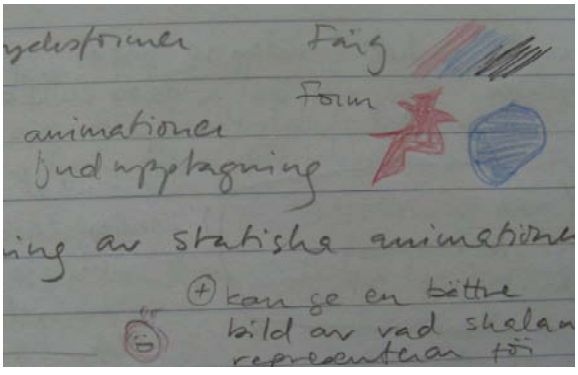

Fig. 19 Ways of expressing something

The benefits from using different kinds of shapes are that they are ambiguous in a sense that a user can choose which shape fits best to the affective state without any set values for the shapes. However this approach seemed to be a bit too ambiguous. The benefit of not having one but

multiple ways of interpreting one and the same shape seemed to be a good one. Shapes however don't give any information on context. The similarities between a set of shapes and the use of pre-defined scales are that they have a certain amounts of possible choices one can choose from. The difference is that a scale represents a set of values, which might limit the user when reporting. The use of shapes and scales in combination I figured would take too much attention from the player when self-reporting; as to assure that a "correct" value is chosen. For the types of emotions I am aimed for the tools to capture, one single scale would be too little, and several scales would take too much space on the device screen. Having users to freely give their input seemed like another alternative.

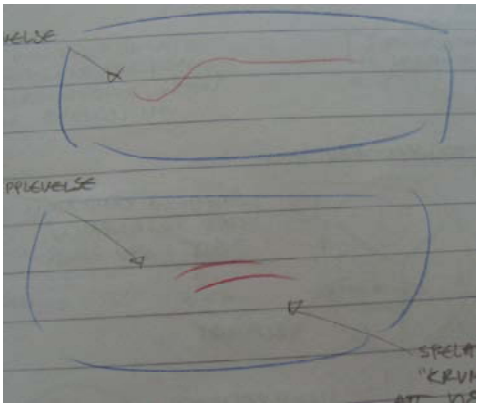

Fig. 20 Giving input freely

Having users to give an input of their own free choice seemed like an idea, though there still existed the problem of ambiguity. A user could give several kinds of input, but this might give too much freedom for the users, ending up in self-reporting with no clear idea of what it is that should be reported back on. I therefore need to be more explicit and give users an idea of what they are to report back on, as well as what type of experiences I am aimed for. When using representations for emotions, both facial expression and colors have been proved to be useful in various contexts. I especially found inspiration from the Emoto study, where colors had been used and were arranged against Russell's circumplex model. I therefore tested the "feel" of using colors and using a color "wheel".

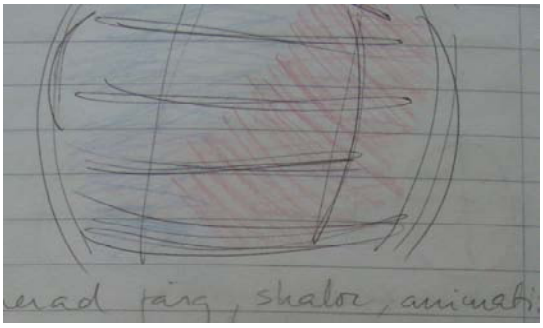

Fig. 21 Device screen filled with colors

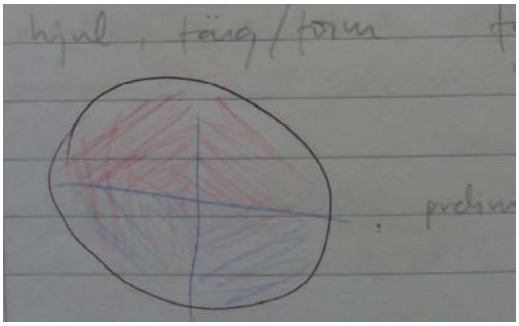

Fig. 22 Colors and shapes

Using colors as such might be a way of mediating affect, though colors alone give the same ambiguity as shapes. Therefore I need to complement colors with a second representation. The second representation I chose to be facial expressions. Instead of using realistic facial expressions, which are too detailed, I decided to draw simple iconic facial expressions, similar to typical smileys. When using facial expression and colors for mediating emotions, both have been proved to be useful separately or in combination. Based on earlier studies I chose to work with facial expressions and colors mapped against Russell's circumplex model. Therefore, the facial expressions I chose to draw were the ones identified on the circumplex model. The reason for choosing to work with a circle rather than a square is for the ease when reporting extremes (having smooth lines to report against, instead of edges).

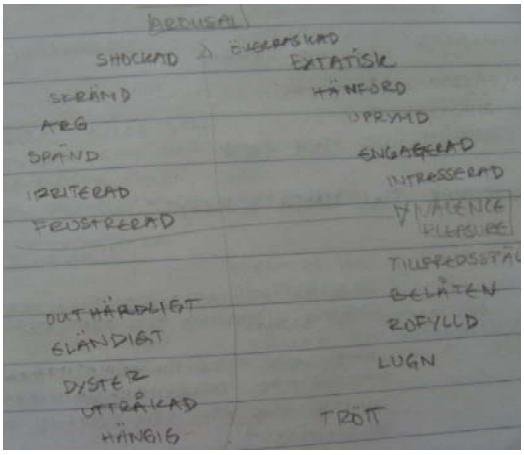

Fig. 23 Expressions found on the circumplex model

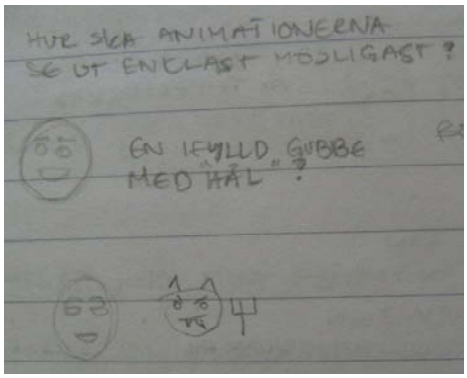

Fig. 24 Faces and expressions

I chose several words from Russell's circumplex model as descriptions for the faces I drew. Instead of using the words in their original from, I used similar words; only I used words that were activity-related, such as "excitement" and "committed". The faces I drew, I arranged on a circle along two axes corresponding to high/low activity and positive/negative experience. I then chose the colors to be set in the background, where the colors were arranged along the axes and according to the circumplex model, similar (but not entirely) to that proposed by Ståhl and Sundström et al ([Ståhl, 2005] , [Sundström et al, 2007]).

5.1.7.2 Drawing in Photoshop

After the faces were decided on, together with the colors, I drew them in Photoshop to get more "clear" images. This I found necessary because of the importance to actually see and get a greater understanding of what the iconic faces were representing, as well as the colors.

Fig. 25 The color wheel

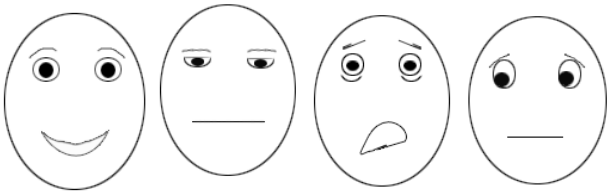

Fig. 26 The facial expressions

5.1.8 Idea generation - The activity-reporting tool

5.1.8.1 Sketching and re-sketching

There have been no similar case studies for reporting on activity in games, and instead I chose to use representations that suited what I wanted the users to report back on. The type of activities I chose to work with is *listening*, *pretense* and *gaming*. With three types of activity, a triangle was the shape that came up in mind. However, in capturing different levels of activities in a game, there might be other alternatives that suit better. So I decided to test alternative suggestions, which ended up as scales in different forms.

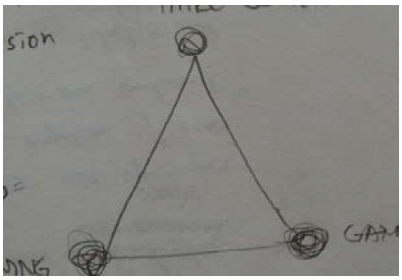

Fig. 27 Using a triangle

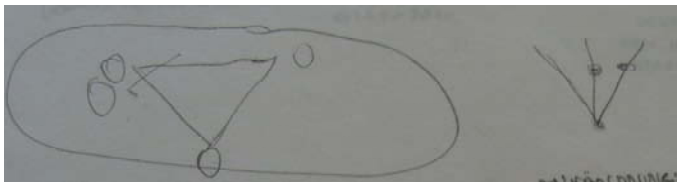

Fig. 28 Ways of placing the triangle

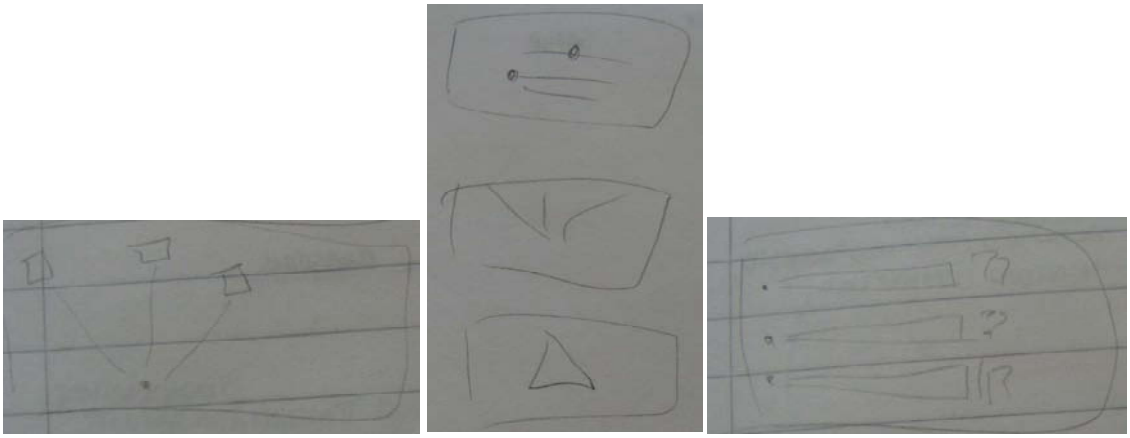

Fig. 29, 30, 31 Using scales as representation

I selected three different illustrations, one for each activity, with several possible words describing the illustrations.

Fig. 32 A Dice

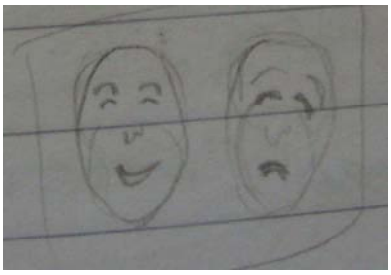

Fig. 33 Theater masks

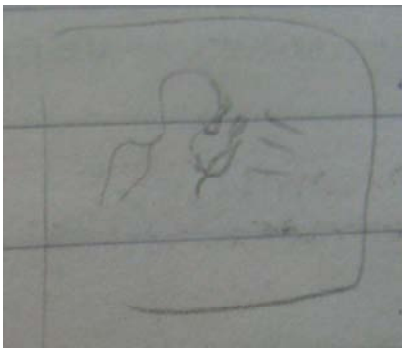

Fig. 34 A figure “listening”

The illustrations I chose were theatre masks for *pretense*, a *dice* for gaming and a figure that is listening for something, as *listening*.

5.1.8.2 Drawing in Photoshop

I drew simple lines in Photoshop, indicating some kind of scale, though I never marked any starting or ending points for the scales. The same I did with the triangle, which simply was a triangle. I was however uncertain of how to arrange the illustrations on the triangle and the scales, and so I decided to have them as separate objects, where the illustrations could be arranged freely.

Fig. 35 Alternative layouts

I later on decided to change one of the illustrations. The dice I changed to chess pieces, as I thought a dice would easily be associated to competence or chance. The reason why chess pieces suited better, was that I wanted users to associate gaming to strategic play, which in this case chess pieces fit better.

Fig 36 Illustrations

5.2 DESIGN PHASE II

5.2.1 The study setup

The pre-study began with a short introduction, where the participants were informed of what they were actually participating in, some practicalities and a task-description.[31] The study was divided in two parts, the first part focusing on the details for both tools, such as illustrations, words, faces, colors and the understanding of those. The second part focused on the testing the concepts for the tools. Halfway through and at the end of each study session, I conducted a minor semi-structured interview to capture thoughts and ideas on set.[32] Because of the varied backgrounds of the participants, the study material was available in both Swedish and English.

The first part of the study was divided in two steps, with separate assignments for each tool. For the emotion-reporting tool, I had prepared a color wheel containing 12 colors, 18 faces expressing different emotions and 18 words describing each facial expression.[33] For the activity-reporting tool I had prepared three illustrations and 12 words that described the illustrations.[34] The participants were also provided with a pen and post-it notes if they wanted to add figures or words. The second part of the study was also divided into two steps, with a similar assignment for both tools. For the testing of the concepts, the participants were asked to use the faces and the color wheel for the emotion-reporting tool. For the activity-reporting tool, I asked them to use three different interface-examples, the three illustrations and three dots (to be used as indicators). [35]

Part I

For the emotion-reporting tool, the participants were told to place 18 words and 18 faces on a color wheel separately. And finally to match the words with the faces. The reason for this was to understand how the participants would arrange the words and faces on the color wheel, as well as how well they could understand the facial expressions. For the activity-reporting tool, the participants were told to look at three illustrations and choose one word out of 12 for each which best described the illustration. The reason for this was to understand the meaning making of the illustrations and the words.

Part II

For the emotion-reporting tool, the participants were told to watch a set of YouTube clips and then to report on their experiences, the emotions felt when watching or after watching each clip, by placing one or more faces on the color wheel. There were a total of eight YouTube clips that the participants watched. The clips were different in mood and content, with a mix of excitement, sadness, surprises and humor. For the activity-reporting tool, the participants were told to watch a set of YouTube clips

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[31] See appendix B1

[32] See appendix B2

[33] See appendix B3

[34] See appendix B4

[35] See appendix B5

and report on the levels of gaming, listening and pretense they felt were expressed in the clips by using the dots, the illustrations and one of the example-interfaces. There were a total of nine clips the participants watched, three clips per each interface example. The clips had similar themes but expressed in different contexts, where the levels of listening, gaming and pretense varied.[36]

5.2.2 Participants

In search for participants for the study, I had no specific target group in mind. An email was sent to several mailing lists, where participants from various backgrounds reported their interest in participating. I chose to limit the number of sessions to five, with two participants in each session. The participants were in total ten (10), nine male and one female. The age of the participants ranged from 13 to 42 and the main occupation of the participants were "student", "researcher" or "employee". The nationality of the participants varied, as the participants were from countries such as Sweden, Norway, France, Switzerland, South Africa, The US and China.

5.2.3 Documentation

During every session I wrote observation notes. I also had an audio recording during every session, where the participants were told to talk aloud of what they were thinking of when performing a task. Halfway through the study and at the end of the study, I conducted semi-structured interview that also were audio recorded. After every completed task, the results were documented with a digital camera.

5.2.4 Hypothesis

In this study I was interested in knowing how the participants respond to the concepts and. I had three hypotheses for the outcome of the study:

- For the emotion-reporting tool, the participants will associate the colors and faces
- differently.
- For the activity-reporting tool, the participants will associate the illustrations and
- words similarly.
- For the activity-reporting tool, participants will have difficulties in adapting the
- triangle.

[36] See appendix B6

5.2.5 Results

During the analysis of the results, I experienced data loss as a result of technical problems with my laptop. Therefore I have no detailed records from the interviews as well as a large amount of pictures that were lost. I have however my observation notes from each study setup, as well as written citations that I found especially interesting when going through my material before the data loss.

5.2.5.1 Observations and interview findings

Study part I

Tool 1

Several participants expressed their excitement in placing faces and words on a color wheel, as they felt that it was a good way in showing their emotional state. The majority of participants commented that it suited more to use faces instead of words, wherefore faces in combination with colors gave them the opportunity to express “more” than the use of words. Some of the participants commented the lack of some colors; the colors brown, black and dark green were asked for:

“I would have liked the color brown to be in the circle, and also dark green... brown feels like a calm color to me, and dark green I associate with hope. And this face [angry] I would like to place on black, because that is an aggressive color”

Female, 27

Brown was interpreted as a peaceful color, black as an angry/aggressive color and dark green as a color expressing hope. There was also a comment on where to place one self on the color wheel when not feeling anything. As a suggestion, the color white was mentioned as being a neutral color. Another color that was mentioned was light blue:

“I believe this face [satisfied] expresses “calm”, but I didn’t actually find any color on this circle that I could place it on. I would say light blue, which to me is the color that represents “being calm”

Male, 26

There was a common confusion to what the faces were expressing as they, for some participants, where hard to understand. There was less confusion around faces expressing joy or sadness, but a great deal around expressions such as miserable, tense, frightened, excited or shocked, and the differences between annoyed and frustrated. One participant commented that he tried to figure out the emotions expressed by looking at the shape of the eyebrows and mouth. The majority of the participants didn't however seem to have any problems in placing the words and faces according to positive-negative colors. The majority had placed positive faces and words on the right half of the circle, and the negative ones on the left side. Even though the chosen colors were intentionally placed as done in earlier studies, a majority of the participants places high active-negative emotions such as angry, frustrated, excited and frightened on red/pinkish tones.

Tool 2

There was some confusion among the participants in understanding one of the illustrations for this tool. Almost all participants chose the words listening and dramatize for the theater masks and the ear. But only one participant chose the word gaming for the chess pieces, and a total of three participants saw that the illustration was supposed to be chess pieces. The reason was that the illustration felt unclear. The other two participants chose the word compete for this illustration.

"Oh, they were chess pieces? I thought they were some ugly lamps, or vases, or something like it. No, lamps I believed they were. Well, now that you mention it, they do look a bit like chess pieces"

Male, 35

Study part II

Tool 1

When watching the different YouTube clips, the participants placed the faces on the color wheel as they felt suited them and the situation. As their focus on the clips varied depending on interest, the act of placing the faces often occurred *after* watching a clip. One participant commented that he felt uncertain in what to report back.

"I'm not really sure whether I'm supposed to report on what I feel, or the emotions expressed in the clip. Because, I'm mostly being amused watching the clips. I'm not exactly reporting any extremes"

Male, 42

Since the participants placed the faces *after* watching a clip, the reporting became a sum-up of the emotions felt when watching the whole clip. Something very common was that the participants placed multiple faces on the color circle, indicating the different emotions they felt when watching the entire clip. Since some of the clip had a mixture of elements provoking excitement, sadness and enjoyment, there was also a variety in facial expressions and placement of them on the wheel.

Tool 2

For the study I had prepared dots for the participants to use as indicators, but not all of the participants used them:

"If I would have seen this on like a website as an example, I would have thought that I was supposed to point on the line where appropriate, and the line would fill with some color showing how much I feel is right"

Male, 14

The differences between the example-interfaces were minor between example-interface one and two (horizontal and vertical lines). Therefore, the participants used them in similar ways.

"The first two I felt was like mixing tables, I could use them to show how much and how less of something"

Male, 26

Example-interface 1 (3 Horizontal lines)

There were differences between the participants in placing the icons on the vertical lines, and also in placing the indicators to show a starting position before every clip. The, original horizontal lines were by some participants placed vertical. Some participants chose to place the indicators on the middle of the lines, and some on the far end of the lines. One participant even chose to not place any indicators at all, and instead placing the indicator in the end after watching every clip, where there could be 2 or 3 indicators close to one icon (as to express the dominance of one participation type). Some participants didn't even use the original dots as indicators, and instead used a pen, drawing on the lines to show which participation types were identified and dominated in each clip.

Example-interface 2 (3 Vertical lines)

There were fewer variations in placing the indicators and icons in this example-interface. There were differences in placing the indicators (if placing them on the middle of the lines or in the bottom), but the most common was to place them on the bottom where the lines were joint together, placing the indicators next to each other or on the small area which separates the lines. Also in this example, some participants used a pen to draw on the lines, instead of using dots as indicators.

Example-interface 3 (Triangle)

This example-interface was difficult for some participants to use, and easier for others. The confusion was mainly caused by not knowing how to use the triangle. The icons were mainly arranged at the corners of the triangle, where most of the participants placed the indicators on the middle of the lines. Some participants moved the indicators inside the triangle, whilst some stayed on the lines. And some placed the indicators near the icons, to show the dominant type of participation in the clips. One participant gave an alternative solution to the triangle:

“I chose to place the dots outside the triangle, and then placed them inside the triangle where I felt suited. But I would have liked it to be a circle, to give more space and dividing the area between the pictures, and I could place one or even two dots, and that would feel more accurate and correct”

Male, 28

The triangle gave the opportunity to report on the *level* of activity that was carried out.

5.2.6 Discussion

The participants gave an overall positive feedback to both concepts for the tools. A majority of the participants particularly commented on the use of colors (for the emotion- reporting tool) as representations of emotions both interesting and new. There were differences in how the participants placed the words and faces on the colors. This was a result of the different associations the participants made when deciding the meaning for each color. The fact that the participants actually took their time to think of the meaning of the colors is not something that might occur in a game context. One participant commented on the lack of a color that she associated to calmness, and another for hope. In choosing colors for the color wheel, I don't see the necessity in understanding the different associations users actually might make. I do however believe that I need to give users a pre-understanding of what kind of emotions the colors represent. This is because of the fact that the color wheel alone doesn't seem to suffice to give users enough information on what kind of emotion the colors are meant to mediate.

Another factor I need to have in mind is the tone of the colors. During the study, the color circle seemed to have been split in half, where the right half stood for the words and faces expressing positive emotions, and the left half for the words and faces expressing negative emotions. A reason for this might have been the choice to have light color tones on the right half of the circle and dark tones on the left half. This was a direct match to results derived from previous studies, and was also the case in this study.

The iconic faces for the emotion-reporting tool received various critique. The majority of the participants had difficulties in interpreting the emotions expressed by the faces. One participant commented that the shape of the eyebrows and the mouth were the guidance for him to understanding the expressions. Because of the limited details on the faces, the details need to be made more "clear" in order for users to be able to interpret the expressions more accurately.

The illustrations for the activity-reporting tool were easy to understand, except for one. The illustration for the activity type *gaming* was unclear, and so the illustration needs to be improved. The aim for this step was to see how well the participants could relate the words to the illustrations. Though I was the one making the decision of which illustrations to use. If I instead had chosen several illustrations for each activity type, a dozen words for each illustration, and asked the participants to match words and illustrations, it would have given me even more insight on how users typically refer to the illustrations and words. I therefore believe my choice of setup for this task has a direct effect on my results, as my illustrations might not necessarily have been the "right" representations for the activity types.

When testing the concepts in a simulated reporting situation, the participants were positive to the idea of watching YouTube clips and self-reporting. The majority of the participants reported back *after* watching a clip, which means that they had their focus on the clip and didn't feel it appropriate to report while watching the clip. This means that the tools in a game context will be used *less* during intense moments in the game. The participants also used multiple faces when reporting on what they felt, meaning that one face is not enough to report on the whole experience. I don't however believe this will be the case when the tools are used in a game context. Once again, the participants took their time when reporting, but this might very well not be the case in a game context. Although I believe it's worth testing if users will use multiple faces in a game context as well.

The testing of the concept for the activity-reporting tool seemed a bit confusing for the participants. Since the interface-examples were very simple, they gave the participants the opportunity to interpret and use them as they felt suited them. And therefore there were several different typical ways in which the participants used them, but this also made the participants uncertain in how they *should* use them. While the examples consisting of vertical and horizontal lines seemed to have been more commonly seen and used in other contexts (and were used in similar ways by the participants), the triangle was the most difficult one for the participants to use. Even though this was the case, the triangle in comparison with the other two example-interfaces seemed more accurate when reporting on the level of activity carried out in a game context. As the participation types might change continuously within a game, one type might dominate over the others, but still not exclude them. When working with dimensions, I believe that the triangle would suit my purposes the most.

5.2.7 Consequences for design

The study indicates that the concepts would work for the tools in practice. Although I found several aspects in which the design could be improved for both tools. Using facial expressions and colors as concepts for the emotion-reporting tool worked well. I had the hypothesis that the participants would associate the colors and faces somewhat differently, which they did. Regarding the colors, the participants had surprisingly similar associations to the majority of the colors, which is beneficial for my design. I do however need to add a color to give a user the opportunity to express a neutral emotional state. I also need to work on the details on the facial expressions. Not only do I need to work on the details, but also to perhaps exclude some that look too similar. The aim is to have facial expressions to represent emotions that the participants might feel relevant and significant, which I believe will be more clear when the facial expressions are less similar and clear in design.

This was also the case for the activity-reporting tool. For the activity-reporting tool I predicted that the participants would match similar words to respective illustration, which they did. The illustration representing chess pieces need to be clearer in design. Regarding the layout, none of the suggestions was good. I predicted the triangle to be the most difficult layout for the participants to use, and this proved to be the case. Although I received the insight that the triangle actually suited us best since I am interested in having the participants to report back in three dimension (for listening, gaming and pretense). I will therefore develop the concepts for both tools further, with some improvements with the colors, faces for the emotion-reporting tool and the illustrations for the activity-reporting tool. I will also use the triangle as the basis for the interface of the activity-reporting tool.

5.3 DESIGN PHASE III

5.3.1 Design considerations and re-design

As I am working with a two-dimensional scale with the emotion-reporting tool, I need to make it visible that the users might be able to use *the whole* color wheel when reporting. This means to either work with shades of colors, or to simply draw the axes (corresponding to high/low activity and positive/negative), or perhaps do both. It might be well to use an alternative solution to both suggestions also, to lessen the amount of details on the device screen. With the critique in mind regarding the facial expressions, they not only need to be drawn more clearly, but also perhaps be fewer in number. Using too many similar expressions that will be represented on a small color circle on a device screen will make it more difficult to pinpoint the "exact" location of the correct expression, since they will be placed close to each other, but also make the user uncertain of the minor differences between them. I want the users of the activity-reporting tool to also consider self-reporting in dimension, as it gives a better understanding of the different levels of activity carried out using a dimensional scale rather than a simple scale. I will however not use the triangle, but a circle instead, based on an earlier comment from a participant from the user study. A circle will limit the area of reporting as well as simplifying the reporting with no edges representing the extremes in a circle.

5.3.2 Sketching the first prototype - The emotion-reporting tool

I started of by thinking about the interaction model that would suite us the most. My first idea was to have the color circle as a movable object, where pressing on a location (a color) and "swing" it around to a marker at top of the screen makes the input. The reason is that I want the input to be intended by the user. This however went against the fact that the participants from the study during the second part placed more that one face on the color circle. I therefore thought of the idea of using fixed points, up to three, which the user can move by touch and drag the markers. This however effects the efficiency and effectiveness in self-reporting, since a user might not want to use three markers all the time, and might need to pay too much attention to self-reporting.

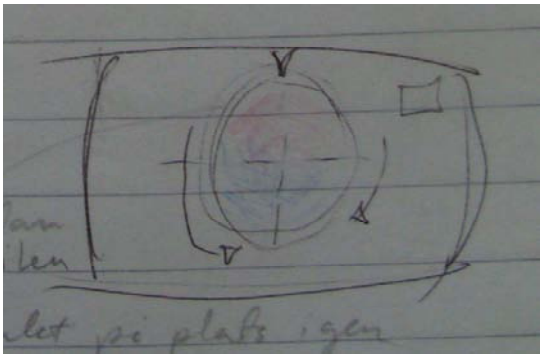


Fig. 37 A rotating circle

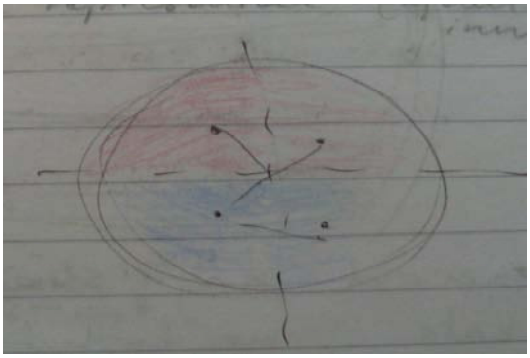


Fig. 38 Fixed points

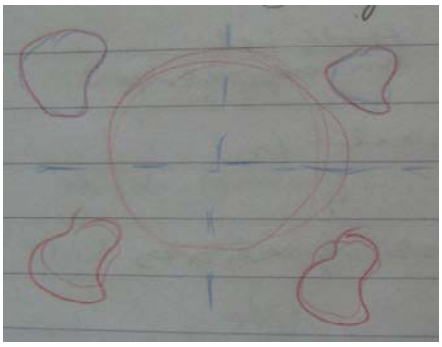


Fig. 39 Objects in the corners

Fig. 40 Placing faces in the corners

When I thought of the fact that the color wheel it self didn't give the user enough information on that kind of emotion they were reporting, I felt the need to make this more clear. Instead of using the axes corresponding to high/low activity and positive/negative, I thought of the idea of having the extremes by the "corners" of the circle, giving a hint on what kind of emotions that are represented on the wheel. The extremes have further been chosen based on circumplex model.

5.3.3 Sketching the first prototype - The activity-reporting tool

Similar to the idea for the emotion-reporting tool, I thought of manipulating objects on the interface. Using a marker to touch and drag is however more suitable, since I want the users to move inside the triangle to indicate the level and type of activity. Therefore, I also need to draw the "borders" between the activity types, as well as placing icons that illustrate the activities.

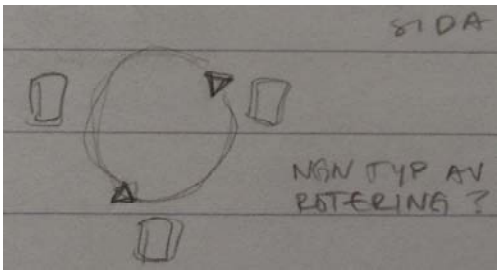


Fig. 41 manipulating objects

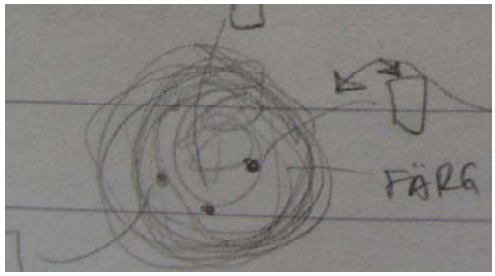


Fig. 42 Using a marker

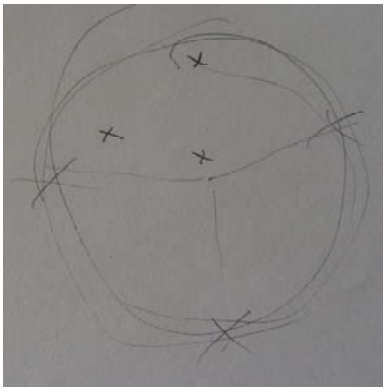


Fig. 43 Amount of markers

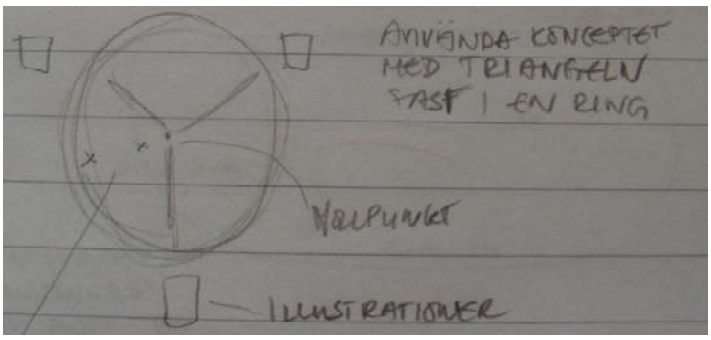


Fig. 44 Placing the illustrations and borders

5.3.4 The resulting prototype - The emotion-reporting tool

The design I propose is an interface consisting of a color wheel and four facial expressions in the corners. When a user wants to mark a location, (s)he presses on a location on the color wheel. When the user lifts his/her finger, a small facial expression appears where the user had placed his/her finger, representing the current emotional state of the user. The facial expression that appears is a result of the location on the color wheel based on the circumplex model. When the user wants to change the state of the interface (if the emotional state has changed), (s)he places a finger on the facial expression, and drags it to another location, whereby a new facial expression appears. If the user would like to add another facial expression, (s)he points at another location on the color wheel, whereby a second face appears (the user can have up to three at the same time). If the user would like to remove one, (s)he drags it outside the color wheel, whereby it disappears. If the user places him/her self on the white color, the facial expression, naturally, becomes blank.

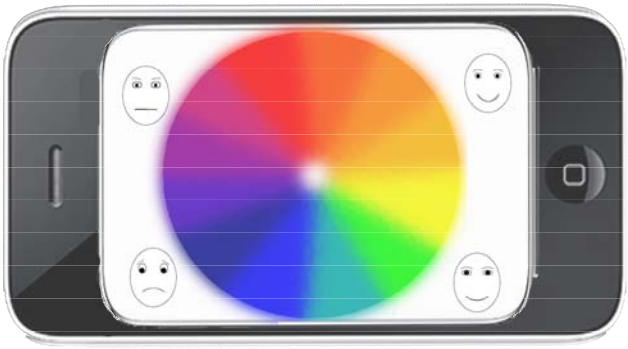


Fig. 45 The design proposal for the emotion-reporting tool

The facial expressions were the first thing I re-designed, where I especially worked with the details (eyes, eyebrows and mouth). I also changed the color wheel slightly, based on the results from the user study and comments from the participants.[37] I focused on working with dark tones on the left side and bright tones on the right side. I also added white in the middle for a “neutral” position and light blue in the bottom of the circle, as well as rearranging some of the colors.

5.3.5 The resulting prototype - The activity-reporting tool

The design I propose is an interface consisting of a circle with drawn lines in the middle, and the illustrations placed by the end of the lines. At the middle on the circle there is a black rounded marker by which the user needs to use to report on the level and type of activity. When the user wants to report on current level of activity, (s)he places a finger on the marker and drags it to the wanted location.

Fig. 46 The design proposal for the activity-reporting tool

[37] See appendix C1

When it came to re-design, the illustrations were my main focus. I especially tried to work with the chess pieces, as this was the illustration most participants from the user study had difficulties in recognizing as chess pieces.

Fig. 47 The illustrations

Chapter 4

In this final chapter I will go through the results from the design process, sum-up my results and founding from the choice of process as well as the conceptual study and discuss them further. I will also discuss the lessons learnt from the project and future work.

6 FINAL DISCUSSIONS

6.1 WORK BETWEEN TRADITIONAL CHI AND EXPERIENCE-CENTERED DESIGN

In my project I have tried to work with methods and methodology derived from traditional HCI, in order to capture experiences. The fact that *experiences* involves a complex set of processes within a person, makes them especially difficult to capture using methods with the aim of analyzing error rates and time taken to complete tasks as discussed by McCarthy and Wright [2004]. During my research where I have worked with concepts for self-reporting tools, which are directed to capture some of the users subjective feeling in a game context, the main focus has been less on usability and more on representations for emotional expressivity, simplicity and a minimalist design. In order to evaluate my ideas, I tested my ideas them in a conceptual user study. The results derived from the user study have further on been the basis for my proposed designs for both tools. The methods I chose for gathering and documenting the results have intentionally been typical evaluation methods available and used in typical HCI projects. Yet the proposed designs might have severe usability problems, largely due to the requirements for the tools. I believe however that these can be more or less refined when identified, if the tools are tested further in a second iteration. Although the aim is still to keep the tools simple, easy and effective to use.

6.2 THE CHOICE OF PROCESS

In this project I chose to plan my design process as one of three iterations, as proposed by Nielsen [1993], in which the first iteration would lay the grounding for future work. I believe dividing the whole process in three iterations, in which my project is the first, is a good idea, considering that the tools are not complex and what will be tested is the interaction model together with the concepts. After receiving feedback and results from the user study, I now have a design proposal for both tools. Having a qualitative approach as proposed by Hazzan et al [2006] was one of the reasons for the insight I gained from interviewing the participants directly. It gave me the opportunity to complement the the ideas and thoughts that were behind the placing of the words, faces and illustrations with collection of quantitative data.

Keeping the designs simple and open for changes will be to my benefit, as a second iteration would give us even more insight into how the tools might work in a game context as well as what might need to be changed. I therefore believe working in an iterative process is beneficial for my purposes and aim for this project, since I need to test the designs further and possibly refine them. Still I will only be able to see if the chosen strategy and process works, by the final outcome of testing the tools in its intended context, in a pervasive game. Only then will I be able to see if the outcome of my work meets the requirements for the tools.

6.3 ASPECTS OF THE PROCESS

I believe there are some aspects in my process that, if done differently, would have given me different results and perhaps affected the outcome. The first aspect is how I set my idea generation phase. Studying related work and similar case studies simultaneously might have had an influence on my own design choices. Particularly regarding the emotion-reporting tool. Even though I had no need to bring forth an innovative idea, the concepts might have looked differently if this had not been the case. The second aspect is the user study setup. In the study there were a total of ten (10)

participants, whereas only one out of the ten was a female. I don't believe this would have had any effect on the outcome of the study, since the study it self was primarily set to test the concepts. I do however think that if I would have had more female participants, it might have perhaps given me different perspectives on the concepts.

6.4 THE CHOICE OF CONCEPTS

Choosing to work with colors, faces and illustrations as concepts for the tools gave me interesting and constructive feedback from the participants, which has been my guidance when working with the re-design. Using faces and colors, for the emotion-reporting tool, instead of words created ambiguity, which in combination gave the opportunity to interpret the colors and faces more freely. Just as reported by Sundström et al [2007], there was a clear correspondence to which emotions the participants associated the colors. Interpreting the colors too freely will however make it difficult to decide on a design with a set of pre-chosen faces. Using only a color wheel alone also makes it too difficult in placing the colors and faces correctly. I believe my proposed designs will make it easier for users to use the tool more "accurately".

The emotion-reporting tool proved to be the easiest to work with during the second part of the study, although this might have been a result of the uncertainty in using the illustrations and the suggested layouts. The fact that I had in beforehand chosen the illustrations for this tool doesn't necessarily make them the most appropriate or correct illustrations for the type of activity they represent. Whether the illustrations are appropriate or not, will be obvious if tested in a second study, as part of a second iteration. I have therefore chosen to use colors, faces and illustrations as my choice of concepts for the self-reporting tools, as it can provide a different yet easy way of providing player feedback during gameplay that, at the same time provides opportunity for free interpretation and meaning-making.

6.5 POSSIBILITIES AND LIMITATIONS

Even though possible users of the emotion-reporting tool have several facial expressions to choose from, they are still limited to a set of emotion. The choice of letting users represent their emotional state with more than one facial expression is a conscious design choice because of the limited amount of facial expressions. While this might be more "accurate" for the players (considering that emotions are a set of complex processes and might not be represented by only one expression), the context in which the tools will be used (in a game that is fast paced) might make the function unnecessary. The set of expressions chosen are general in that they go from expressing "frightened" to "surprised". But the genre of the game (in which the tools might be used in) might require expressions I haven't included in my design proposal. In other words, the tools can be used in various pervasive games and be adapted to the game genre, but this will require to include new expressions or to exclude some.

6.6 FUTURE WORK

I believe the concepts chosen for both tools will suit my purposes, though I need to test how well they work in a game context. I therefore propose the tools to be tested in a game context. It will however be difficult to observe the usage of the tools if I choose to test the tools in their intended context, in a pervasive game. I therefore need to test the tools in a controlled environment and a set location for the game to take place. Only then will I be able to observe them directly, as well as

question the users on set on what they thought of the tools and using them in-game. A controlled environment and a set location for the game might however have an affect on the usage of the tools because of the difference in context of use, which indicate a difference in requirements for the tools. I therefore need to choose a type of game that has similarities to a pervasive game. I would also propose the tools to be tested in an actual pervasive game, to see how well they work in its intended use context, the limitations of the tools and what can be improved.

6.7 EXPANDING THE USAGE

Even though the concepts for the tools are originally aimed at capture game experiences (emotional states and activity), the idea of using tools for self-reporting that are quick and efficient to use can very well be used in other contexts as well. There might be different contexts that suit each tool better separately. It would e.g. be interesting to study the use of digital tool for reporting on evoked emotions, instead of using SAM [1995] in analog form for marketing purposes. For evaluation purposes in general, whether it be services or products that are being evaluated. Or even in classrooms, where pupils report when experiencing confusion, frustration, excitement etc when working on assignments or during lectures for the teacher to collect (the data) and reflect upon. The difference here between using the emotion-reporting tool and the Subtle Stones as proposed by Alsmeyer et al [2008], is the possibilities in using more than 7 emotions, as well as using a standard "language" for expressing emotions, instead of pre-defining what each color means, individually.
The activity-reporting tool might be well suited for usage in activities that shift between types and levels of activities, such as other types of games that require some levels of listening and strategic play combined with pretense. The types of activities represented in the tool can also be changed and adapted to the type of context they might be used in.

REFERENCES

Andersen, E *"Systemutveckling – principer, metoder och tekniker"* Studentlitteratur, Lund (1994)

Abowd, G. D., Mynatt, E. D *"Charting past, present and future research in Ubiquitous Computing"* Transactions on Computer-Human Interactions, Vol. 7, Issue 1 Georgia Institute of Technology (2000)

Agarwal, R., Karahana, E *"Time flies when you're having fun: Cognitive Absorption and beliefs about information technology usage"* Article in *"MIS Quarterly"*, 24 (4), 665-694 (2000)

Alsmeyer, M., Luckin, R., Good, J *"Developing a Novel Interface for Capturing Self Reports of Affect"* CHI '08 Extended abstracts on Human factors in computing systems, ACM (2008)

Alvarez, J., Djaouti, D., Ghassempouri, R., Jessel, J-P., Methel, G *"Morphological study of the video games"* Proceedings of the 3rd Australian conference on Interactive entertainment, Murdoch University (2006)

Bailey, G *"Iterative Methodology and Designer Training in Human-Computer Interface Design"* Proceedings of the INTERACT '93 and CHI '93 conference on Human factors in computing systems, ACM, 1993

Banwell, L., Coulson, G *"Users and user study methodology: the JUBILEE project"* Information Research, Vol. 9, No 2, Northumbria University, 2004 Available at: http://informationr.net/ir/9-2/paper167.html Visited March 2009

Barkhuus, L., Rode, J. A "*From Mice to Men – 24 years of Evaluation in CHI*" CHI '07, San Jose, USA, ACM (2007)

Baskinger, M *"Pencils Before Pixels – A Primer in Hand-Generated Sketching"* Interactions, Vol. 15, Issue 2, Carnegie Mellon University, ACM (2008)

Benford, S., Crabtree, A., Reeves, S., Flintham, M., Droz, A., Sheridan, J., Dix, A *"Frame of the Game: Blurring the Boundary between Fiction and Reality in Mobile Experiences"* CHI '06 Proceedings of the SIGCHI conference on Human factors in computing systems, ACM (2006)

Benford, S., Flintham, M., Drozd, A., Anastasi, R., Rowland, D., Tandavanitj, N., Adams, M., Row-Farr, J., Oldroyd, A., and Sutton, J. *"Uncle Roy all Around You: implicating the city in a location-based performance"* Proc. Advances in Computer Entertainment Technology, ACE (2004)

Benyon, D., Turner, P., Turner, S *"Designing interactive systems: A fusion of skills"* chapter 1 in *"Human-Computer Interaction"* Stockholm University/KTH, Department of

Computer and Systems Sciences, Pearson Education Limited, Harlow, UK (2007)

Bernhaupt, R., Ijsselsteijn, W., Mueller, F. F., Tscheligi, M., Wixon, D "*Evaluating User Experiences in Games*" CHI '08 Extended abstracts on Human factors in computing systems, ACM (2008)

Bichard, J-P., Waern, A *"Pervasive play, Immersion and Story: Designing Interference"* DIMEA '08 Proceedings of the 3rd international conference on Digital Interactive Media in Entertainment and Arts, ACM 2008

Biemans, M., Swaak, J., Hettinga, M., Schuuman, J. G *"Involvement Matters: The Proper Involvement of Users and Behavioural Theories in the Design of a Medical Teleconferencing Application"* Proceedings of the 2005 international ACM SIGGROUP conference on Supporting group work, ACM (2005)

Bockman, P *"The three-way model"* in '*As larps grow up*', 'Book of Knudepunkt' (2003)
Available at: http://www.laivforum.dk/kp03_book/classics/three_way_model.pdf
Visited April 2009

Boehner, K., DePaula, R., Dourish, P., Sengers, P *"Affect: From Information to Interaction"* Proceedings of the 4th decennial conference on Critical computing: Between sense and sensibility, ACM (2005)

Bower, G. H., Forgas, J. P *"Affect, Memory, and Social Cognition"*, Chapter 3 in *"Cognition and Emotions"* Oxford University Press Incorporated (2000)

Braham, R., Tiritoglu, A *"Design Strategies and Methods in Interaction Design: The past, present, and future"* CHI '97 Extended abstracts on Human factors in computing systems: Looking to the future, ACM (1997)

Broberg, H *"DEVIS: Design av verksamhetsstödjande IT-system – En designteori och metod"* Doctoral thesis, Institution for Industrial and Economic development, University of Linköping, Sweden (2009)

Brown, E., Cairns, P *"A grounded investigation of game immersion"* CHI '04 extended abstracts on Human factors in computing systems. Pages 1297 – 1300, ACM (2004)

Cailloise, R *"Man, Play and Games"* University of Illinois Press Ltd (2001)

Chamberlain, A., Benford, S., Flintham, M., Reeves, S., Oppermann, L., Marshall, J., Farr, J. R., Adams, M., Tandavanitj, N "*Deliverable D17.3: Cultural Console Game, Final Report*" IPerG, Integrated Project on Pervasive Gaming, FP6-004457 (2008)

Csikszentmihalyi, M "*Flow. The Psychology of Optimal Experience"*
Harper & Row, New York (1990)

Desurvire, H., Caplan, M., Toth, J. A *"Using heuristics to evaluate the playability of*

games" CHI '04, Extended abstracts on Human factors in computing systems, ACM (2004)

Eichman, E *"Cognition and Emotion"* Oxford University Press Incorporated (2000)

Ermi, L., Mäyrä, F *"Fundamental Components of the Gameplay Experience: Analyzing Immersion"* Selected Papers of the 2005 Digital Games Research Association's Second International Conference, pp. 15-27, ACM (2005)

FAO *"Semi-structured Interviews"*
Available at: http://www.fao.org/docrep/x5307e/z5307e08.htm
Visited March 2009

Flintham, M., Smith, K., Benford, S., Capra, M., Green, J., Greenhalgh, C, Wright, M., Adams, M., Tandavanitj, N., Farr J.R., and Lindt, I. *"Day of the Figurines: A Slow Narrative-Driven Game for Mobile Phones Using Text Messaging",* In: Magerkurth et al. (eds.): 4th Inernational Symposium on Pervasive Gaming Applications, IPerGames, Shaker Verlag (2007)

Grady, H. M *"Web Site Design: A Case Study in Usability Testing Using Paper Prototypes"* Technology & Teamwork, IEEE (2000)

Halverson, R., Shaffer, D., Squire, K., Steinkuehler, C *"Theorizing Games in/and Education"* Proceedings of the 7th international conference on learning sciences, International Society of the Learning Sciences (2006)

Hazzan, O., Dubinsky, Y., Eidelman, L., Sakhnini, V., Teif, M *"Qualitative Research in Computer Science Education"* Proceedings of the 37th SIGCSE technical symposium on Computer science education, ACM (2006)

Hevner, A. R., March, A. T., Park, J., Ram, S *"Design Science in information systems research"* Management Information Systems Quartley, 28:1, 75-105 (2004)

Huizinga, J *"Homo Ludens: A Study of the Play-Element in Culture".* The Beacon Press, Boston, USA: Routledge (1955)

IPerG
Available at: http://www.iperg.org/
Visited April 2009

Jegers, K *"Pervasive game flow: understanding player enjoyment in pervasive gaming"* Computers in Entertainment (CIE) Vol. 5, Issue 1, ACM (2007)

Jennett, C., Cox, L. A., Cairns, P., Dhoparee, S., Epps, A., Tijs, T., Walton, A *"Measuring and Defining the Experience of Immersion in Games"* International Journal of Human-Computer Studies Vol. 66, Issue 9. Pages 641-661, Academic Press Inc (2008)

Jurgelionis, A., Bellotti, F., IJsselsteijn, W. and de Kort, Y. *"Evaluation and testing*

methodology for evolving entertainment systems" Proceedings of ACE 2007 International Conference on Advances in Computer Entertainment Technology, Workshop 'Methods for Evaluating Games - How to measure Usability and User Experience in Games', ACM (2007)

Juul, J *"The repeated lost art of studying games"* Game Studies (2001)
Available at: http://www.gamestudies.org/0101/juul-review/
Visisted April 2009

Kaptelinin, V., Nardi, B., Macaulay, C *"Methods and Tools; The Activity Checklist: A Tool for Representing the "Space" of Context"* Interactions, Volume 6, Issue 4, ACM (1999)

Keinonen, T. K., Jääskö, V., Mattelmäki, T. M *"Three-in-One Used Study for Focused Collaboration"* International Journal of Design, Vol. 2, Issue 1 p1-10 (2008)

Keltner, D., Ekman, P *"Introduction: Expression of Emotion"* Article in *"Handbook of Affective Science"*, Oxford University Press, Incorporated (2002)

Kensing, F., Munk-Madsen, A *"PD: Structure In The Toolbox"* Communications of the ACM, Vol. 36, Issue 6, ACM (1993)

Laaksolahti, J *"Plot, Spectacle and Experience – Contributions to the Design and Evaluation of Interactive Storytelling"* Doctoral thesis, Stockholm University, Sweden (2008)

Lawson, B *"How Designers Think – The design process demystified"* Architectural Press, Jordan Hill, Oxford (2006)

Levitin, D. J. *"Foundations of Cognitive Psychology: Core Readings"* MIT Press (2002)

Lewis, J. P., McGuire, M., Fox, P *"Mapping the Mental Space of Game Genres"* Proceedings of the 2007 ACM SIGGRAPH symposium on Video games, ACM (2007)

Lewis, J. R *"IBM Computer Usability Satisfaction Questionnaires: Psychometric Evaluation and Instructions for Use"* International Journal of Human-Computer Interaction Vol. 7, Issue 1 p.57-78, L Erlbaum Associates Inc (1995)

Li, Y., Landay, J. A *"Activity-Based Prototyping of Ubicomp Applications for Long-Lived, Everyday Human Activities"* CHI '08 Proceedings of the twenty-sixth annual SIGCHI conference on Human factors in computing systems, ACM (2008)

Lim, Y-K., Stolterman, E., Tenenberg, J *"The anatomy of prototypes: Prototypes as filters, prototypes as manifestations of design ideas"* Transactions on Computer-Human Interaction, Vol. 15, Issue 2, ACM (208)

Mandryk, R. L *"Objectively Evaluating Entertainment Technology"* CHI '04 Extended abstracts on Human factors in computing systems, ACM (2004)

Mandryk, R. E., Atkins, M. S., Inkpen, K. M *"A Continuous and Objective Evaluation of Emotional Experience with Interactive Play Environments"* CHI '06 Proceedings of the SIGCHI conference on Human factors in computing systems, ACM (2006)

McCarthy, J., Wright, P *"Technology as Experience"* Massachusetts institute of Technology (2004)

McCullagh, K *"Designers' perception of development – development's perception of design"*, Chapter 8 in *"Becoming Designers"*, Intellect Books (2000)

McKean, E "*The New Oxford American Dictionary, second edition*" Oxford University Press, 2005. Oxford Reference Online
Available at: http://www.oxfordreference.com/views/ENTRY.html?subview=Main&entry=t183.e15924
Visited August 2009

Moggridge, B *"Designing Interactions"* MIT Press Ltd (2006)

Montola, M. *"Exploring the edge of the magic circle; defining Pervasive Games"* Proceedings of DAC 2005, ITU of Copenhagen (2005)

Montola, M., Waern, A "Participant Roles in Socially Expanded Games" The 3rd International Workshop on Pervasive Gaming Applications, Pervasive Conference (2006)
Available at: http://www.pervasive-gaming.org/Publications/Montola-PerGames06-ParticipantRoles.pdf
Visited May 2009

Montola, M., Stenros, J., Waern, A "*Pervasive Games: Theory and Design*" 'In press' (2009)

Moran, T., Dourish, P *"Introduction to this special issue on Context-Aware Computing"* Human-Computer Interaction, Vol. 16, Issue 2, L Erlbaum Associates Inc (2001)

Morris, J. D *"Observations: SAM the self assessment mannequin – An efficient cross-cultural measurement of emotional response"* Journal of Personality and Social Psychology: 39, 1161-1178 (1995)

Nielsen, J *"Iterative User Interface"*
Web version of paper at: http://www.useit.com/papers/iterative_design/
Visited March 2009

Nielsen, J *"Enhancing the Explanatory Power of Usability Heuristics"* CHI '94 Proceedings of the SIGCHI conference on Human factors in computing systems: Celebrating interdependence, ACM (1994)

Nielsen, J *"Paper Prototyping: Getting User Data Before You Code"*
Available at: http://www.useit.com/alertbox/20030414.html

Visited April 2009

Nielsen, J *"Why You Only Need to Test With 5 Users"*
Available at http://www.useit.com/alertbox/20000319.html
Visited April 2009

Nokia's Swedish website for E71;
http://www.nokia.se/hitta-produkter/produkter/nokia-e71
Visited March 2009

Slater, M *"Measuring presence: A response to the Witmer and Singer Presence questionnaire"*. Presence: Teleoperators and Virtual Environments, Vol. 8, Issue 5, MIT Press (1999)

Sociology Center *"Focused (Semi-structured) Interviews"*
Available at: www.sociology.org.uk/methfi.pdf
Visited March 2009

Spool, J. M., Scanlon, T., Snyder, C *"Product Usability: Survival Techniques"* CHI '97 Extended abstracts on Human factors in computing systems: Looking in to the future, ACM (1997)

Stenros, J., Montola, M., Waern, A., Jonsson, S "Deliverable D11.8 Appendix C: Momentum Evaluation Report" IPerG, Integrated Project on Pervasive Gaming, FP6-004457 (2007)

Stenros J., Montola M., Waern A., and Jonsson S. *"Play it for Real: Sustained Seamless Life/Game Merger in Momentum" Situated Play,* Proceedings of DIGRA conference (2007)

Ståhl, A. *"Designing for Emotional Expressivity"* Licentiate thesis, Institute of Design, University of Umeå, Sweden (2005)

Sundström, P., Ståhl, A., Höök, K *"In Situ Informants Exploring an Emotional Mobile Messaging System In Their Everyday Practice"* International Journal of Human-Computer Studies, Vol. 65, Issue 4, Academic Press Inc (2007)

Sweetser, P., Wyeth, P *"GameFlow: a model for evaluating player enjoyment in games"* Computers in Entertainment *(CIE)* Vol. 3, Issue 3, ACM (2005)

Tran, V *"The influence of emotions on decision-making processes in management teams"* Doctoral thesis in psychology, University of Geneva (2004)

Ullman, D. G., Wood, S., Craig, D *"The importance of drawing in the mechanical design process"* Oregon State University (1990)

Van der Veer, G., Van Weile, M *"Task Based Groupware Design: Putting Theory into Practice"* DIS '00 Proceedings of the 3rd conference on Designing interactive systems:

Processes, practices, methods, and techniques, ACM (2000)

Vyas, D., Van der Veer, G. C. *"Rich evaluations of entertainment experience: Bridging the Interpretational Gap"* ECCE '06 Proceedings of the 13th European conference on Cognitive ergonomics: Trust and control in complex socio-technical systems, ACM (2006)

Walther, B. K. *"Playing and Gaming – Reflections and Classifications"* Game Studies (2003)
Available at: http://www.gamestudies.org/0301/walther/
Visited April 2009

Weiser, M *"The Computer for the 21st Century"*
Web version of article at: http://nano.xerox.com/hypertext/weiser/SciAmDraft3.html
Visited March 2009

Weiser, M., Gold, R., Brown, J. S *"The origins of ubiquitous computing research at PARC in the late 1980s"* IBS Systems Journal, Vol. 38, Issue 4, IBM Corp. (1999)

Westerink, J. H. D. M *"Experience In Products"* Chapter one in *"Probing Experience-From Assessment of User Emotions and Behaviour to Development of Products"* Philips Research Laboratories, Eindhoven, The Netherlands, Springer (2008)

Wikipedia on *"Adobe Creative Suite"*
Available at: http://en.wikipedia.org/wiki/Adobe_Creative_Suite_4
Visited April 2009

Wikipedia on *"Adobe Photoshop"*
Available at: http://en.wikipedia.org/wiki/Photoshop
Visited April 2009

Wilson, T. D *"Recent trends in user studies: action research and qualitative methods"* Information Research, 5(3) (2000)
Available at: http://informationr.net/ir/5-3/paper76.html
Visited April 2009

Wixon, D *"Qualitative Research Methods in Design and Development"* Interactions, Vol. 2, Issue 4, ACM (1995)

Wixon, D., Ramey, J., Holtzblatt, K., Beyer, H., Hackson, J., Rosenbaum, S., Page, C., Laakso, A. A., Laakso, K-P *"Usability in Practice: Field Methods Evolution and Revolution"* CHI '02 Extended abstracts on Human factors in computing systems, ACM (2002)

Zeng, Z., Pantic, M., Roisman, G. I., Huang, T. S *"A Survey of Affect Recognition Methods: Audio, Visual and Spontaneous Expressions"* ICMI '07 Proceedings of the 9th international conference on Multimodal interfaces, ACM (2007)

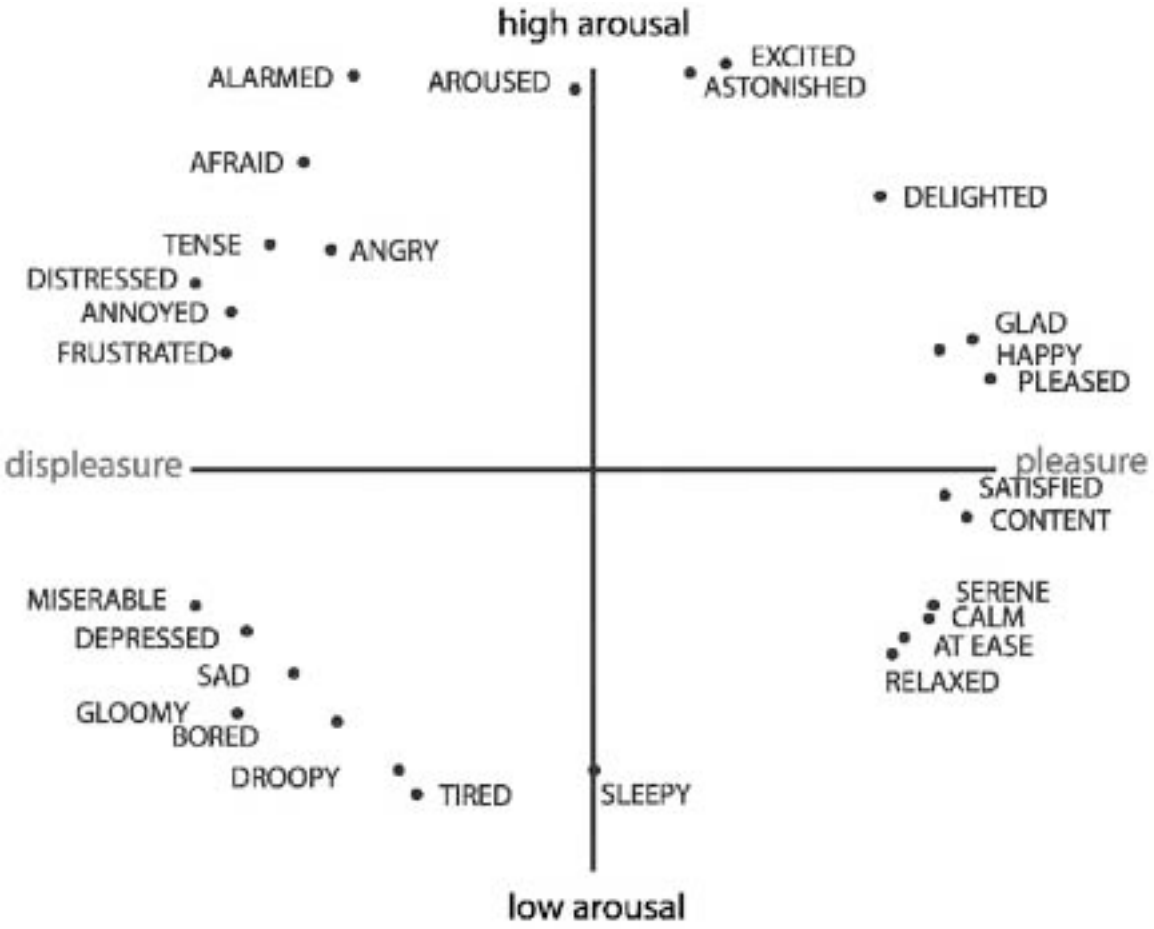
Zimmerman, E *"Play as Research: The Iterative Design Process"* Chapter in *"Design Research: Methods and Perspectives"* MIT Press Ltd (2004)

Zimmerman, J., Forlizzi, J., Evenson, S *"Research Through Design as a Method for Interaction Design Research in HCI"* CHI '07 Proceedings of the SIGCHI conference on Human factors in computing systems, ACM (2007)

APPENDICES

A1 – Russell's Circumplex Model of Affect

Russell's Circumplex Model of Affect



A2 – Graphical Expression in Emoto

Graphical Expression in Emoto

B1 – Introduction and Task Description

Introduction

Hi and welcome!

My name is Zeynep Ahmet and I'm doing a master at the Game studio here at Mobile Life, the interactive Institute. Right now I'm doing a study where I'm looking at different ways of capturing the affections of players of pervasive games when they are in-game. Pervasive games are games that take place in our everyday environment where the players get to more or less role-play and use high-end technology.
My mission is to find different ways of capturing gameplay affections, which has resulted in suggestions for two tools. I would like your help in looking over the details of these suggestions, and also to test the different suggestions.

On the table you have further instructions of what you are going to do. (You will be doing the task individually, but you are welcome to talk to each other if you want.) I will be here in the room if you have any questions, or if something seems unclear later on. When you feel like you're finished after each task, let me know and I will take picture of what you've done for documentation and analysis. I will also be recording your voices, so you are welcome to "talk aloud" if there is something you're thinking of when working with the tasks.
Do you have any questions?

Good luck!

Task description

Part 1

I would like your help with the details for the interfaces for two different tools in this going through. The purpose is for me to get an overview of how you perceive the details within the interfaces. I want you to evaluate the details in several minor tasks. You will receive a plastic file containing the material for your assignments. I will be taking pictures of what you have done after every completed task.

Tool 1

Range of colors – Words

In front of you there are a bunch of words describing different affections. You also have a paper with a range of colors shaped as a wheel. Where would you place the words (affections) on the color wheel?

When you're done, let me know.

Range of colors – Faces

In front of you there are a bunch of ”faces” displaying different affections. Where would you place the faces on the color wheel?

When you're done, let me know.

Faces – Words

Now that you've used both words and faces, I wonder: Which word and face might be related?

When you're done, let me know.

Tool 2

In front of you there are three different illustrations and a bunch of words. Place each word with each illustration as you find relates best to each other. You may only use one word for each illustration.

When you're done, let me know.

Part 2

During this final part I would like your help to try the interface suggestions for the two tools. To make the testing more efficient, you are going to watch different YouTube-clips. The purpose with this going through is for me to get an understanding of how you perceive and use the interfaces.

Tool 1

This tool is meant to give players a way of expressing their affections at certain moments in the game.
In front of you there is a paper with the suggestion for the interface of the tool including the color wheel. You also have the faces at your disposal.
You will watch 8 YouTube-clips for this tool. You are to show **which affect or affections you felt** during or after watching each clip. If you experience or feel something different than what the faces represent, write down your own description on a post-it note.

I will be taking a picture of what you've done after each clip.
When you're ready to begin, let me know.

Tool 2

This tool is meant to give players a way of estimating the levels of gaming, listening and pretense at certain moments in the game.
In front of you there are three different papers, each representing a suggestion for the interface of the tool, the three illustrations of gaming, listening and pretense and also three “dots” at your disposal to use when you interact with the imagined interface.
You will watch 3 YouTube-clips for each paper (with the suggestion for the interface). You are to show **the level of gaming, listening and/or pretense you felt** during or after watching each clip by using the interface.

I will be taking a picture of what you've done after each clip.
Begin with the paper on top of the pile and look at the suggestion of the interface, where you can place the three illustrations as you find best suited. Place also the dot/dots in advance on the paper to indicate your start position.

When you're ready to begin, let me know.

B2 – Interview Bullet Points

Interview bullet points

Part 1

Tool 1 – Understanding, Intuitive, Change
(How well do they understand words and faces?
How intuitive does it feel to use faces and colors?
Changes needed?)

Tool 2 – Understanding, Intuitive, Change
(How well do they understand words and illustrations?
How intuitive does the illustrations feel?
Changes needed?)

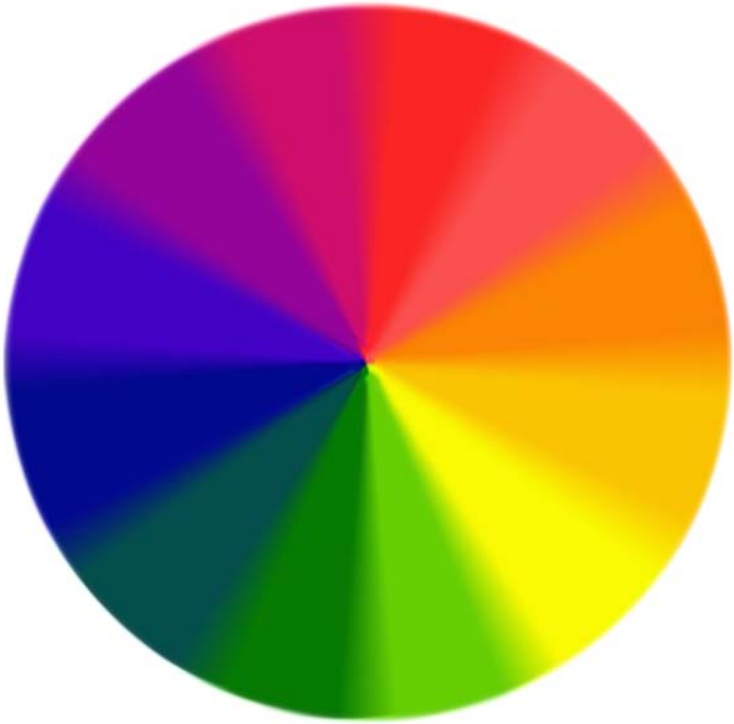
Part 2

Tool 1 – Understanding, Difficulties, Change
(How well do they understand the intended usage?
Did they experience any difficulties when using faces and colors as they did?
Changes needed?)

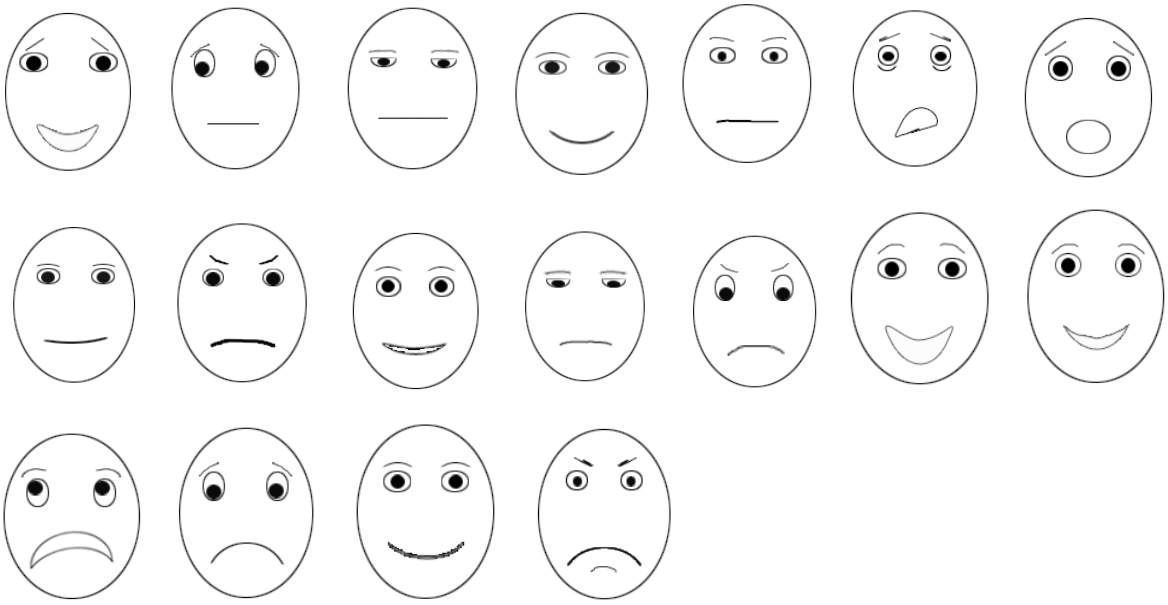
Tool 2 – Understanding, Difficulties, Choice of layout, Change
(How well do they understand the intended usage?
Did they experience any difficulties when using the layouts, illustrations and dots?
Which layout would they prefer?
Changes needed?)

B3 – The Color Wheel, Faces and Words

The Color Wheel



The Faces



The Words

EXCITED	ASTONISHED	COMMITED	INTERESTED
PLEASED	SATISFYED	CALM	TIRED
DROOPY			
BORED	GLOOMY	MISERABLE	FRUSTRATED
ANNOYED	TENSE	FRIGHTENED	ANGRY
SHOCKED			

B4 – The illustrations and Words

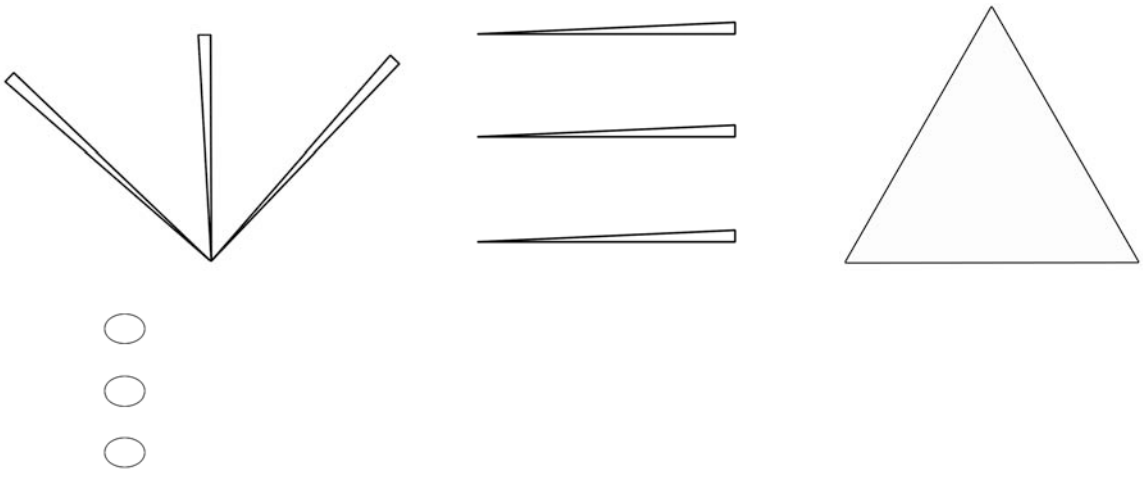
The Illustrations

The Words

GAMING	LISTENING
PRETENSE	DRAMATIZE
COMPETE	MAKE UP
ACT	PRETEND
CREATE	FORM
MAKE-BELIEVE	RECEIVE

B5 – The Layouts and Dots

The Layouts and Dots



B6 – YouTube Links

YouTube Links

Tool 1

Alauven LARP
http://www.youtube.com/watch?v=6AL0ZYEQSb0

Freerunning
http://www.youtube.com/watch?v=3aMZICuvECw

Left 4 Dead Opening!
http://www.youtube.com/watch?v=Pa-Nk02_C4I&feature=related

Cubic Tragedy
http://www.youtube.com/watch?v=-fBcjHq9rv0

Angry kid
http://www.youtube.com/watch?v=kBVmfIUR1DA

Christmas
http://www.youtube.com/watch?v=nLazKA9KTYk

Origami Bat
http://www.youtube.com/watch?v=kFR4LRZdU2Q&feature=channel

U-359
http://www.youtube.com/watch?v=3DIs7SUbt_k

Tool 2

1.

Maev's speech
http://www.youtube.com/watch?v=vywf91mt16Y

Airsoft - S.W.A.T. VS Terrorists
http://www.youtube.com/watch?v=B7qSADg1ldY&feature=related

Hamlet
http://www.youtube.com/watch?v=XbM7DE_Y2rM
2.

The Armada Speech
http://www.youtube.com/watch?v=Yq7SHlMiWeI&feature=related

Dark Ages Fight
http://www.youtube.com/watch?v=bfDNZI9HH8s&feature=related

The First Sith
http://www.youtube.com/watch?v=J5uhTtF-RxI&feature=related

3.

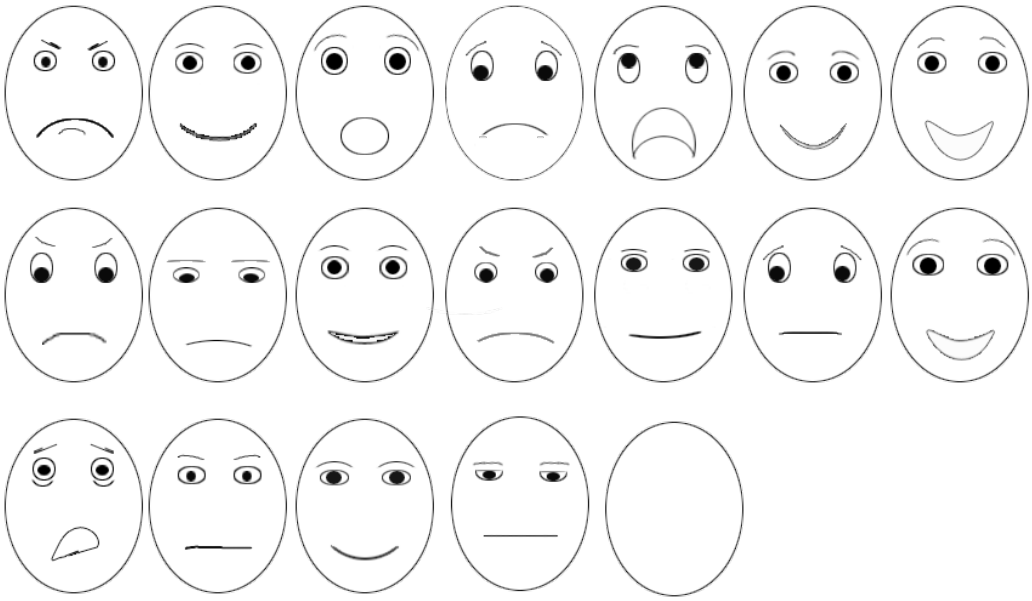
A Letter to the Avalon Foundation
http://www.youtube.com/watch?v=6z1AYRlwQYE

Four yr old playing
http://www.youtube.com/watch?v=UPjFI1KxhZs&feature=related

Theatre Sports
http://www.youtube.com/watch?v=pYLG7smV2uA&feature=related

C1 – The Faces and the Color Wheel

The Faces



The Color Wheel