A Theoretical Model of Media Experience and Research Methods for Studying It

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Executive Summary

The importance of taking media experience into account when creating new media content, services and technologies is well established. There are several methodological approaches and measurement techniques (e.g., interview, self-report, psychophysiological assessment, tracking of behavioural indicators of media experience, media ethnography) to assess media experience, but they are not well integrated with each other.

In this report, we introduce a model of media experience which identifies the media experience dimensions and their relationships. Moreover, we present a framework which maps the media experience dimensions to several possible research and measurement methods. The model takes into account three levels of looking at media experience: a meta-level, a macro-level, and a micro-level. First, the meta-level refers to the societal, economic and technological changes which alter media use and media products. Second, the macro-level deals with the increasingly important social aspect of media use and media experience. Third, the micro-level represents individual dimensions of the media experience including everyday media practices, interaction with the media artefact, what the media feels like, and evaluation of media content. In addition to these experience dimensions at the micro-level, the motives and context of use (e.g., goals and habits), the user dimensions (e.g., personality and values), and the media characteristics (especially interactivity) are discussed.

Research partners include Aalto School of Economics, Aalto School of Basic Sciences, Aalto TAIK, HIIT and VTT. Each partner brings into media experience research their own theoretical background and research methods which are presented in this report.

The aim is to utilize these different approaches in pilot studies with media companies to test and evaluate the methods and results in order to develop combinations of methods which give a deeper understanding of changing media use and media experience.

1. Introduction

1.1. Task overview and objectives

The objective of this work is to integrate the different media experience assessment methodologies. An important research question is how the various methods employed in media experience research could be combined in order to get more accurate and comprehensive information on media experience. In this connection, the validity (e.g., convergent validity) of the different methods will be assessed in the pilot research to be conducted in fall 2011.

Specific objectives are:
- to identify the most relevant media-specific experience dimensions;
- to examine/assess the validity of the different measures as indices of these dimensions;
- to develop/identify methods to assess co-experience and playfulness and to identify the factors that contribute to them. Co-experience and playfulness are emerging features of media experience because media consumption can be viewed as a social activity that takes place in connection with family member and friends, for example. Playfulness has also been identified as an important factor in media experience;
- to compare the media experience elicited by traditional and digital media.
In particular, this report focuses on identifying and describing the dimensions of the media experience. The output of this task is a model of media experience. Both traditional dimensions known as influencing media experience and new dimensions emerging from the advances of media in terms of interactivity and social factors embedded in the media products are discussed. Our previous research has identified four main categories of research methods of media experience, namely psychophysiological, self-reporting, behavioural and ethnographic. Finally, we provide a framework for mapping the experience dimensions to suitable methods of research taking also into account whether the experience is described through feeling or appraisal dimensions. By providing also a time-based mapping of experience dimensions to different research methods, the report tries also to identify how the objective measurements of different media experience dimensions can be used to assess/predict immediate and long-term (engaging) effects of media use. This in turn can have an impact on designing new product concepts and on identifying target groups and attraction plans of customers.

Media products can be classified based on the type of content as static content, interactive content, and moving picture content (e.g., video). In the present project and report, we focus on the evaluation of media experience with print and digital media that can contain interactive elements and video (however, movies and games are mainly excluded).

1.2. Report structure

The report starts with Executive Summary which summarizes the aim and the contents of the report, as well as the project partners. Chapter 1 presents an introduction of the task carried out.

Chapter 2 introduces the media experience model. To capture the diversity and interconnectedness of media experience dimensions, we have divided the model into three levels, which we named meta, macro and micro, and which influence each other and also have impact on the actual media use and media experience. The Appendix presents in detail the meta- and macro-levels, while Chapter 3 describes the dimensions at the micro-level. Chapter 4 discusses in more detail the characteristics of the research methods used to measure the media experience (i.e., collect and analyse data). Chapter 5 presents a framework which maps the media experience dimensions to several possible research and measurement methods. Chapter 6 concludes the report by highlighting possible research directions and challenges. In Appendix there are detailed the aspects of media experience that are not addressed in the main document or addressed briefly, such as the meta-level, the macro-level describing the social dimensions of media experience, interactivity elements of the media artefact and user interaction models, sensory perception experience map, and user dimensions.

2. General overview of media experience model

The model of media experience developed in this project is presented in Figure 1. It is developed based on theoretical and practical knowledge of audience behaviour and audience or media experience methods. We have also interviewed media representatives both from research, editorial and digital departments about how their organizations do audience research, how they define media experience, and what needs they have for research about media use.
The media experience model presented below does not include time-based phases of media use, nor does it show the causal or temporal relationships between different dimensions using arrows. The dimensions of media experience can occur at different phases of becoming exposed to media. The phases of exposure of a user to a media product and how the engagement/disengagement can occur in time are presented in Figure 2, based on the audience model by Napoli (2010a, p. 91). The dimensions of the experience model in Figure 1 are highly intertwined and in our different research approaches we have different starting points and different research contexts, ranging from the household and individual everyday media practices to laboratory settings with electrodes, to measure emotions.

### Figure 1. Model of media experience (the dimensions in italics are described in detail and considered for measurement in further studies)

The model is first divided into meta-, macro- and micro-levels – from societal change to how the paper of a magazine feels like, for example. The meta-level is introduced because the changing media field and the societal and cultural context are essential in understanding media use and experience, as well as the need to develop existing and new media experience methods. The macro-level, the social uses of media, is a fairly new phenomenon, but with digitalization has emerged not only in web use but also e.g. in e-reading programs as online book club discussions,
online sharing and social filtering. News are circulated by sharing and recommending, they can be commented on or become personalized like in Negroponte’s (1996, p. 153) idea of an electronic personalized newspaper, “The Daily Me” like a “a printed edition of one”.

The micro-level of media experience depends first of all on the medium because print, broadcast and digital platforms provide different types of content to the readers/users. Besides the content (that is, text, images and sounds), the visual format (visuality) in which the content is presented also influences the media experience. The interaction feature as defined by the interactivity elements of the media products influences usability and hence the user experience with the media. The core components of the media experience are the feeling and appraisal dimensions which define the way the user feels and thinks about the media he/she uses. The media practices, needs and user dimensions such as personality and values are described in the Appendix. The dimensions highlighted in italics are described in the main document.

To illustrate a time line of media use and engagement/disengagement, we refer to Napoli’s model of audience dimensions (Napoli 2010a) describing the phases of audience behaviour starting with awareness of a media product and ending with behaviour or action (Figure 2).

![Figure 2. Audience dimensions (Napoli 2010a, 91).](image)

The audience model starts with awareness of media products which can then lead to interest and exposure. This is a crucial issue in the fragmented and competitive media environment. In American magazine shops there can be thousands of magazines to choose. Or how can a new media product be introduced? One way bookstores have set up is a coffee shop inside bookstores where you can browse books, newspapers and magazines. If one starts browsing or watching a program interest can follow but also disinterest. Napoli places attentiveness and loyalty in parallel with exposure as they are described usually with exposure data. They are also placed under the broad headline of engagement which includes appreciation and emotional response. These in turn influence recall and attitude and lead to behavioural changes.

We have presented a comprehensive model of media experience, but do not claim or suggest that all dimensions and methods presented in the following chapters should or even could be used in the same study. Depending on the research questions and theoretical and practical interests, it is possible to combine several dimensions and methods.
around the same media artefact, to study different groups of media users with the same methods, or to map the time-based dimensions and effects of media use depicted in Figure 2. The mapping of the research methods to MX dimensions taking into account the time-line of experience is presented in section 5.

In the following chapters we present what we mean by these concepts and how they are and can be researched.

3. Media experience dimensions

3.1. Visuality and presentational factors

In his book *Unified Theory of Publishing* Brian O’Leary divides the realm of publishing to three entities: context (links, interaction), content (text) and to container (physical and visual form, presentational factors). O’Leary argues that publishing in 2000s needs to go context and content first and forget the restrictions of old container-model in order to evolve and fully benefit from branching to new fields (O’Leary, 2011). O’Leary differs from other protagonists by seeing the context intriguingly as a separate value and component. Usually the media structure is divided only to content and container, where content is seen mainly as a text, forming a trunk of the media “tree with different branches making up the different media in which texts are stored and transmitted” (Erickson 2003) in different forms.

While being beneficial and accurate from vantage point of general media research, from the user experience (UX) point of view the theories which strictly separate content from container and see some components more important than some others are inherently problematic.

Research shows that container – we call it here presentational factors – is integral part of user experience. In fact, it is difficult to draw a rigorous separation line in UX, where content ends and container starts: lay-out, graphics and other visual elements are overlapping with the concept of content, they will give hint and even determine the mood in which the text content is interpreted and are crucial e.g. in decisions about which browser becomes a reader. The first immediate dimension of media experience and interest is the visual outlook of the media product. The first impression is generated in less than a second – whether to continue or not. This applies to media products as whole and also to individual stories.

How is the container constructed? First there is the physical form, for example size and binding of the book, resolution and form of the screen, or paper weight of the magazine. Then there are visual or even precisely graphic design elements, which include colors, typography and pictures, but also textures, shapes, column heads, logos and so on. These elements are arranged with high level design principles like aesthetics, hierarchy and consistency and with the lower level principles like proximity, alignment, repetition and contrast, both levels being guided by the chosen style or style book.

Perceived aesthetic design has many interesting properties. Firstly, several studies have confirmed that people tend to see more aesthetic designs to be easier to use than less-aesthetic ones, even if they are not. (Lidwell, Holden and Butler 2010) Secondly more aesthetic designs are more likely to be used and liking, which is formed at first glance, is likely to be resistant to change, similar phenomena is well documented with regard to human attractiveness (ibid.).

It is important to bear in mind also consistency and hierarchy as visual design is too often seen only as aesthetics. Meaningful visual design is also functional, about how to communicate effectively.
Visual hierarchy in which elements are emphasized and content is organized logically and predictably is crucial variable in UX. Purpose of hierarchy is to make it easy for a reader to use the product. It is about user experience design but also about usability.

Especially important is the brand visuality, the basic visual elements that are produced from issue to issue, or in a series’ episodes in consistent way. Consistency forms the identity, which of course can and have to be varied with limits that are still recognizable for brand. Visuality remains much the same, but cannot be directly copied in its details from one issue to another. Also the visual consistency creates differences between different media products and genres.

Sandboxing the media elements – content, container and context – can also lead to quality problems in production. If visual form is seen as part of content, they are designed simultaneously which leads to different solution as seeing visuality as something that can be added afterwards, like candy wrap. In modern editorial environment the art director is more often seen as a right hand of the editor, taking part in editorial decisions not as an separate artist who tries to visualize text after it has been created (Helle 2010; Helle and Töyry 2009). Bad example of sandboxing is the common phenomena in media web sites, which live in a separate universum not giving much support the main product.

Reactions on visuality can be studied with many methods: interviews, questionnaires, close reading, giving tasks, self-reporting, eye-tracking and measuring emotions in reading situations.

3.2. Feeling dimensions

3.2.1. Emotions

Emotions are a powerful force influencing the behaviour of humans as well as several other species (Plutchik, 2002), and as such there is no reason to expect that they would not be involved in media experiences as well. Emotions are intimately related to the four primary goals of media messages: to attract attention, to be remembered, to entertain and to persuade (Bolls et al., 2001; Ravaja, 2004a). It is likely that media that succeed to move their users emotionally capture more attention and are remembered better, are more entertaining and more persuasive.

Although various definitions of emotions have been proposed, most emotion theorists endorse a multi-component view where emotions are constituted by three aspects or components: subjective feelings, expressive behaviours, and physiological responses; others add cognitive appraisal and/or action tendencies as well (e.g., Oatley et al., 2006; Plutchik, 2002). Dimensional emotion theories hold that subjective emotional experiences can be reduced into a space spanned by a small number of emotional dimensions, such as valence and arousal (Posner et al., 2005; Russell, 1980). Figure 3 displays such two-dimensional space schematically.

The valence dimension reflects the degree to which an affective experience is negative (unpleasant) or positive (pleasant), whereas the arousal dimension indicates the level of activation associated with the emotional experience ranging from very calm or sleepy to very excited or energized. It has been suggested that together the valence and arousal dimensions constitute the ‘core affect’; that is, an ever-present emotional state underlying one’s consciousness (Russell, 2003). Several studies have clearly demonstrated that news messages presented as text, radio and video messages evoke emotional responses that vary on the valence and arousal dimensions (Bolls et al., 2001; Ravaja 2004b;
Ravaja & Kallinen, 2004; Ravaja et al., 2004). Furthermore, it has been shown that high-arousal news messages are remembered better than low-arousal news (Bolls et al., 2001).

More recent postulations have suggested that instead of a continuous dimension, the positive and negative valences should be considered as two independent dimensions (Cacioppo, Gardner, & Berntson, 1999). Additionally, other theorists have suggested that the two main, orthogonal dimensions of emotional experience are negative activation (NA) and positive activation (PA) that represent a 45° rotation of the valence and arousal axes as illustrated in Figure 3 (Watson & Tellegen, 1985; Watson et al., 1999). The NA axis extends from highly arousing negative emotion (e.g., fear, anger) on one end to low-arousal positive emotion (e.g., pleasant relaxation) on the other, while the PA axis extends from highly arousing positive emotion (e.g., joy, enthusiasm) to low-arousal negative emotion (e.g., depressed affect, boredom). The PA and NA dimensions have been paralleled with biological approach and withdrawal motivations, respectively (e.g., Wattson et al., 1999).

![Figure 3. A schematic for the two-dimensional structure of affect.](image)

**Left:** Positive and Negative Activation abbreviated as PA and NA, respectively, are mapped on a Valence-Arousal two-dimensional map of affect (adapted from Larsen & Diener (1992) and Watson, Wiese, Vaidya, & Tellegen (1999)); **Center:** Different emotional responses (adapted from Desmet (2008)); **Right:** An Emotions Color Wheel (adapted from do2learn (2011)).

### 3.2.2. Flow

Flow is defined as being an *optimal experience* (Csikszentmihalyi, 1990). In general, flow occurs when the skill of a user is in balance with the challenge of the encountered task over some period of time. This psychological state refers especially to experiences that are inherently gratifying without receiving any external reward. Csikszentmihalyi labelled this kind of experience as “autotelic” or self-motivating (ibid). In detail, flow can be described by characteristics such as intense concentration on the task at hand, a merging of action and awareness, the absence of reflective self-consciousness, or the loss of time. For example, flow is often experienced when doing creative work, such as writing a story for a magazine or a book, painting a picture, or designing & creating a website. Even daily tasks such as answering emails, taking care of the household, or driving a car can trigger experiences of flow.

An important contribution to flow research in relation to media, particularly in the context of using online media such as news websites, comes from Hoffman and Novak (1996). Central to their account is the navigation through online environments. Important mediating variables are *content characteristics*, such as *interactivity* or *vividness* of the
medium, as well as process characteristics, such as motivation or utilitarian or hedonic benefits that contribute, moderate, or condition the experience of involvement, focused attention, (tele-) presence, and, eventually, flow.

Flow has also been studied in relation to media enjoyment. Because experiences of flow are inherently gratifying and enjoyable, Sherry (2004) argues that they may also occur when media users are in balance between the message difficulty and their usage or interpretation skills. Message difficulty is strongly linked to the narrative structure or writing style, for example. The classical structures, such as tragedy or comedy, are easily understood by the majority of people. However, departures from their inherent characteristics, such as “the purposeful violation of conventions to push the medium forward” (ibid, p. 334), increase the difficulty to understand the message. In order to understand a message a media user must interpret it (see the sense-making process “interpretation” from Wright et al., (2003) and McCarthy & Wright (2004)). However, the outcome of this process depends on the user’s skills, such as on formal training in the interpretation of media content or on accumulated specialized knowledge. If the balance between the difficulty of the message, on the one hand, and a user’s message interpretation skills, on the other hand, is not given, then flow and thus enjoyable experiences of media content cannot emerge.

An empirical study showed that flow occurs both for task-oriented activities (i.e. when website users are in the goal-mode) and for experiential or recreational activities (i.e. when website users are in action-mode) (Novak et al., 2003). However, the task-oriented activities implying goal-achievement may facilitate flow experiences more likely than explorative, experiential, or recreational activities.

3.2.3. Spatial presence

Quite obviously, media that successfully capture the attention of their users and evoke the feeling of engagement, presence or immersion, are likely to become more popular. The concepts of engagement, presence and immersion have been used in several research contexts, sometimes synonymously and sometimes with slightly different connotations, without an agreed upon consensus for their external references. These concepts have received interest particularly in the context of digital media such as computer games, virtual environments and social media. Within these media uses, all of the mentioned concepts revolve around a common phenomenon: how engaged, present or immersed in the media experience the media users are. These media also share a common denominator as they all involve an artificially created, mediated, environment. Presence has been likened to the feeling of being personally and physically present in such an environment; in a sense to the illusion that the mediated experience is not mediated (cf. Ravaja et al., 2006). Lombard and Ditton (1997) have suggested three types of “transportation” into a mediated environment: i) “You are there”, in which the user is transported to the environment, (ii) “It is here”, in which the environment is transported to the user (for example a television program brings events and objects from an environment into that of the user), and iii) “We are together”, in which two or more users are exported into a common space. The last type of “transportation” is discussed in section 3.2.4 Social presence. Below, we discuss spatial presence and its related concepts in more detail.

Immersion, according to a common definition, “is a metaphorical term derived from the physical experience of being submerged in water” (Murray, 1997) and hence characterizes a deep involvement in a media experience. Brown and Cairns (2004), for example, performed a number of interviews to investigate what computer game players themselves mean when talking about immersion. Their results describe a progression of three stages of immersion with
increasing levels of involvement: engagement, engrossment and total immersion. Engagement is a prerequisite for the other levels and refers to the lowest level of immersion necessary for the players to invest their time in playing. Engrossment, the second level, describes a state where the players’ attention and emotions are directly affected by the game. The emotional investment in the game urges players to keep playing and may even lead to emotional fatigue after the playing is stopped. The final level, total immersion, refers to a temporary state of being cut off from external reality so that the game was all that mattered.

If presence refers to the illusion of considering a mediated environment as a non-mediated one, digital media that concentrate on providing realistic visual, audiovisual and multimodal stimulation would seem to have a knack over the traditional media. Traditional media such as news magazines, radio and even television have a hard time competing with the sense of realness provided by modern computer games, virtual reality environments and 3-D cinema. It is nevertheless true that books showing black ink on white paper can be as engaging as computer games powered by the latest graphics cards and even provide a strong sense of “transportation” into the book’s imaginary environment. Quite clearly, these examples illustrate the importance of both spatial and psychological involvement in a mediated environment, which should be kept separate in the context of different media. The existing measurement scales (see section 4.2.2 Spatial presence questionnaires) in fact appear to do so.

3.2.4. Social presence

Social presence is a component of the so-called co-experience dimension of media experience (see Appendix). Social presence is itself a multidimensional concept that involves the feeling of being together with other person(s) in a real or virtual environment, as well as the possibilities and needs for communicating with the other person(s). This construct can be measured using self-reported data that are gathered using for example the social presence inventory developed by Biocca et al. (2001) and Harms and Biocca (2004). In this questionnaire, the social presence is determined by three dimensions, i) co-presence; ii) psychological involvement; and iii) behavioural engagement. First, a trivial prerequisite for social presence is physical co-presence, i.e. that the observer is aware that he/she is not alone and secluded. The requirement of physical co-presence is not sufficient for social presence; however, any more than being in the same space with a person would suffice for meaningful social interaction. The second level of social presence refers to psychological involvement with the other actor. This dimension includes, first, mutual understanding of the communication between the actors, but also emotional empathy between them. That is, at this level, the actors are capable of understanding each other’s emotions during the communication and also experience empathy so that their emotions influence each other. Behavioural engagement, the third dimension, refers to the extent to which an actor’s behaviour affects and is affected by the other actor’s behaviour. Figure 4 presents the theoretical dimensions of the social presence construct.
There are also other research methods that can potentially be employed to study the degree of social presence, for example, observation, psychophysiological measurements, interviews, and behavioral measurements by the means of eye-tracking.

3.2.5. Sensory perception

Sensory perception dimensions (or sensory attributes) are the properties of media that we perceive through our senses, such as colourfulness of pictures, gloss or roughness of paper. These properties are known to affect our overall media experience in many ways, either strengthening or weakening the mental impressions that are desirable for a given media product. Only a fraction of sensory information in real-life situations enters our conscious perception, but nonetheless these lower-level perceptual attributes shape our higher-level psychological response to media products in various ways, even if we are not aware of it. An important goal in sensory evaluation studies is to better understand and ultimately control these perceptual effects in the development of media products and concepts.

In the following we present examples of typical sensory media attributes. The list is not meant to be exhaustive but indicates the kind of attributes that are typically measured. Somewhat different sets of attributes are required for describing the sensory perception in the context of different media types. It should also be noted that human perception of the world is fundamentally multimodal, the information from different senses interacting with one another: what we feel with our fingers or hear with our ears may affect what we see with our eyes, and vice versa.

Visual attributes

Most visual attributes apply to all kinds of visual media, and depend both on the properties of the media and the processing of visual content. Further sensory attributes may be necessary in specific research tasks, for example when dealing with moving images, stereoscopic 3D media, real 3D shapes and forms, or the effect of different textures in surfaces or layout elements, for instance. Also the colour perception can be broken down to more detailed visual dimensions. Together these lower-level visual attributes mould the higher-level experience of \textit{visuality}.

- \textbf{Gloss} refers to the perceived magnitude of ambient light that is specularly (as from a mirror) reflected from the surface of a printed product. \textbf{Flare} is a similar attribute for self-luminous displays. While flare is mostly considered
to be an annoyance, gloss can be a desired attribute in printed products and can strongly affect the mental impressions associated with the product.

- **Whiteness** refers to the perceived similarity of an object to a “perfect” (preferred or standard reference) white. Whiteness is associated with colour stimuli that are categorized as white, but whitish surfaces such as paper may show a degree of departure from the perfect white. Departures along specific perceptual hue axes, such as reddish-greenish, may be further specified.

- **Contrast** refers to the magnitude of perceived tonal differences of a view, from the darkest black to the lightest white. Here a “view” may refer to a single image, a printed page, a whole magazine, or a self-luminous display.

- **Vividness** refers to the perceived overall colourfulness or chromatic contrast of a view.

- **Sharpness** refers to the perceived clarity of edges and small details in view.

- **Readability**; The perceived ease of reading text on a given media product.

- **Artifactual attributes** refer to a general class of unwanted visual attributes such as perceived noise in images, or unevenness of colour surfaces.

**Tactile surface, structure, and handling attributes**

These attributes are typically used in describing those properties of printed products that are felt with the sense of touch, some of them being also applicable to other types of media surfaces.

- Perceived **Roughness** of the surface, ranging from smooth to rough.

- **Slipperiness** refers to the perceived lack of friction when sliding one’s finger on a surface.

- **Stickiness** refers to perceived tendency of paper (or other surface) to stick to one’s fingers.

- **Rigidity** describes the perceived structure of paper, ranging from flexible to rigid.

- **Stiffness** refers to perceived flappiness or stiffness of the paper when being handled.

- The perceived **durability** and **page turnability** are also important attributes for print media.

**Auditory and other sensory attributes**

In print media the sound of handling a book, magazine, or newspaper can be described by attributes such as **sound intensity** (quiet-loud) or **sound quality** (soft-hard). A wider range of applicable attributes arises when describing the auditory perception of the broadcast media and on digital platforms.

The sense of smell (interacting with taste) is known to often evoke strong responses and to affect our emotions, and to strengthen and trigger memories. This has been taken advantage of in the print media by the use of scented inks and varnishes.

### 3.3. Appraisal dimensions

Appraisal dimensions are those that characterize the meaning of media to its user. These dimensions are likely to influence the user’s *engagement* with the media and its *emotional evaluation*. Cognitive appraisal theories of emotion describe emotion as a process where the emotional experience of an event is based on its (conscious and unconscious) appraisal in terms of, e.g., self-relevance, familiarity, coping potential (Scherer, 1999). For example media items that
are considered more interesting are likely to be more self-relevant and to evoke more positive emotional reactions in their users. Below, we suggest eight dimensions for evaluating the properties of media. These dimensions can be measured via media users’ self-ratings for example on a 5-point Likert scale ranging from response options “Strongly disagree” to “Strongly agree”. Additionally, we present brand experience with an associated self-rating scale.

3.3.1. **Usefulness**

Usefulness refers here to the subjective perception of how useful a media item is to its observer. This implies that the user has some goal and the media item is perceived as helping in attaining this goal. Although the goal may typically be gaining information, there may be also other goals, such as social interaction or mood regulation. Thus, usefulness applies well to any media with factual contents, such as news messages in print or digital media, but is not limited to it. It would be expected that usefulness is related to the emotional valence of media experience; that is, useful media is expected to elicit positive emotions.

3.3.2. **Interestingness**

Interestingness is an important part of the personal significance of the media item. That is, interestingness is a prerequisite for the four important objectives of media presented above: interesting media items attract attention, are remembered better, are more entertaining, and are more persuasive. Interesting media items are also expected to elicit higher emotional arousal. Interestingness is expected to strongly affect the behaviour of a user; for example, a user is likely to read news messages with interesting headlines. Interestingness applies to all types of media and all contexts of using media.

3.3.3. **Understandability**

Understandability is of importance with any kind of media and in all media use contexts. Irrespective of the complexity of the media contents, the media item has to be as understandable for its audience as possible. Understandability is a prerequisite for usefulness and interestingness. Non-understandable media items are expected to elicit frustration and negative affect.

3.3.4. **Trustworthiness**

Trustworthiness or credibility applies to media use where the aim is to gain information or knowledge (e.g., when reading news messages). Trustworthiness here refers to the perceived truth value of the used media. For example, for news services, trustworthiness is of utmost importance. A news message read from an untrustworthy news source is likely to evoke suspicion and negative emotions and, in the long run, such sources are unlikely to keep up the interest of their users (resulting in rejection). An untrusted news message is also unlikely to be useful.

3.3.5. **Familiarity**

Familiarity refers to how familiar a person is with the specific media channel or media provider he/she is using. For example, people who have read a specific news journal or followed a specific Internet site for a long time may keep reading the same journal or Internet site because of their familiarity. Similarly, some elderly people who have never gotten accustomed with computer technology may feel repulsed or intimidated by any kind of media applications involving computers. Respectively, it is important to know in advance how familiar a specific media channel, media
provider or type of media item is to the person experiencing media. Familiarity is likely to increase perceived trustworthiness, may increase understandability and is closely associated with brand. Familiarity applies to all types of media but it can be considered at several levels (that is, in different contexts): familiarity with the media channel itself (e.g., computers), familiarity with a specific media service (news magazine or Internet news provider) and familiarity with a type of media item or media activity (reading books, kinds of journals, computer game genres etc.).

### 3.3.6. Unexpectedness

Entertainment media in particular requires that the media item contains unexpected elements in order to maintain the interest of the observer, that is, unexpectedness is related to interestingness and positive emotional evaluation of the item. In other contexts unexpectedness may be considered annoying, and it may hinder understandability and usefulness of the media item. Unexpectedness, when understood in a positive sense, applies best to all entertainment media. That is, unexpectedness is an important part of amusement so that the media users continue to keep up their interest.

### 3.3.7. Brand experience

Brand experience is conceptualized as “sensations, feelings, cognitions, and behavioural responses evoked by brand-related stimuli that are part of a brand’s design and identity, packaging, communications, and environments” (Brakus, Schmitt & Zarantonello, 2009). Brand experience is expected to contribute to the overall emotional responses to a given media. It is also expected to affect the behaviour of the user (adoption vs. rejection).

### 3.3.8. Price/value

Price pays an important role in decision to form a sustainable readership relation with media products and their content. Consumers are used to paying for digital services like broadband, mobile phones, TV channels and so on. But as the perceived value exists in consumer’s head and opinions the pricing strategy is not self-evident and should not be based on old print-media pricing systems.

Research has shown that people are willing to pay around 100 dollars for e-ink eReaders and 200-300 for colour tablets (on a mass scale). For e-books the price has settled between 10-120 dollars. Consumers are not willing to pay for basic news services as there are so many news providers for free. As magazines and newspaper circulation is in Finland based on yearly subscriptions people are not used to pay in the web either for singular copies or news articles. Some kind of packaging and value added services are possible scenarios for the future. But the news should not be over-emphasized; they are not the main focus of the general public’s media consumption. Therefore the pricing methods should be carefully studied and piloted before implementation.

Media companies should take into account other methods for revenue creation besides charging for content. Communities around consumption of travel, wines, books, gardening etc. can create extra revenue, as well as organizing events, useful interactive advisory services etc. can also generate money as the consumers trust the media brand and its recommendations.

### 3.3.9. Playfulness (entertainingness)

Playfulness is a powerful motivator for behavior, as is exemplified by the recent “Digitalkoot” project organized by The National Library of Finland and Microtask company (URL: [http://www.digitalkoot.fi/](http://www.digitalkoot.fi/); accessed 18. April 2011).
The goal of this project is to recruit people to help in digitalizing old Finnish newspapers. Most of the newspapers have already been digitized using computerized text recognition; however, the recognition algorithm is not able to identify all words and it also makes some mistakes. To correctly recognize such words, Digitalkoot have created games where players proceed by writing words where the computer failed or by identifying words the computer has misread (see Figure 5). According to the Digitalkoot webpage, Internet players have at the time devoted more than 170,000 minutes to these games.

Playfulness appears to be a concept whose meaning everyone knows, but which is very difficult to define. Existing research literature describes several characteristics of playfulness. However, there are two distinct perspectives of looking at this concept: 1) as a feature of the users; 2) as a feature of the system/product. When referring to people, playfulness is characterized by cognitive, physical, and social spontaneity; manifest joy and a sense of humour in children (Barnett, 1990); and gregariousness, uninhibitedness, comedic expression, and dynamicity in adults (Barnett, 2007). When referring to a (media) product, in order to be considered playful, this should enable a playing activity and elicit the aforementioned mental states in the user.

![Figure 5. Mole Hunt game created in Digitalkoot where the aim is to identify words that were misread by the computer. Image copied from URL: http://www.digitalkoot.fi/](image_url)

Most of the existing studies seem to consider playfulness as a trait of the user rather than an activity (Barnett, 2007; Glynn & Webster, 1992). Woszczyński and co-workers (2002) have suggested that playfulness as an activity corresponds to the behaviorally observable component of flow experience (Woszczyński et al., 2002); however, they do not define what these behavioral components are. We think that the view of playfulness as a trait of the user holds only partially true. That is, a more fruitful approach may be to view playfulness as a state characterized by those behaviors and mental processes listed by Barnett (1990, 2007; see above) and elicited by the characteristics of a media product/service in interaction with the traits of the user. The question then arises as to which are the characteristics of a media product or a service that elicit playfulness. The concept of playfulness seems to apply best to media channels and media artefacts that are designed for entertainment. In particular, digital computer games have become one of the most popular and socially acceptable ways to experience and express playfulness among adults. For example popular party games (e.g., Singstar, Guitar Hero, Kinect and Move games) obviously fulfil the characteristics of playfulness in adults (Barnett, 2007): they involve gregariousness (sociality), uninhibitedness, comedy and dynamicity. However, even characteristics of a user interface (e.g., in iPhone) may potentially elicit more subtle forms of playfulness.
3.4. Interaction dimensions

In the context media experience research the term interaction refers to the process of using a media product in a given context for particular reasons. Given this perspective, interaction has consequently a considerable impact on how a media product is experienced by the user. Interaction is commonly understood as an iterative process that starts with a person’s goal. A phase follows in which the person creates a plan on how to achieve the goal. A translation into concrete behavioral sequences follow that are then executed against the environment. The sequences reflect the way a person believes to achieve the goal. Then the person perceives the feedback from the environment, if any, interprets it and evaluates whether the changes in the environment reflect the expected change correctly. If not the action sequence will be modified and adapted so that the expected outcome will be achieved after later execution. The person repeats the cycle until the overall goal is achieved.

From an experience perspective, two of the most important components determining it are the usability of a product and its interactivity.

3.4.1. Usability

ISO defines usability as being the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction, in a specified context of use. Several additions to ISO definition exists, one of the most well-known is Jakob Nielsen’s who supplemented definition with learnability, memorability and low error rate.

Traditionally, usability is used to measure interactive systems with quantitative methods. It has its background in Human-Computer Interaction (HCI) studies made in small circles at the beginning of modern computer era to test and research emerging graphic interfaces (GUI) and gained momentum in the beginning of the 90’s when computers become mainstream and web-pages become popular (Myers, 1998). After that the scope of usability has keeping on widening.

In 2000’s it is common to talk about usability as ease of use of any made object, service or even environment. (See for example, Norman (1990)). Currently it is common to see usability as one element of user centered design (UCD), a design philosophy and a process where usability is evaluated at every stage of the design process, and the users’ wants and limitations of end users of a product are given extensive attention in addition of fulfillment of the goals of the project.

However while usability and UCD are well established field of industrial design, in graphic design the tradition is still somewhat weak focusing mainly to two fields: designing for people with disabilities (so called Design for all – tradition, DfA), and research focusing on the relationship between legibility and typography. Latter has been developed specially in the field of psychology.

There has been a lot of discussion lately for the urgent need of making inroads for this tradition in the field of graphic communication. For example, Hannu Pulkkinen stresses in his dissertation Architecture of News that “it is my understanding, that development of Finnish newspapers would require that publishers would do and use more audience research and usability research”, “old readability research is not enough, we need versatile information of how reading
is done (Pulkkinen, 2007). Other veteran of newspaper design, Carl Henning, has also brought this subject up (Lamberg, 2005).

The problem is that traditional methods like heuristics (see for example, Shneiderman (2005)) are geared for interaction design and are not directly applicable to print. The other caveat is that currently visual designers receive only small amount - if any- expertise in the field of usability. Educational needs have been underlined for example by Steven Heller (Heller, 2006) and Jorge Frascara (Frascara, 1997). Academically educated graphic designer should be able to fulfill the old roles of commercial artist and author, he should be able to advance designs with quantitave methods and point out why certain solutions are appropriate to certain needs (ibid.)

Importance of usability and UCD is still likely to increase due to the growing amount of elderly people and the new transition of print to digital media via eReading devices and tablets. More characteristics of usability of eReading devices and products are presented in Appendix, section 7.4.1.

Methods of measuring usability are described in section 4.5 and also in the Appendix. New possibilities for gathering the user data are opening through the emergence of tablets, for example it will be possible in future to measure how much time a user spends in particular section with automatic logging measurements.

3.4.2. Interactivity

The concept of interactivity of a product can refer to multiple meanings that are still under debate in science. However, three meanings can be distinguished. First, interactivity refers to the degree of relatedness of exchanged messages in the interaction with an interactive artifact or in the communication with another person (Rafaeli, 1988). This relatedness reflects the variability of the dynamics of interaction and communication (Kiousis, 2002) and, besides the number exchanged messages, is an important indicator of the “hotness” of a discussed topic in the comment section of an online newspaper, for example. The second meaning is influenced by the technological capabilities a medium itself. Interactivity is characterized by the speed, range, and mapping capabilities of a medium that influence the “extent to which users can participate in modifying the form and content of a mediated environment in real-time” (Steuer, 1992, p. 84). The third conceptualization comes from researches addressing the perceptual side of experiencing interactivity of a medium or artifact. From this perspective interactivity is described as a psychological state and linked to self-efficacy (Newhagen, Cordes, & Levy, 1995). That is, users evaluate the interactivity of a medium based on the quality and quantity of feedback they get from the receiver after sending a message. But also direction of communication, time flexibility, sense of place, level of control, responsiveness, and perceived purpose of communication play a role (Downes and McMillan, 2000).

In the context of Media Experience we consider interactivity to refer to the set of perceived and accessible choice alternatives that allow a user to actually interact with the product, i.e. decide the next step in using the product. For media products these choice alternatives may refer to a number of visible affordances, such as pages, buttons, menu items, checkboxes, or any other interactable user interface components. In web environments, such as on an online news website, for example, links to different news sections, i.e. politics, economics, sports, etc., represent such a set of choice options. In a magazine application on a tablet computer choice options may refer to the way a reader can navigate
through the magazine, how s/he can access additional content within an article or in which ways new or other issues of the magazine can be obtained.

Given that perception is the first stage of any interaction a person has with the environment, the experience of interaction and interactivity starts usually with the visual scanning of the environment. In a media context, a person glances over the user interface of the medium and perceives the available choice alternatives to engage in physical interaction. For print media this can be the table of contents and the perception of the titles and page numbers on which to find articles or book chapters. If one of the seen items creates a positive emotional response, either because it fits to the current reading goal of the person or because other factors trigger an internal activation the likelihood of navigating to the item or accessing it will increase considerably and consequently it is visited or consumed. An important fact in this process is that the semantic meaning of the item description, e.g. either a textual label or a pictorial representation precedes the triggered affect (Storbeck, 2006). In other words, a person always first has at least a rudimentary understanding of the environment before the emotional stimulus is triggered that leads to observable behavior. From a research perspective this means that concrete behavior, such as the clicking of a link in an online newspaper, can be assumed as a reflection of a person’s interest.

From a product design perspective interactivity thus offers a design space to guide users through a media product by the careful arrangement and layout of content elements such as labels, headlines, pictures, or graphics. Thus interactivity and visuality act as moderators of media experience.

4. Research methods

4.1. Psychophysiology

Psychophysiology is a branch of psychology that studies the changes in the activity of the physiological systems caused by the psychological input (Turner 1994). The psychological input can be represented by different cognitive, emotional and behavioural phenomena. These are then studied as to their effects and relationships to physiological systems by observing/measuring, for example, heart rate, electrodermal activity and electroencephalographic activity. Providing that specialized equipment and experience are available, these types of psychophysiological measurements have been found as yielding useful information for assessing media experience in terms of attention and emotion of users.

Psychophysiological measures have some advantages over participants’ self-reports of emotions (Ravaja 2004a). Self-reports typically have to be collected after the experimental session in order not to interfere with it, which makes them prone to the confounding effects of language, memory and cognitive interpretations. Importantly, psychophysiological measures may also reveal subtle emotional responses that are not available to conscious awareness. A potential problem with psychophysiological measures is that they may be related also to other psychological constructs. For example, heart rate can explain both changes in attention and emotion, thus making this measurement difficult to interpret; whereas heart rate accelerates to emotional arousal, it is decelerated by attentional engagement.
### 4.1. Facial electromyography (EMG)

Facial EMG is a noninvasive method, where the facial muscle activation level is measured by attaching electrodes on specific facial locations, and which is used frequently as a psychophysiological index of positive and negative valences (P. Lang et al., 1993). There are three muscles whose responses are usually recorded using electromyography: zygomaticus major (lip corner raiser muscle), corrugator supercilii (brow furrower muscle), and the outer region of the orbicularis oculi (cheek raiser muscle).

### 4.1.2. Electroencephalography (EEG)

EEG is based on the recording of the electrical activity of the brain with electrodes placed in a special cap (2-256 electrodes). The EEG data are typically analyzed using spectral analysis. One of the most important indices derived from EEG data is brain prefrontal asymmetry that has been used to index emotional valence and motivational direction. Accumulated research suggests that relatively greater left frontal cortical activation is associated with positive activation (PA) and approach motivation, whereas relatively greater right frontal activation is associated with negative activation (NA) and withdrawal motivation.

In addition, alpha activity has been found to correlate with attention, emotional arousal, interest and recall (Simons et al. 2003). Alpha wave power is defined as the amplitude of brainwaves in the 8-13 Hz frequency band.

The EEG measurements have also been used in measuring social presence by assessing the synchronicity of biosignals of two persons/users while engaging in a decision making game (Basiloni et al., 2007). That study stimulates further research in this area to measure social presence of users engaged in media use. Moreover, simpler biosignal recordings, such as skin conductance (see below for EDA), facial electromyography (facial EMG) and heartbeat intervals (see below) could be evaluated as to their validity to measure social presence in media use.

### 4.1.3. Electrodermal activity (EDA)

EDA measurement is commonly known as skin conductance and it measures changes in the electrical conductance of the skin caused by the level of sweat in the eccrine sweat glands. EDA is frequently monitored to measure the activation of the sympathetic nervous system (Ravaja, 2004a). Consequently, EDA is an excellent index for the physiological component of arousal, and it has been shown to correlate with subjective ratings of arousal (P. Lang et al., 1993). Specific measures based on EDA can index the occurrence of involuntary attention (see Ravaja, 2004a).

In contemporary electrophysiological research, EDA is usually measured with a constant voltage bridge. For skin conductance measurement, specific electrodes are placed on the palmar side of the second phalanx of the first and second fingers of the nonpreferred hand although other placements are also possible.

### 4.1.4. Heart rate (HR) and related measures

Heart rate refers to the number of heart beats in a minute (Ravaja, 2004a). HR is influenced by both sympathetic and parasympathetic arousal. In order to measure the heartbeats, one can measure the electrical potentials generated by the heart during each cardiac cycle using electrocardiography (ECG). In psychophysiological studies, only the reliable identification of the R peaks on the ECG is usually required which indicates the time when the left ventricle contracts and pump the blood out to the body. The time between R peaks represents the interbeat interval (IBI).
Another measure is given by the **heart rate variability** (HRV). Heart rate variability refers to the fluctuations of HR occurring in response to mental or physical demands. Related to stress and mental effort, it is known that if stress and mental effort (e.g., caused by searching information from Internet) increases, then HRV decreases (Tullis and Albert, 2008). A measure based on HRV that holds promise for media research is the **respiratory sinus arrhythmia** (RSA), which is highly sensitive to changes in attention (Ravaja, 2004a) and overcomes the disadvantages of the heart rate measurements, which are difficult to interpret.

### 4.2. Self-reporting

Self-reported data are collected when one wants to gather information about user’s perception of a product or of the interaction with it, or to gather information about the emotional experience of the users such as what the users feel about the product. Self-reported data can be collected both during laboratory sessions of interacting with the product or during live interaction. Self-reported data are commonly collected during a usability study and may regard aspects like credibility, efficiency, effectiveness or satisfaction of the whole product or of specific tasks, but also may be focused on specific elements of the product such as homepage, online help, search function, etc.

There are many ways of collecting these kinds of information from users, but the most common techniques are rating scales (e.g., Likert scale, semantic differential scale), lists of attributes to choose or to rank, and open-ended questions. According to Tullis and Albert (2008) in laboratory settings it is recommended to use standard questionnaires for assessing the aspects or elements of interest, if such questionnaires exist or to adapt existing questionnaire to the objectives of the studies. In live settings, the questionnaires should be limited in size and focus on the most relevant aspects to be evaluated. In psychological studies, a common instrument for measuring the emotional response to an event is the self-assessment manikin (SAM). The SAM is a non-verbal pictorial assessment technique that was developed by Lang (1980; Hodes, Cook and Lang, 1985) to directly assess the pleasure (valence), arousal (activation), and dominance (degree of control) in reaction to an object or an event. This instrument has been effectively used to measure emotional responses to various stimuli such as pictures, images, sounds, advertisements, and pain.

In media research, there are a number of standard questionnaires that are continuously built up and evaluated. As an example, for evaluating social presence there is a social presence inventory developed by Biocca et al. (2001). In addition to questionnaires, there are other ways to measure media experience, for example, using specific ratings scales for measuring sensory attributes such as gloss and color. In the following, we shortly describe existing standard questionnaires or other self-reporting approaches for measuring relevant dimensions of media experience.

#### 4.2.1. Sensory evaluation

Sensory evaluation techniques are used to measure the low-level sensory attributes of media samples *as experienced by human observers through their senses*. Examples of such sensory attributes include gloss or roughness of paper in print media products, or sharpness or colourfulness of pictures, graphics, or text (whether printed on paper or shown on a digital display) among others (see section 3.2.5 for a list of attributes). Sensory evaluation can be seen as a form of self-reporting, but it does not typically involve the kind of conscious introspection as sometimes found in other self-reporting techniques. The participants are typically given a task to order or rate the given set of media...
samples according to the perceived magnitude of the given sensory attribute, and a perceptual scale for the media samples is calculated from the raw data from multiple participants. When conducting a task in sensory evaluation experiment, the participant effectively compares certain aspects (defined by the sensory attribute being evaluated) of the internal experiences evoked by different external stimuli (the media samples being evaluated).

As an example, a sensory evaluation study could be carried out to study the perceived sharpness of pictures. For instance, the variation in sharpness could be caused by different properties of various paper grades, printing or display technologies, or numerous variables in media production processes, starting from photography.

A number of different experimental techniques can be used in sensory evaluation, the designer of the experimental setup choosing the optimal one based on factors such as the number and type of media samples, the range of attribute levels present in the sample set (from just noticeable differences to differences of large perceptual magnitudes), the available resources, and the desired mathematical descriptive power of the resulting perceptual scale (whether it is enough to simply have the samples roughly ordered according to a given attribute, or if accurate indication the relative magnitudes of perceived differences between the samples are needed).

Common techniques include direct interval scaling by using a physical ruler (for example, asking the observers to place the sample with the picture of highest perceived sharpness on one end of the scale, the least sharp sample on the other end of the scale, and the others between them so that the distances on the scale correspond to perceived differences in sharpness), or indirect interval scaling techniques such as rank ordering of the samples according to the magnitude of the given attribute (from the least sharp sample through to the sharpest sample) or paired comparison (repeatedly choosing the sharpest sample of the pair from the samples presented in pairwise manner). All three experimental techniques, when combined with appropriate data analysis methods, yield interval scales on which numerical differences correspond to perceptual differences between the samples.

Use of trained sensory evaluation panels (such as those trained to efficiently and consistently evaluate and report differences in certain sensory attributes between different paper grades) allows sensory evaluation studies to be carried out efficiently, while a larger number of observers and additional time dedicated to introducing the observers to the evaluation task is needed when using untrained consumers. Nonetheless, low-level sensory perception is considered to be relatively similar across different observers (apart from those with abnormal sensory physiologies, such as color-blind individuals) and thus the sensory scales of media products resulting from sensory evaluation studies are expected to be independent of the group of observers participating in the experiment, although less random variation is expected with trained panels than with untrained observers, all other factors being equal.

When multiple sensory attributes of different media product samples have been measured, profiles comprised of values of different sensory attributes can be used to describe and compare the sensory experiences evoked by different samples. For example, Figure 6 compares the sensory profiles of three different print media products.

Further, we have used similar evaluation techniques to measure aspects of higher perceptual level, such as the overall pleasantness of a media product or perceived harmony of layout. Indeed, a goal of a sensory evaluation study can be to find out how low-level sensory attributes contribute to such higher-level perceptions. The experience map shown in the Appendix provides an example of how the relationships between different products and their attributes can be visualized.
4.2.2. Spatial presence questionnaires

Although the concept of presence was at first measured using ad-hoc self-rating items, more conclusive and empirically validated self-rating scales such as ITC-Sense of presence inventory (ITC-SOPI; Lessiter et al., 2001) and MEC Spatial Presence Questionnaire (MEC-SPQ; Vorderer et al., 2004) have been developed recently. Both scales have been derived theoretically, and revised and validated empirically using factorial and confirmatory methods.

The ITC-SOPI scale consists of four factors: i) Sense of Physical Space, ii) Engagement, iii) Ecological Validity and iv) Negative Effects. The first factor consists of items such as “I felt I was visiting the places in the displayed environment” that tap the sense of physical placement in and interaction with the mediated environment. Engagement contains items related to psychological involvement and enjoyment such as “I felt involved in the environment”, “I enjoyed myself” and “My experience was intense”. Ecological Validity refers to the perception of the mediated environment as lifelike and real, whereas Negative Effects refer to any adverse physiological reactions.

The MEC-SPQ scale consists of several factors, including Attention Allocation (e.g., “I devoted my whole attention to the [medium]”), Spatial Situation Model (“I was able to imagine the arrangement of the spaces presented in the [medium] very well.”), Spatial Presence / Self Location (“I felt like I was actually there in the environment of the presentation”), Spatial Presence / Possible Actions (“I felt like I could move around among the objects in the presentation”) and Higher Cognitive Involvement (“The [medium] presentation activated my thinking”).

Both of the presented presence scales appear to be most suitable for new media such as computer games; however, they could be used also with traditional media. Of the ITC-SOPI factors, the three first factors, Engagement in particular, apply at least to some extent to all media types. MEC-SPQ scale has already been tested with four types of media including text, movie, hypertext and virtual environment (Vorderer et al., 2004).

4.2.3. Social presence questionnaire

The social presence can be measured using questionnaires. Biocca et al. (2001) have developed the Networked Minds Social Presence Inventory, which is a questionnaire that has been intended to tap the three levels of social
presence described in section 3.2.4. The self-rating items in the scale have been selected from an initial set of questions, and the validity of the resulting factors (Figure 4) has been confirmed via factor analytic methods. Different types of media channels have been used when validating the scale.

4.2.4. Flow questionnaires

Several scales have been derived for measuring flow (e.g., Novak & Hoffman, 1997; Poels et al. 2006). In a self-report scale developed for measuring various components of gaming experience (Poels et al., 2006), the flow component is operationalized as a sum of the following self-report items that are rated on a 5-step scale: “I was fully occupied with the game”, “I forgot everything around me”, “I lost track of time”, “I was deeply concentrated in the game” and “I lost connection with the outside world”. As can be seen from these items, flow shares similar characteristics as spatial presence (see section 3.2.3 and section 4.2.2).

4.2.5. Emotion ratings

Self-ratings are the most commonly used measures for emotional dimensions. For example, valence and arousal dimensions are routinely measured via graphical or textual Likert scales. In a commonly used measurement scheme (Lang, 1994), the valence scale consists of nine graphic depictions of human faces ranging from sad to happy expression, whereas arousal scale contains nine graphical characters varying from a calm state to a state of high visceral agitation. Positive and negative activation (PA and NA) are often measured as sum variables of self-rated items such as joyful, enthusiastic and peppy (high PA) or distressed, anxious and fearful (high NA) (e.g., Ravaja 2004b; Watson et al., 1999).

4.2.6. Playfulness scales

Playfulness seems to be an elusive concept to study experimentally. In addition to the lack of clear theoretical specification and existing research methodology, playfulness is easily confounded with other positive emotional phenomena such as joy, happiness and cheerfulness (cf. Kruger, 1995).

Self-evaluation scales exist for evaluating the playfulness as a personality trait among adults. For example, Glynn and Webster (1992) have developed a self-evaluation scale for adult playfulness, (however, see Kruger 1995 for heavy criticism) and Barnett (2007) lists 15 qualities (e.g., “cheerful”, “spontaneous”, “jokes/teases”) that uniquely describe a playful individual based on factor analysis. Although playfulness may show overlap with more established personality traits (Woszczynski et al., 2002), in particular the work by Barnett (2007) appears to be useful in evaluating the playfulness trait of media users. The existing playfulness self-evaluation scales could also be used to measure the playfulness experienced during media use rather than playfulness trait. For example, the playfulness characteristics of Barnett (2007) translate easily from traits into activities; e.g. “I felt cheerful”, “I acted spontaneously” and “I felt like making jokes”. Because the scales have not been validated for such use, however, their validity needs to be re-established after such evaluation data has been collected.

4.2.7. Brand experience scale

Brakus and co-workers (2009) have constructed a brand experience scale and confirmed its reliability and validity using a range of analytic methods. The scale consists of four dimensions, which on their part consist of a total
of 12 self-evaluation items. The four dimensions (with example items) are sensory (“…makes a strong impression on my visual sense or other senses”), affective (“induces feelings and sentiments”), intellectual (“stimulates my curiosity and problem solving”) and behavioural (“results in bodily experiences”) brand experience.

4.3. Behavioural measurements

Behavioural measures capture the physical actions that humans target at information technology. These actions are usually produced to exert some form of influence on the given user interface. Users usually combine several actions into patterns of behaviour allowing them to accomplish their goals. From an observer’s perspective such patterns not only indicate the goals users have, but also allow to deduce users underlying motivations of using information technology. Typical actions include eye movements, mouse movements, click streams, keyboard presses, or any other information that comes from an input device connected to a computer observing and recording human behaviour.

4.3.1. Eye tracking

Eye-tracking refers to the measurement of human visual attention by recording a person’s eye movements. For experience research this is particularly important as visual attention can tell the investigator where a person looks at, i.e. the object of interest in the surrounding environment. In the context of media experience, eye-tracking reveals which type and part of content a person is paying attention to.

To measure visual attention three basic types of eye movements are of primary interest: saccades, smooth pursuit, and fixations. Saccades are fast movements or jumps of the eye “used in repositioning the fovea (the focal point on the retina of the eye) to a new location in the visual environment”. Saccades may be executed both in a voluntary and reflexive fashion and last between 10 and 100ms. Smooth pursuit occurs when a person visually tracks a target moving in the environment. The constant focus on the moving target requires the brain to continuously update the eye positions, manifested as a simple negative feedback loop based on a few neurons. Fixations are non-moving points of interest in the environment on which a person focuses. Unlike what the term suggests, fixations do not imply that the eye is fixed on a particular point. Rather, miniature movements such as tremor, drift, and micro-saccades move the eye constantly over and around the object of interest. The reason for the constant eye movements is the motion-sensitive nature of the human vision system: the brain needs motion in order to make sense out of the sensory information coming from the retina. Without the miniature eye movements the image on the retina fades away, as the photosensitive cells in the retina no longer fire any signal.

Eye movements are of interest to media and experience research as they provide information about a person’s interest. A typical measure of visual attention, for example, is the duration of fixations. Measured in milliseconds, this metric can take values between 200 and about 600ms; longer ones occur very seldom. In general, the longer the eye focuses on a certain object or area of interest in the environment, the more interesting this object may be to the observing person. Saccades can also tell something about a person’s behaviour. The longer the span of a saccade, i.e. the higher its amplitude measured in degrees of visual angle, the more likely it is that a person searches through the visual scene she or he is seeing as compared to reading, for example. This has implications for media and experience...
research, as real-time analysis of such data can be used to deduce whether a person consumes the content that she or he is seeing or whether she or he is looking for more content, for example.

Eye movements are recorded by a video camera that continuously observes one or both eyes of a test subject. The camera operates in the infra-red bandwidth of the electromagnetic spectrum. This is particularly important because of two reasons. First, measuring the eye via infrared makes the camera insensitive to surrounding changes in the luminance of visible light. Consequently, it can even track eyes in total darkness. Thus this property makes eye tracking robust and reliable in this regard. Second, this measure remains unobtrusive for the test subject as infra-red light does not have any harmful effect on the retina or other sensitive tissues of the eye.

4.3.2. User logging

User logging refers to the recording of actions users exert against a computer input device, such as a touch screen, a mouse, a keyboard or any other device translating human behaviour into computer-understandable signals. In a media context user logs mirror the path users take through contents. Therefore, a classical analysis result from such data is the average path. An average path is the “typical” path users follow when using an online newspaper, for example. The analyst can find out how stable that path is across users, e.g. how often users start to read the cover page and then immediately go into the “foreign news” section of the paper.

The data produced is often voluminous because many different user actions can be easily captured at the same time. Although the data is usually present in a numerical form, automatic analyses, such as correlations are hard to conduct due to the diverse nature of the recorded data. For example, mouse moves and clicks are recorded in two-dimensional screen coordinates in pixels, whereas recording keyboard presses captures particular key characters or codes. Moreover, every investigator is interested in different events, and isolating them from the data stream requires additional work. Thus, log data is usually coded in a manual intermediate step of editing the raw data by assigning certain agreed codes to certain (sequences of) data values. In other words, when a user clicks on a button in a window and then presses a certain key, a researcher interested in this particular behaviour assigns the code “A” to it. Another type of behaviour becomes associated with the code “B”, and so on. The resulting code sequences represent the basis for comparing the behaviour of one user with another. Thus, behavioural logs allow identifying similar average paths among groups of users and their variation under influence of a content change, for example. An analyst can find out how stable that path is across users, e.g. how often users start to read the cover page and then immediately go into the “foreign news” section of the paper.

More advanced analyses of log files cover the prediction of user behaviour under the influence of certain elements of the user interface of a medium. This method called sequential analysis offers insight into why people behave in one way and not another. The key structure of this method is the creation of Markov chains, a mathematical sequence of behavioural states linked via corresponding transition probabilities. The basic idea behind Markov chains is: how likely is it that a user will visit the webpage B, for example, given that she/he is currently visiting webpage A and the link to page B is prominently visible? By combining several of these likelihoods, a probability can be calculated showing that a user reading content on page A will, via page B and C, eventually end up on page D. Although the initial states have to be coded again manually and the probabilities of navigating from page to page will have to be measured.
manually via controlled experiments, this approach offers a promising way of deducing and creating general models of human behaviour with media.

Given that media become increasingly complex in both user interface and presentation terminal (e.g. print vs. tablet computers) it becomes possible to log a substantial amount of user behaviour, especially in digital media products, such as digital magazines or newspapers applications. The drastically increasing amount of information in a user log then becomes more and more time-consuming to code and analyse with traditional methods. Therefore data mining methods represent a viable alternative. Data mining algorithms parse the logs and can mine a multitude of tentatively interesting behavioural patterns for media companies. However data mining methods have also their limitations as the real-time mining of patterns across multiple logs or different user actions is still not possible. However, recently good progress in this research field has been achieved as researchers have begun to tackle the problems in analysing data streams coming from multiple sensors or sources, such as sensor networks. These methods can be applied to media experience research as media companies face similar problems when combining the information from multiple user logs and aforementioned emotional measurements.

4.4. Media ethnography

Traditional anthropology and ethnography have been interested in understanding and describing stability, not change. However, there is an increasing emphasis on change and development e.g., in applied ethnography, which aims at contributing to solving problems and decision-making. Interest of applying anthropology/ethnography to organizational change has been visible since the 80’s in organization research. Moreover, it represents a way of understanding the customers.

In the rapidly changing media field of production and consumption there is an urgent need to understand the daily media practices of users at different times and places. It is not enough to observe one person or use of one type of media or one media product as media use is inherently social, multimodal and consists also of simultaneous use of different media.

The meaning and motivation of media use is generated and sustained in the practical lifeworlds of people. Ethnography is aimed at understanding meaning and motivation e.g., choices of media use. Media use is not mainly for gaining political or economic information, but for building communities, own identity, having useful information for everyday tasks, talking and sharing about media content, how to influence one’s surroundings, relaxation and entertainment. With ethnographic methods we can gain information about how media can serve the everyday needs and practices of people and what kind of media concepts are needed for today and the near future.

This complexity calls for a reflexive and participative ethnography with multiple methods and sites as well as multiple timescales in data gathering and analysis. Besides being depicted as ethnography of change, it is also “processual” research, a case study of “a sequence of individual and collective events, actions, and activities unfolding over time in context”. It advocates using ethnography to make different voices visible and interact and help construct a new zone of proximal development for a media organization, its personnel and media users.

This means also addressing several issues ethnographers face: what and whom to observe, from which theoretical and personal standpoints, home or abroad, how long, what other data is needed; what is the audience we write for. The main methods proposed for MX research are interviews, questionnaires, close observation of
individual people (shadowing) in their daily practice from home to work/study, hobbies and back home, different kinds and methods of media diaries, videotaping homes morning and evenings and stimulated recall interviews.

In the recall interviews, the ethnographic data (e.g., videos) are showed to the participant and he/she is asked to think out and talk about the events with the researcher. Close observation includes for example, video recording and close reading. Both are described in more detail further in this section. Automatic tracking of devices used for media consumption is also a part of the methods repertoire. This is described in detail in section 4.3 Behavioural measurements.

Despite many methods available, there is also need for many new methods in ethnography: hanging out, immersion, visits, email, phones etc. and "it is the circumstances which define the method rather than the method defining the circumstance".

Traditional anthropology uses ethnography as its main research method. “Proper ethnography is described as participant observation done during fieldwork”. Participation nowadays often refers not to actual participation (living with the people observed) but close observation of everyday practices. Delamont (2004) describes two main types of fieldwork as 'total immersion' and 'partial immersion'. The first one refers to traditional anthropological tradition where a researcher lives in the community s/he studies. The latter one is applied in sociology, education and the applied disciplines where the researcher spends part of his or her time oscillating between the field, university, and home.

The focus in ethnography has been shifting towards finding out how people strive to find meaning and solve problems in "their continually changing relationships and circumstances". Therefore is an example of applied research, which is defined as an "inquiry that is intentionally developed within a context of decision making and that is directed toward the interests of one or more clients".

In MX pilot research we aim to use all the above mentioned methods in the framework of rapid ethnography. The subjects will be chosen after discussions with the companies. As the methods are quite time consuming, to analyse a small sample is used in the pilot next fall. Rapid ethnographic methods are also utilized in human computer interaction research, design and consumer behaviour.

Rapid ethnography emphasizes several principles that also characterize the approach used to do ethnography and developmental interventions. Extensive, but time-limited ethnography, research teams, iterative methods of gathering knowledge, emphasis on emic knowledge and giving space to silenced or disagreeing voices and an interest of solving problems of importance for the stakeholders are common characteristics with rapid ethnography and developmental interventions of creating media concepts, testing and developing them in an iterative process in next year’s MX activities.

There is strong need in media and audience research to differentiate between normative accounts of media use, like the importance of news and how they are used and shared with conversations and technologically mediated practices. Media practices can be more adequately understood as places for the successive divergence, convergence and realignment of multiple, shifting lines of activity.

4.4.1. Video recording

Video recording provides a shared resource to overcome gaps between what people say they do, and what they in fact do. It makes it possible to record permanently the primary data in its richness and makes it possible to go over the
data and analyse it repeatedly, also with the people appearing in the videotapes and with other researchers. But of course video does not capture all data, only where the lens is focused. Smell or heat does not show on the video, nor the passing moments of sharing what has been learned from media during the day.

"There is reason to suspect that what we call cognition is in fact a complex social phenomenon. The point is not so much that the arrangements of knowledge in the head correspond in a complicated way to the social outside the head, but that they are socially organized in such a fashion as to be invisible. "Cognition" (or media use also) observed in everyday practice is distributed - stretched over, not divided among - mind, body, activity and culturally organized settings (which include other actors)" (Lave, 1988, 1).

4.4.2. Close reading

Although different kinds of audience research is frequently conducted in connection with magazines, most of them are studies that do not reach the experience of being a reader, but are focused more on the interests of the reader. This sort of research is done mainly in the context of the commercial media sector and serves the publishers’ marketing departments. The main contradiction that is associated with the marketing research viewpoint is whether we talk about being the receiving audience or being an active audience in consumption of media. We think that audience research needs to focus on the practices of experiences and the actions of audiencing.

The purpose of close reading method is to research the readership and the engagement between the reader and the magazine or its’ brand. We will focus on printed and online magazines and examine the readership and media experience from different viewpoints in the cultural studies framework. These viewpoints are the practices of reading and meaning construction of audiencing starting with needs, values, interests, identity and community.

The practices of reading can be researched with many methods, e.g. using probes and media diaries. Probes are commonly used in design and interface research to gain information e.g. on how the users use certain artifacts and how those artifacts should be re-designed or improved. In this study the participants could be given specific tasks and be asked to record the situations when reading magazines or capturing it with other media on film, video or text. Media diaries or smart phones (for dictating or photographing or filling questionnaires about what happened with immediate media use) could complement the probes as the readers or users would be able to write down or record their thoughts, feelings and needs in the situation.

Audience studies that focus only on a particular medium distort the meanings of that medium. In the study we try to avoid the over-emphasis of the meanings and use of a single magazine by examining the magazines as a part of the readers’ media use and comparing the meaningful contents in magazines to contents in other mediums. To gain proper results on media practices it is necessary to position the use of magazines in their relevant place in the readers’ media landscape. Outlining the media landscape could be done interviewing the participants on their media use. These questions could include the needs of the people, magazines responses to them, other mediums or contents that respond to similar needs, and the difference between these mediums, contents and their meaningfulness to the reader.

To reveal the meanings given to the magazines that produce the engagement we will conduct deep interviews with the participants. The themes in the interviews could involve the reader's expectations of the magazine, the magazine's and reader's values, interest and disinterest of certain stories, the meaning of the images and lay-out, ways constructing identity and belonging to the imaginary community that the readers create. It is also beneficial to read the...
magazines *out loud* (together with the researcher) to clarify the thoughts and meanings on the content. As Hermes (1995, 12) points, the readers, in fact, do not recall very well the articles they have read, but they need to browse the magazines to discuss them in detail.

This part of research can also be supplemented with sensory perception conducted by VTT analysing the paper feel and touch with the same subjects as above and asking them how these factors relate to their media experience.

### 4.5. Usability evaluation

Tradition of usability evaluation methodology can be divided to two branches: User testing and expert evaluation, both with corresponding specialized methods as pictures in Figure 7.

![Figure 7. Two branches of usability evaluation](image)

Every method has its own strong points and weaknesses and it is generally accepted that evaluation should be a combination of various methods. Menu of methods is chosen on a case basis and is part of usability professionals’ skills. However, in its simplest form, a usability test can be performed even in-house. Basic usability test consists of 1) Task & scenario; 2) Talking out loud – observing & note taking; and 3) Report and suggest fixings. *Task* is a small job or mission which user is supposed to accomplish. For example “Find a book *x* in eReader device”. *Scenario* is the described situation, which helps the user to adjust to test situation. For example “You are in your home and have just received this device by post and…”

*Talking out loud* is a method where the user tells the observer what s/he is does and why. Usually user testing consists of at least usability test and interview. User testing is frequently reinforced with expert evaluation. This method is to identify usability problems based on established human factors principle. It commonly utilizes established guidelines or principles (heuristics), noting down their observations and ranking them in order of severity.

Usability evaluation can also be carried out using self-reporting methods, by using questionnaires that are administered to users after they interacted with the media product. For a review of questionnaires applied to usability evaluation see Tullis and Albert (2008).
5. Research methods tapping different experience dimensions

In this chapter, for each distinctive research method, where appropriate, we present the feeling and appraisal dimensions that can be measured with that method, adding also examples of studies as well as ideas of further research (hypotheses that would be interesting/feasible to study). The mapping method-dimensions are then presented in two separate tables, one for feeling dimensions (Table 1) and the other for the appraisal dimensions (Table 2).

We have placed the Playfulness in Table 1 because of space limitations, but also because this concept is difficult to define and it can easily be associated with a feeling or mood dimension. The discussion in this chapter concentrates on the psychophysiological measurements, because they are more likely to be correlated with a wider range of dimensions, while other measurements focus on specific dimensions, such as flow self-reports are used to measure flow, ethnographic methods are used to study media practices, choices and motivations, usability evaluation investigates the usability dimension, and behavioural measurements focus on patterns of use. Thus, Table 1 and Table 2 represent starting points for integrating different research methods with the aim to study in depth and from different perspectives the same or similar MX dimensions. Figure 8 summarizes the MX research framework for further studies by mapping different dimensions to different methods in a time-based model of media experience.
5.1. Psychophysiological measurements

5.1.1. Facial EMG

Facial EMG is frequently used to index positive and negative valences (P. Lang et al. 1993). The activity recorded at three groups of facial muscles is typically measured to index different types of emotional responses to psychological stimuli. Increased activities at the zygomaticus major (ZM) and corrugator superciliii (CS) regions have been associated with positive and negative valences, respectively (P. Lang et al., 1993; Witvliet & Vrana, 1995), especially when studies are framed in the picture-viewing paradigm. When the stimuli were unpleasant or negatively-valenced sounds, words, or vocal expressions of anger, only the CS muscle showed a higher activity (see Ravaja 2004a for examples of studies). Activation of the outer region of orbicularis oculi (OO) region has been associated with high-arousal positively-valenced emotions (Jäncke, 1994; Ravaja, 2004a). Moreover, increased activity at OO is thought to be involved in the expression of enjoyment smile and genuine pleasure (Ekman et al., 1990) and also has been found to discriminate between positive and negative or neutral states in picture viewing (e.g., Jäncke 1994). Bradely and Lang (2000) have presented also evidence that the OO muscle has elevated activity for arousing versus neutral sounds.

In media research, some studies show similar evidence of the activity at CS and ZM when participants are presented with affective content of films (i.e., dynamic medium compared with still pictures) that supports the associations between facial EMG and negative and positive valence of stimuli, respectively (see Ravaja, 2004a for examples). Similarly, Bolls et al. (2001) show evidence of CS and ZM higher activity when exposed to negative and positive radio ads, respectively.

When studying the effect of more neutral messages as conveyed by financial video news messages on the affective dimensions of valence and arousal, Ravaja et al. (2004) found that corrugator activity was significantly higher during a priori negative, compared to positive, messages, but negative and positive messages were not differentiated by zygomatic activity. In addition, OO activity was higher during a priori positive messages and high-arousal messages as compared to negative messages and low-arousal messages, respectively. In that experiment the stimuli variation was represented by small reliable differences in the emotional tone of the messages.

A study by Hazlett and Hazlett (1999) compared facial EMG to self-report as a measure of emotional responses to television advertisements containing many emotional cues. They found that facial EMG measures discriminated emotional responses more effectively than self-report. In addition, the facial EMG was more strongly related to recall than self-report (although, this association was not convincingly established). Furthermore, peaks in facial EMG responses elicited during the commercial were temporally related to specific emotion-congruent events in the commercial. However, this study demonstrated that a commercial that has a high likability rating can elicit negative emotions (as measured by EMG) related to tension and drama. Therefore, it is not straightforward to conclude on the basis of EMG data which commercial to be selected for publication, because there is some evidence that a good advertisement may elicit a strong overall emotional response, whether positive (indexed by zygomatic activity) or negative (indexed by corrugator activity). Thus relying only on EMG data may not be warranted in many situations; it is possible that a combination of facial EMG and cognitive response analysis resolves some of the problems (Ravaja, 2004a).
The aforementioned studies suggest that corrugator EMG activity can be used as a valid indicator of negative emotional responses in media studies, whereas zygomatic EMG activity should be interpreted with caution as an index of positive emotional responses, especially when the emotional messages are less extreme. As a further caveat, a slight increase in zygomatic activity (e.g., a facial grimace) may also be produced by very unpleasant stimuli (e.g., pictures of mutilated bodies) (P. Lang et al., 1993).

With regard to OO muscle activity, this is a potentially useful measure of positive emotional responses also during media messages, although OO activity may increase also during high-arousal stimuli (see also Witvliet & Vrana, 1995). Another related measure uses the blink reflex at OO which is found to associate with affective valence of the message in the context of presenting brief startle stimuli in media perception (P. Lang et al. 1990).

To summarize, the facial EMG measures are useful to index pleasantness, and positive high-arousal emotions. It is, however, also conceivable that facial EMG can be used to index other media experience dimensions involving emotional components, such as flow (involves positive affect by definition), playfulness (through enjoyment and pleasantness), spatial presence (when spatial presence is high, emotional content is likely to elicit more extreme positive or negative responses), social presence (social relationships are intrinsically rewarding, thereby eliciting positive affect), usability (satisfaction elicited by good usability), usefulness (useful media would be expected to elicit stronger positive affect compared to non-useful media), interestingness (more interesting content is expected to elicit stronger positive affect compared to uninteresting content), understandability (understandable content is expected to elicit more positive affect compared to non-understandable content), trustworthiness (media perceived as trustworthy would be expected to elicit more positive emotions compared to untrustworthy media), brand experience (good brand experience should be accompanied by positive affect), perceived price/value (low price/value should elicit positive affect), and familiarity (familiar products may elicit positive affect). The relationship of facial EMG measures with these other dimensions of media experience has, however, not been thoroughly examined and further studies are needed in this area to validate facial EMG as a measure of these dimensions.

5.1.2. EEG

EEG measures have been found in many studies to correlate with positive affect and approach motivation. There are two main physiological responses that can be captured using EEG: frontal EEG asymmetry and alpha power. The measurements of the left frontal cortical activation have been found to correlate with positive activation and approach motivation, while right frontal cortical activation associates with negative activation and withdrawal motivation. The alpha power EEG measure correlates with attention, emotional arousal, interest and recall (Simons et al., 2003; Mulholland, 1978; Appel et al., 1979; Reeves et al., 1985).

Examples of studies that are based on EEG measures to investigate the response of users to different media stimuli are in the domain of television viewing (e.g., Simons et al. [2003] investigated the effect of image motion on users attention when compared to still images), TV commercials (e.g., Appel et al. [1979] and Reeves et al. [1985] investigated the relationships between recall and alpha power, while Ohme et al. [2010] applied frontal EEG asymmetry to investigate the effectiveness of TV ads in generating approach motivation).

Given the relationship of frontal EEG asymmetry with positive affect and approach motivation, it would be expected that frontal EEG asymmetry might be able to index the same media experience dimensions as suggested in the
case of facial EMG (see above). The established relationship of the EEG alpha power with attention and interest suggests that alpha power can be used to index perceived unexpectedness and interestingness of media stimuli. However, as is the case for facial EMG, further studies are needed to validate EEG-based measures as measures of these other media experience dimensions. Tables 1 and 2 summarize the established and hypothetical links of EEG with the different media experience dimensions.

5.1.3. EDA

Based on different conceptual definitions of arousal, EDA is an excellent operational description of it. Moreover, empirical studies using the picture-viewing paradigm have also shown that EDA is highly correlated with self-reported emotional arousal (e.g., P. Lang et al., 1993). Accordingly, arousing pictures of either valence result in increased EDA as compared to low-arousal pictures.

A number of studies have also suggested that EDA is associated with various theoretical constructs of processes such as activation, attention, and the task significance or affective intensity of a stimulus as experienced by a subject (Dawson et al., 2000). However, these theoretical constructs do not relate to EDA separately or directly, but in the context of other variables and processes. Therefore, because EDA measures can be associated with many psychological constructs, it is difficult to interpret them in empirical studies, and hence the experiments should be designed carefully. In this respect, to be able to infer the psychological process mediating the resultant electrodermal response, one has to control experimental conditions so that only a single process is varied at a time (e.g., emotional arousal as influenced by emotional tone of the messages). This ensures that the differences in EDA between the conditions are not due to message confounds, but to the specific factor under analysis.

Studies on media have showed increased arousal as indexed by EDA during exposure to television and radio messages with arousing content, television messages with a high rate of cuts and edits, and video messages presented on a large screen (see examples of studies in Ravaja, 2004a). Grabe et al. (2000) found that differences in education level are associated with differences in arousal as measured by EDA and in information encoding (as measured by a verbal recognition test) when people are exposed to messages containing negatively compelling images. Moreover, the same study showed that, in that experimental setting, self-report and psychophysiological measures provided different conclusions. A similar study was conducted by Grabe and Kamhawi (2006) who showed that there are gender differences in processing negative news in terms of skin conductance measures of arousal.

To summarize, EDA measures can be used to index arousal and attention, as well as task significance and affective intensity. Thus, EDA can potentially be used to index also other media experience dimensions involving arousal and attention, such as usability (poor usability elicits frustration accompanied by increased arousal), flow (that is accompanied by relatively high positively-valenced arousal), spatial presence (when spatial presence is high, high-arousal content will elicit higher subjective and physiological arousal), social presence (social interactions are arousing), playfulness (involves at least moderately high arousal), interestingness (interesting content elicits higher arousal), understandability (non-understandable content elicits frustration and arousal), brand experience (good brand experience would be expected to be accompanied by at least moderately high arousal), and unexpectedness (unexpectedness may elicit arousal). Also in the case of EDA, validation studies are needed to establish its relationship...
with some of the experience dimensions, although some of the suggested relationships are quite obvious (e.g., with usability, interestingness, understandability).

5.1.4. Heart rate

In media research, there are several studies that have used heart rate measures to observe the role of attentional and emotional factors in message processing (Ravaja, 2004a). Ravaja (2004a) points out that HR has been shown to be a good measure of both short-term attentional selection (i.e., automatic resource allocation; phasic analysis) and long-term attentional effort (i.e., voluntary attention; tonic analysis). Accordingly, two studies by A.Lang et al. (2000) and Bolls et al. (2001) found that a decrease in tonic HR is related to increased attention in the context of media perception when the situation does not require cognitive effort. The picture-viewing literature has also shown that moving images prompted a stronger HR deceleration compared to still images (Simons et al., 2003; Reeves et al., 1985). Potter (2000) and Thorson and Lang (1992) concluded that a decrease in phasic HR is associated with orienting response (involuntary attention or short-term change in attention) in the context of presenting a novel, unexpected, or signal stimulus via a structural features of video messages. Moreover, a decrease in tonic or phasic RSA measure has been found to be associated with increased attentional engagement in two studies on media perception (Porges, 1991; Ravaja, 2004b). Lacey and Lacey (1970) have, in turn, shown that an increase in tonic HR is related to cognitive effort, stress and emotional arousal in a sensory rejection task (mental arithmetic). Usability studies have also shown that heart rate decreases when users interact with a well-designed website (Ward and Marsden, 2003).

However, the HR has the disadvantage of being difficult to interpret; due to the fact that the heart is innervated by both the sympathetic and parasympathetic branches of the autonomous nervous system, the HR is not univocally attributable to any single source. Increased cardiac parasympathetic activity causes the heart to slow down and is associated with information intake, attention, and approach behaviour, while increased cardiac sympathetic activity causes the heart to speed up and is associated with emotional arousal, general preparation for action, and mobilization of resources (Ravaja, 2004a).

To summarize, though the common HR measures are ambiguous, they could be used to measure emotional arousal, attention, cognitive effort and stress. It would also be expected that HR measures can be used to indirectly index the same media experience dimensions as EDA (see above). For example, one would expect HR to be positively associated with interestingness and social presence.

5.2. Self-reports

In section 4.1, standard questionnaires and self-reporting scales have been presented for measuring specific dimensions of the media experience. In Tables 1 and 2, there are summarized the mappings from measurement to feeling and appraisal dimensions, respectively. As shown in section 4.2.1 and in Appendix, sensory evaluation can be extended to the evaluation of mental impression or subjective evaluation of media products.
### Table 1. Applicability of the research methods to assess the feeling dimensions

<table>
<thead>
<tr>
<th>Method</th>
<th>Measurement</th>
<th>Pleasantness</th>
<th>Arousal</th>
<th>Sensory perception</th>
<th>Flow</th>
<th>Spatial presence</th>
<th>Social presence</th>
<th>Playfulness</th>
</tr>
</thead>
<tbody>
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<td>Facial EMG</td>
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<td>-</td>
<td>ind</td>
<td>ind</td>
<td>ind</td>
<td>ind</td>
<td>ind</td>
</tr>
<tr>
<td></td>
<td>EEG</td>
<td>yes</td>
<td>-</td>
<td>ind</td>
<td>ind</td>
<td>ind</td>
<td>ind</td>
<td>ind</td>
</tr>
<tr>
<td></td>
<td>EDA</td>
<td>-</td>
<td>yes</td>
<td>ind</td>
<td>ind</td>
<td>ind</td>
<td>ind</td>
<td>ind</td>
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<tr>
<td></td>
<td>HR</td>
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<td>ind</td>
<td>ind</td>
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<td>ind</td>
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<td>manikin</td>
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<tr>
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<td></td>
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<td>yes</td>
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<td>ind</td>
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<td></td>
<td>Social</td>
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<td>-</td>
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<td>Eye-tracking</td>
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<td>-</td>
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<td>-</td>
<td>-</td>
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<td>ind</td>
<td>-</td>
</tr>
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<td>ind</td>
<td>ind</td>
<td>ind</td>
</tr>
<tr>
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<td>yes</td>
<td>ind</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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</table>

ind = indirectly (establishment of a relationship may require additional studies)

### Table 2. Applicability of the research methods to assess the appraisal dimensions

<table>
<thead>
<tr>
<th>Method</th>
<th>Measurement</th>
<th>Usefulness</th>
<th>Interestingness</th>
<th>Understandability</th>
<th>Trustworthiness</th>
<th>Familiarity</th>
<th>Unexpected</th>
<th>Brand</th>
<th>Price/value</th>
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<td>ind</td>
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<td>-</td>
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</tr>
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<td>ind</td>
<td>ind</td>
<td>ind</td>
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<tr>
<td></td>
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<td>ind</td>
<td>ind</td>
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<td>ind</td>
<td>ind</td>
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<tr>
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<td>-</td>
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</tr>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Brand experience</td>
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<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
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<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ethnographic</td>
<td>Media diaries</td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>ind</td>
<td>yes</td>
<td>ind</td>
<td>ind</td>
</tr>
<tr>
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<td>yes</td>
<td>yes</td>
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<td>ind</td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
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</tbody>
</table>

ind = indirectly (establishment of a relationship may require additional studies)
Table 3. Applicability of the research methods to assess the visuality and the interaction dimensions

<table>
<thead>
<tr>
<th>Method</th>
<th>Measurement</th>
<th>Visuality</th>
<th>Interaction dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Usability</td>
</tr>
<tr>
<td>Psychophysiological</td>
<td>Facial EMG</td>
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<td>ind</td>
</tr>
<tr>
<td>EEG</td>
<td>ind</td>
<td>-</td>
<td>ind</td>
</tr>
<tr>
<td>EDA</td>
<td>ind</td>
<td>ind</td>
<td>ind</td>
</tr>
<tr>
<td>HR</td>
<td>ind</td>
<td>ind</td>
<td>ind</td>
</tr>
<tr>
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<td>Likert scales</td>
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</tr>
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<td>Eye-tracking</td>
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</tr>
<tr>
<td>User logging</td>
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<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Ethnographic</td>
<td>Media diaries</td>
<td>-</td>
<td>ind</td>
</tr>
<tr>
<td>Interview</td>
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<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observation</td>
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<td>yes</td>
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</tr>
<tr>
<td>Usability evaluation*</td>
<td>Several techniques</td>
<td>-</td>
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</table>

*ind = indirectly (establishment of a relationship may require additional studies)

6. Conclusion

Media experience is a multidimensional construct that is ultimately intertwined also with societal situation, economy, and technology. As the term “Media Experience” implies, the concept refers fundamentally to mental experience including appraisals and evaluations of the media content and artefacts (e.g., perceived usefulness, understandability, and trustworthiness) and feeling states elicited by media (e.g., emotions, spatial presence, playfulness). However, there are a number of important factors influencing these core components or dimensions of media experience, such as media practices, user traits, and the media artefacts. Media are used in different contexts (e.g., time and place) and for different purposes (e.g., identity building, information, entertainment). It is expected that the context of use and user needs, goals, attitudes, and personality affect the evaluation of media content, for example, and thereby how the media feels like. It should also be noted that not all the media experience dimensions are relevant to all media (e.g., social presence may not be relevant when watching a movie alone).

We also identified a number of important short- and long-term effects of media experience, including actions, engagement with (or rejection of) media, adoption, recall, and attitude change and persuasion. The different components of the media experience model are expected to influence these short- and long-term effects mainly through a mediating influence on the core components of media experience (i.e., appraisals/evaluations and feeling states). In the long run, positive media experience can transform the short-term effects, such as occasional media use, into habitual media practices – permanent long-term use of media.

Given the increasingly social nature of media consumption (and content production), the importance of the social dimensions of media experience cannot be overestimated. For example, media can either be used together with other people (when users are co-located; e.g., watching television or reading newspapers with the others) or social interaction may be mediated (e.g., communicating over the web, sharing, commenting, circulating content). We identified social presence (i.e., the sense of “being together with another”) as the core social component of media experience. Social presence is likely to significantly contribute to the aforementioned short- and long-term effects of media experience. Examining the conditions eliciting social presence would be expected to guide the design of new media artefacts and content, including technologies of simulated or mediated social interactions, so that they would be optimal from the
perspective of natural social interaction. In our forthcoming empirical studies, we will also focus on the social aspects of media experience.

There are a number of different methodological approaches and measurement techniques (e.g., self-report, psychophysiological assessment, tracking of behavioural indicators of media experience, media ethnography) to assess the different components or dimensions of media experience. Different methodological approaches are optimal for assessing the different components of the media experience model. For example, media ethnography is particularly well suited for studying media practices, whereas continuous psychophysiological recordings are a strong method for acquiring information on the emotional aspects of media experience. In the empirical studies, our aim is to integrate the different media experience assessment methodologies, an important research question being how the various methods employed in media experience research should be combined in order to get accurate and comprehensive information on media experience.

One potential way to see the relation of media ethnography with the psychophysiological approach, for example, is that the use of media ethnography precedes in time quantitative research approaches aiming to test specific hypotheses. That is, media ethnography may reveal the usages of a given media in different contexts, thereby facilitating theory construction and pinpointing the important research questions that can then be addressed using quantitative approaches, such as emotion-related psychophysiological measurements. In the empirical studies, we will address these issues in collaboration with the company partners.

7. Appendix

7.1. Meta-level: Society, technology, economy and new media products and practices

7.1.1. Emerging techno-economic paradigm changes the media field

Media experience research task is related to the critical issue for media companies and society. How is media behaviour changing and how can this change be researched and measured to provide information for new business models and advertisers as well as for engaging content.

A lot of hype has been produced about the wonderful possibilities for media production and consumption starting with the telegraph (Im, 1997), the internet (Negroponte, 1996) and in the past year iPad or other multimodal tablet devices. However the rosy future does not always materialize and the consumers reject the offerings based on new technologies. Curran (2010) has presented four examples of much hyped digital “revolutionary” products that were supposed to transform media use and fill the coffins of media organizations. In the 1980’s in England reporters and analysts put their faith in interactive cable-TV to become the entertainment centre at home. In the 1990’s the talk turned to digital TV as the solution for all communication and entertainment needs at home – also in Finland. In England local community TV in the 1980’s was the catchword. The collapse of the IT-bubble around 2000 was an example of what happens when customers/media users do not care about the new offerings.
Nowadays buzz words like social media (Youtube, Facebook, Four Square), web journalism (Politico, Huffington Post, The Daily Beast), content aggregators like Flipbord, Zite, Pulse or HitPad), user-generated content, ebooks, ubimedia, smart phones, augmented reality, wearable media and so on have emerged as new media products changing the mediascape and media practices. These changes in media practices also impact media experiences of the audiences and methods of how to measure them.

Increased literacy, increased per capita income, availability of broadband at home, mobile (smart) phones, competition for readers time and money have characterized the changes in the global media field. However change in media products, their production and user practices is slow and unpredictable (Domingo, 2008). It takes decades from innovations in the labs to become durable consumer goods produced for profit by large organizations and available to wide segments of the consumers (Pisano, 1997). Lasting change in media production and use is not just a question of inventing new technological gadgets or repackaging the same content for different delivery platforms but a journey lasting years or decades from the first innovations to consumer goods and change in the whole techno-economic paradigm.

Another issue complicates the adaption of new media products or contents. Media industries are unlike many other industries because they operate in a “dual product marketplace”. They seek to manufacture and sell two different sets of content to the audiences and audiences to the advertisers. However these two are highly interrelated and have an effect on each other (Napoli 2010a,b, 2003). The interest of media companies in media experience research has mostly been in providing exposure measurements for the advertisers.

When media organizations gather statistical information about its audience the measured audience emerges. Some information is also gathered through ethnographic methods of citizens/consumers and their media behavior in the everyday life to try to understand what Napoli calls the actual audience - people who read or watch the media. However the actual audience always remains unknowable to a certain degree. It is a more or less accurate perception of an audience by media firms and advertisers (Napoli, 2003, pp. 29-34).

Not all technological innovations are turned into commercial products and everyday use. What is technologically feasible may not be economically profitable or socially and culturally acceptable. Technological innovations do not just produce “ready-made” new products or services for consumers. Each technological revolution provides a set of generic technologies, infrastructures and organizational principles — a new techno-economic paradigm — which is capable of gradually modernizing and increasing the productivity of the whole economy (Perez, 2005).

According to Perez (2005) technological revolutions begin to emerge in cycles of 40-50 years beginning with an innovation and installation period and they gradually mature into the deployment period until new radical innovations begin to challenge existing technologies and the techno-economic paradigm. In the figure below Perez depicts each cycle of technological paradigm changes as going through the same phases: The first half of each surge is called the installation period – where old and new technologies and products confront each other.

"After this battle against resistance has been won that the decisions are taken –through various social processes– as to the specific shape that the full flourishing of the new potential will take. This usually happens after the collapse of a frenzied bubble of intensified investment in the new technologies and infrastructures, which has regularly occurred midway along the propagation of each technological revolution” (Perez 2005, 7).
During the installation period economy is typically led by short term criteria of financial capital searching for extraordinary profits. In the deployment period economy returns into the hands of renewed and strengthened production capital. The whole potential of technological revolution is deployed across the economy. Between installation and deployment periods the turning point period reigns and the tension left by the bursting of the technological bubble needs to be resolved.

Figure 9. Phases of technological revolutions (Perez, 2002, 37).

The installation period is characterized by constant innovation forced by investor expectations and fierce competition. Target markets are small and sophisticated and industry structures fluid. The established industries are pushed to modernize or they become obsolete and many companies disappear.

The media business seems to be at present at the installation period and in the deployment period in which the new digital media innovations are being developed into sustainable commercial products. Thus understanding the everyday media practices of people has become a central concern in business models. Innovations change from high-risk technology push to innovations and services that are pulled by demand (ibid).

The deployment period is characterized by product and market expansion, successful business models relying on new technology-based products and services, stability of industry structures and wider target markets.

Technological innovations do not entail rapid growth only in new industries but it also rejuvenates many so called old industries, emphasizes Perez (2005). According to her technology does not determine the content or speed of change as technological change takes place through an interactive and social process which includes social, political and managerial change. Each recurring technological revolution has a double nature writes Perez. “The great wealth creating potential provided by each of them stems from the combination of the new technologies, industries and
infrastructures with a set of generic technologies and organizational principles capable of modernizing the rest of the economy” (Perez, 2005, 5). Each technological revolution brings forth also a new techno-economic paradigm which influence organizational structures and work processes as well as consumer and their behavior.

### 7.1.2. New audience measurement system emerging

Digitalization influencing new products and audience measurement tools form a dual motor of change in conceptualizing audiences and their preferences. Napoli (Napoli, 2010a) calls this process an intertwined process of evolution of audience consumption of media and the emergence of a new audience measurement system.

This intertwined development has influenced discussions about how to understand and measure audiences and their media behavior and media experience. The concept of what is an audience is a debated and contested area and one should remember that “particular re-conceptualizations of audiences are beneficial to certain stakeholders interests while harmful to others” (Napoli 2010, 117).

Napoli (2010) points out the media field has changed in the last decades in two fundamental ways: fragmentation of media and audience fragmentation and autonomy. Media fragmentation (ibid. 54-77) means e.g. increased television channel options, more and more niche magazines and in general more publishing platforms with closely targeted content for niche audiences (Figure 10). For example in the States 90% of television channels have less than 1 % of the audiences (Napoli, 2010, 67). Hansel (Hansel, 2006) 57 has developed a new concept sliver casting instead of narrow casting. This affects the development of new and usability of present audience measurement methods.

Audience fragmentation and autonomy is the second great surge of change. Audiences can decide what media content to consume, when where and how. They can choose their choice of content, time and place especially with digital media. Also the line between producers and users of media content is blurring. Audiences can no longer be seen as in traditional mass communication as passive recipients of information but as active actors of media consumption. Masses can communicate to masses or individuals to masses or with each other through a plethora of digital media channels (see (Deuze, 2006). But how to measure the amount, time, motivation for this audience work which is based on free labor (Napoli, 2010b). All these developments could also be monetized if there where proper methods of researching the changes in media practice and media experience outside the mass media focus.

![Figure 10. The fragmentation of media environment (Napoli 2010, 57).](image-url)
In the United States audience measurements typically focus on measuring the audience for particular pieces of media content, not on measuring the audience for the advertisement embedded within media content. The vehicle exposure (content) and the audience of advertising exposure can be quite different. For example, almost half of the prime time television leave the room during commercial breaks. Napoli discusses the difficulties of getting accurate and meaningful data of audience behavior in practice and writes that the actual audience is actually unknowable even though content audiences are the currency of exchange between advertisers and media organization. In the web it is easier to measure audience behavior (content and ads) with different kinds of tracking methods and automated analytics.

Napoli (2003, 2010) has summarized the criticism of the traditional audience measurement methods and their accuracy to predict the success of media products or advertising. He also challenges the idea that people actively choose what particular story or TV-program to watch. He points to research that shows that media consumption is more a function of availability than content preferences. This applies specially to TV as people still watch it even if their preferred program is not on. This points to the importance of understanding the habits and routines of media practice e.g. which are different in Finland than in the US e.g. with the home delivery of newspapers and magazines. There is a need to know how different media is used during the day and why, what platforms are used and what kind of content consumed. This knowledge would provide media companies opportunities to tailor and bundle their content to different user segments.

The fragmentation and autonomy has led to a beginning of a “crisis” in the media exposure measurement industry, claims Napoli (2010, 76-7) citing several researchers. Large qualitative samples cannot show small even if devoted audiences nor the simultaneous media use. Nor do they capture the emotional aspects of media experience. Internet has made it possible to collect minute details of audience movements in the web and their personal data. Online chatter in social media is and can be monitored, web scraping programs exist. Nielsen’s OnlineBuzzService is one example of the new methods of gathering data from over 100 million blogs to try to predict also future consumption of media (Napoli, 92-3).

The issue of engagement has emerged as a central term used to describe the missing element in audience research: how to measure engagement and where does it occur in the process of experiencing media. Engagement is a frequently used term but there is no common understanding about what it means or how it can be measured. For example the US Advertising Research Foundation had 25 different definitions for engagement in their white paper in 2006 and many with a strong focus related to advertisement recall and persuasiveness (Napoli 2010, 94-99). Media content consists of advertisement and other content produced by journalists or users. It is important to be able to measure these both with qualitative and quantitative measures as the no-advertising content attracts readers and users. However there is much more research on media exposure on advertising and its effects than on why people choose certain media and why, how and when they become engaged or disengaged - and how the everyday context of media use influence media behavior.

For example BBC has developed the concept of audience value as “appreciation multiplied by duration of consumption”. They measure appreciation by asking how the program is rated on the scale of 1 to ten (Holden & North, 2006). Measuring emotions and engagement also includes methods like tracking facial muscles, heart monitoring, psychophysiological methods (see chapter 8 and 9). Traditional surveys and nowadays internet based diaries and reports
are also used. A new concept call eGPR’s (engagement cross metric points) tries to integrate old and new methods of audience methods. Morissey (2009) has even called for a “cost-per-engagement” pricing model online.

Napoli has modeled the evolvement of the conception of the institutionalized conceptualization of audiences as in Figure 11.

![Figure 11. The decline of exposure and the rise of alternative audience conceptions (Napoli 2010, 151).](image)

Instead of the traditional way of focusing on exposure the model depicts audience autonomy and fragmentation at the center changing the exposure to media. The two phenomena change exposure to media and therefore media organizations want and need to understand also audience interests, appreciation, engagement and response. We also deal with these new issues with slightly different terms in our model of media experience presented in the next chapters.

### 7.2. Media practices, habits and needs

#### 7.2.1. Everyday media practices

How is media use changing? Why do people use one media and not the other? Why do they choose one story to read from a magazine and note the other? What is the strength of attention of particular media use? What is interesting or useful about media content? Question like these have risen to the forefront in audience research with media fragmentation and audience autonomy. These issues need more versatile research methods than just exposure measures and duration of media use (Napoli 2010, 2003).

Media practices bring longer time perspective into media experience discussions than approach for measuring reactions to a single interaction situation. We approach audiences as active users of media in their particular life situations from the viewpoints of cultural studies, sociology and co-design. Especially in the rapidly changing media environment we can have difficulties in finding a stable core of media use or experience. Instead we approach media use as a meaning making process, which is not only individual but also shared in face to face situations (Couldry,
Livingstone, & Markham, 2010) and across the nodes of the web in interactive ways of recommending, sharing and producing digital media content (Domingo, et al., 2008; Jenkins, 2008; Thurman 2011).

Studying media practices calls for a variety of methods both quantitative and qualitative. In this chapter we focus on qualitative methods which include e.g. ethnography, interviews, media diaries, focus groups etc. But they can also be combined with technology aided methods like automatic use measurements of the computer or reading device, reporting media use and emotions on a mobile phone etc.

An ethnographic study by Karapanos et al. (2009) on iPhone users illustrates well the importance of understanding the habitual use of media products and services. In their study iPhone users were followed from the actual purchase to four weeks usage with qualitative methods, such as diaries. As a result the authors found out that the meaningfulness of iPhones emerged through it appropriation in specific contexts and the changes this brought to the participants’ life. They also noticed that the usage of iPhone became gradually part of people’s daily rituals and suggest that designing interactions should focus on designing for habituated activities as well.

Also Wilson (2010) found out that the use of mobile use can be highly individualized. For example a Chinese Malaysian woman in Kuala Lumpur used the phone to only read message or answer phone calls from familiar numbers – meaning only from her family. It was not a tool for connecting to the wider world outside her family circle.

Korkman’s (2006) has emphasized that on service development: “the objective of service development becomes thus not the creation of meaningful service, but the cultural production of new forms of practices.” This practice approach could be called an anti- individualistic (Schatzki, 2002), and anti-subjective stance. Consumption practice is not only what the customer thinks, feels, and decides to do (subjectivism), but also the consumption the customer takes part in (objectivism). Many consumption theorists also stress the symbolic as a signal of status and identity, whereas practice theory implies that material is used rather directly in the reproduction of daily life. Moreover, Korkman (2006) points out that many practices are embedded in collective understanding, which at times can be either restricting or enabling for service marketing and management. For instance, when developing a new service, the company should acknowledge the historical development and understanding embedded in the practice it relates to. Concerning service marketing and management, it appears that service providers can create a certain dynamics that creates value for the customers involved in the practice.

We can look at practices both as emerging new ways of acting in the everyday life and at the emerging and hybrid practices of media consumption e.g. with the new technologically available media products and contents but at the same time also at the routinized habits of media use as part of the daily life.

We could also look at practices as individual or inherently social and shared. Schatzky (2001, 12) emphasizes that "knowledge is no longer even the property of individuals, but instead a feature of groups, together with their material setting". In this report we emphasize the social and interactional dynamics of media use (see chapter 6).

Reckwitz is often referred when attempting to define what practices are (Reckwitz, 2002, 249-250): ‘A ‘practice’ (Praktik) is a routinized type of behavior, which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, ‘things’ and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge. A practice – a way of cooking, of consuming, of working, of investigating, of taking care of oneself or of others, etc- forms so to speak of the ‘block’
whose existence necessarily depends on the existence and interconnectedness of these elements, and which cannot be reduced to any one of these elements.'

Qualitative audience research focuses on how people come to see their media involvement. "Accurate description is as important as correctly counting in quantitative research emphasizes (Wilson, 2008, p. 21).

New challenges of research on media practices are posed by the fact that media use is increasingly simultaneous or overlapping. A person can turn on the TV and the set-top-box dutifully records the hours spent in front of television. But in reality the person might be simultaneously be also using his laptop or mobile to search for news, make phone calls, listen to the radio, eating dinner and so on. So he or she is not necessarily actively engaged in watching TV-programs and their ads.

How then we can do research on media practices and measure them? We use different qualitative methods like in-depth interviews, questionnaires, focus groups, media diaries and ethnographic observation.

Traditional anthropology uses ethnography as its main research method. “Proper ethnography is described as participant observation done during fieldwork” (Delamont, 2004, p. 218). Participation nowadays often refers not to actual participation in the activity but close observation of practices. Delamont describes two main types of fieldwork as 'total immersion' and 'partial immersion'. The first one refers to traditional anthropological tradition where a researcher lives in the community s/he studies. The latter one is applied in sociology, education and the applied disciplines where the researcher spends part of his or her time oscillating between the field, university, and home (ibid).

There is a need for many methods: hanging out, immersion, visits, email, phones etc and "it is the circumstances which define the method rather than the method defining the circumstance" (Amit, 1999, p. 11).

We approach studying media research from an applied research perspective which is defined "inquiry that is intentionally developed within a context of decision making and that is directed toward the interests of one or more clients" (E. Chambers, 2001, p. 852). Applied ethnography (Beebe, 2001) is one commonly used method for studying practices in the product development and testing. It can focus on certain elements of practices (Reckwitz, 2002), such as routinized bodily activities, sets of mental activities, using particular things in a certain way when carrying out a practice, collective understanding of the phenomena, discursive practices, etc.

Extensive, but time-limited ethnography, research teams, iterative methods of gathering knowledge, emphasis on emic knowledge and giving space to silenced or disagreeing voices and an interest of solving problems of importance for the stakeholders are common characteristics with rapid ethnography (Beebe, 1995; R. Chambers, 1980; Millen, 2000).

We also use ethnographic methods in a way that could called micro-ethnography (Helle, 2009). This means detailed observation of everyday practices with video-taping or shadowing persons all day. This is done also in combination with different portable measurement methods like automatic tracking of computer or mobile phone use, using mobile phones to insert or record “media diary” information or “mood maps”, small video camera attached to the person, self made mobile videos or pictures of media use etc.

When we think of using ethnographic information on product development one interesting question that Karapanos et al. (2009) raises is how can we design for contexts (or products) that we cannot anticipate? For example completely new media products when people do no know they want. Usually, it is believed that studying current practices with applied ethnography can lead to insights that help in designing new practices. Moreover, there are set of
so called innovative methods, such as co-design methods (Beyer & Holtzblatt, 1997; Holtzblatt & Jones, 1993; Hyysalo, 2006; Keinonen, 2003; Kankainen et al. in press) that can be used for both historical understanding of practices as well as co-designing future designs.

Moreover, as general design guideline Redström (2006) and Karapanos et al. (2009) suggest that the design of interactive systems should leave room for the users to invent their own ways of using the system. Designs that are specific enough to address one single need, but flexible enough to enable the artful appropriation in diverse contexts are more successful that over-defined designs.

The time and space of media use are important components of media practices. For example, measuring how often certain media service is used during a media day or week and whether there is certain rhythm or pattern in the usage can reveal whether certain media service has become as part of daily routines of customers. With web-related measurements it is possible to gain detailed data about how users move in the web, how long they stay in one page etc. Smart phones record and can deliver dozens of categories of information and social media like Facebook has a wealth of information about every user and can be used as data.

### 7.2.2. Needs and media content

From the view point of Cultural Historical Activity Theory all human action is object oriented and materially mediated (Cole, 1996; Engeström, 1987). This object orientedness is what separates activity from concepts that operate under the stimulus-response paradigm. All forms of behavior can be explained as part of a subject’s object oriented behavior instead of only as response to external stimuli. The latter are regarded as reactions as opposed to conscious object oriented activity. This means that to understand for example media practices we have to explore the motives, needs and activity of media users in their everyday practice.

Cultural-historical activity theory regards emotions as an integral mechanism in activity. According to (Leontjev, 1978) emotions color actions according to the motives that the subject has constructed from activity. “The special feature of emotions is that they reflect relationships between motives (needs) and success, or the possibility of success, or realizing the action of the subject that responds to these motives” (Leontjev 1978, 120).

This does not mean that stimuli-response type of research should or could not be practiced in studying media experiences. These are just two different theoretical approaches which produce different results with differing methods. Activity theory is interested in the broader life world of the media users and what motivates them.

Another central concept from activity theory used in media research is the concept of contradiction. "Contradictions are not just inevitable features of activity. They are 'the principle of its self-movement and ...the form in which the development is cast’” (Helle, 2000; Helle & Töyry, 2009b; Helle 2010, Ilyenkov, 1977). In media business the focus is on the content and providing solutions the contradictions in the lives of the audience. Special attention is paid to solving contradictions in their reader’s lives so that a permanent audience interest is maintained. Different issues can be addressed in different ways e.g. in different sections of a magazine or newspaper. The recipes and advertisers urge to purchase and consume all kinds of food while in another part of the magazine there might be a long story about losing weight as the summer season approaches. And the editorial might in the same paper demand new legislation banning unhealthy food in school menu’s and candy machines (see (Helle & Töyry, 2007; Töyry, 2005).
The media tries at the same time to fulfill the needs of their readers, but at the same they also uphold them and create new needs. For example in the production of magazine content two fundamental needs of readers are addressed: the reader is constructed and accepted as who she/he is but also as who she/he wants to be. This means different things at different historical time frames and cultural conditions, and therefore they are important issues in localization. For in the production of magazine content two fundamental needs of readers are addressed: the reader is constructed and accepted as who she/he is but also as who she/he wants to be. This means different things at different historical time frames and cultural conditions.

Medias user’s needs can be characterized (Helle & Töyry, 2009a, p. 19) into five main components:
1. need for information and knowledge
2. need for belonging to a group or community
3. need for entertainment
4. need to influence personal and social surroundings
5. need for building identity

These needs can be overlapping and simultaneous and change with time and space in everyday life. They are behind in the everyday practices of media use and form a basis for more detailed analysis of specific instances of media use like reading a story or searching in the web.

7.3. Macro-level: Social interaction

The activities listed in the model at the macro-level are enabled when social interaction between people takes place, either face-to-face or through a computer-mediated environment such as a website. The conditions that such social interaction activities occur are conceptualized in the literature under the name of co-experience and social presence. While co-experience is a broader concept, more difficult to measure, social presence is a component of it, for which there exist established measures, such as a social presence inventory. Social presence and established methods for measuring it are discussed in more detail in sections 3.2.4 and 4.2.3. As social presence can be considered as a subcategory of co-experience, the presented methods can be of direct relevance to co-experience as well.

7.3.1. Co-experience

Co-experience is an experience that is created when two or more people co-experience episodes of life through their conjoined interaction involving content, technologies, and events (Battarbee, 2003; Battarbee & Koskinen, 2005). Thus co-experience allows the creation and sharing of single experiences and emerges in collaborative settings. For example, it emerges at work in designing a product with colleagues, in sports in a hockey-team playing against another, or in leisure time when a parent reads a fairy-tale to a child. In the context of print and hybrid media co-experiences manifest when reading a magazine or viewing an online video together. “Co-experience reveals how the experiences an individual has and the interpretations that are made of them are influenced by the physical or virtual presence of others” (Forlizzi & Battarbee 2004, p. 263). (Adapted from Kallenbach, 2009). According to Battarbee and Koskinen (2005), the defining feature of co-experience is what people choose to share with others from a specific experience. This suggestion is exemplified by the sharing of a particular holiday photograph in social media service (e.g., Facebook) to one’s friends.
Co-experience, or the creation of experiences together in a social context, is a wide concept which incorporates various phenomena. Among them is social presence which can be characterized as the feeling of being together with another person in a real or artificial environment.

7.3.2. Social presence

As discussed in section 3.2.3 Spatial presence, presence refers not only to the illusion of “being there” in a mediated environment but also to “being there together with others”. Social presence refers to the latter component of presence. Mediated social presence is “the moment-by-moment awareness of the co-presence of another sentient being accompanied by a sense of engagement with the other” (Biocca, Harms, & Gregg, 2001). Trivially, a prerequisite for social presence is then the existence of another social actor, who may be either another real person or a human-like computer character (cf. Lee, 2004). The human tendency for interpreting behaviour of even inanimate objects as intentional (Dennett, 1987) allows for a level of social interaction even with relatively simple computer-generated actors. Interaction with the other actor may be mediated via technology ranging from simple textual exchange (e.g. chat room) to audiovisual virtual environment (computer games or virtual reality).

7.4. Interaction with media artefact

7.4.1. Usability

Traditionally usability has been seen as an assessment of how easy user interfaces are to use in field of HCI. This easiness is measured by breaking usability to several sub categories like learnability, efficiency, memorability, correctness and pleasantness (Nielsen 1994)

Several researchers have claimed that this traditional assessment of usability from the early days of internet is too narrow in the days of the visual Web 2.0, that it focuses too much on finding errors, and that it has a too little to say about qualitative and emotional variables of the product. Even Jacob Nielsen has recently pointed out the importance of a “more sooth” user experience (UX). Nielsen has pointed out that “beauty” is the most common word with what users described the UX of iPad, where as “busy” was the most frequent word when dealing with the UX of web pages (Budiu & Nielsen, 2010).

Clearly the traditional usability approach explains only part of people’s interactional dynamics and their judgment of satisfaction when trying to use technology (Kallenbach, 2010).

A broader definition sees usability as a quality of use. It moves its function from mere avoiding dissatisfaction to produce satisfaction. Some scholars propose an even wider definition. Hassenzahl (2001), for example, contents that even broad definitions neglect the contribution of perceived fun and enjoyment to user satisfaction and preferences.

The importance of a new holistic view about usability has an additional relevance when we are dealing with artifacts which go beyond the traditional scope of HCI. For example, the production of content for new dedicated eReaders and tablets is more closely related to traditional publishing that has experienced over 500 years of evolution of qualitative values in typography and lay-out. There, production relies more strongly on aesthetical design than web publications or computer programs. This new wave of publishing introduces new kinds of customers, who desire the best parts of traditional publications (visuality) combined with the best things of the web (hyperlinks, frequent updates, interactivity) (Ihlström-Eriksson, 2004).
Measuring UX and usability separately is complicated because they are interrelated; good usability affects UX but is not determined by it. UX is constructed by quality of content and easiness of use but also by usefulness. The perceived content quality, ease of use, and usefulness have all a positive effect on gratification. Gratification in turn correlates strongly on the decision of using the product continuously (Shin, 2011).

Research of UX with media is complicated, because it involves more variables than conventional UX with user interfaces and computer programs running on a standard PC. This can become a problem because old methods cannot be applied directly to new phenomena. For example, former and current eReading research has largely concentrated on “e-book” or “digital magazine” without identifying that content is not the only source of UX. In eReading, users are dealing with new kinds of devices and programs they have never encountered before.

In order to validly analyze usability and UX it is important to clarify what are the actual sources, for example, of the perceived pleasantness. Is good UX an attribute of the beautiful execution of the software, related to the easy navigation provided by the software, or a consequence of the attractiveness of the device where these latter two are run on?

In the Next Media 2010 research the sources of e-reading UX were broken to three levels: the device, the software and the content. (Heikkila et al., 2011). In order to grasp the entire scope of the eReading UX and usability, we have also to take into account the access to content. Several studies have pointed out that the abundance of the available content and the easy access to it are very critical factors in the diffusion of eReading applications and services. An extensive selection of content was the most wished attribute along with easiness of reading (Pietilä, 2005).

Thus the market place, the convenient way of shopping, and managing purchased items has to take an important role in evaluation of eReading media experiences. The attributes of good eReading UX are described in figure 8 as nested UI-areas. The design of the publication is the core asset, but in order to succeed in areas the entity should have acceptable quality and capacity to work seamlessly together from a user point of view.

Figure 12. Nested sources of UX in eReading
Measuring usability with qualitative emphasis

The discussion of how the usability approach can be utilized in the assessment of media experiences can be divided into two approaches.

Firstly, we could evolve the traditional usability evaluation to contain more qualitative aspects. This was the case in testing the eReading devices in the research of Next Media 2010 (Heikkila et al. 2011). Tests were constructed in a multifaceted way and interviews and probes were used to find out not only problems that were perhaps missed in observational methods, but also to enrich the measured data and to reveal more qualitative issues. In error finding, both methods produced quite similar findings, but interviews and probes revealed many positive remarks, which would be missed otherwise. People liked the lightness of some eReaders. Also, the Apple iPad gained many positive remarks; it was seen as a playful and intuitive product. Users were intrigued to explore the product and there were even problems to get the device back for others to test.

Another finding from eReading usability testing was that several problems were inherited from the situation in beginning of 2000’s. Page navigation was difficult because of a missing or poorly implemented navigation bar, but also because text in the book appeared to be too similar from page to page. Users complained that it was easy to get lost in the interface and buttons were small and not clearly marked. It is remarkable that these weaknesses were all found already in the tests in the beginning of 2000’s. It can be concluded that for some reason users have not been established as important stakeholders in the technological development of eReading devices.

Traditional heuristic evaluation (Jacob Nielsen’s 10 principles and parts taken from Donald Norman’s 7 rules, Tognazzini’s 16 principles and Schneiderman’s 8 golden rules) is most suitable to error-finding and should be updated in some way to include qualitative issues as well. For example, the evaluation of typographic quality can be based on a check-list created by Hannu Pulkkinen (Pulkkinen 2007).

Secondly, traditional usability tests could be used with the fact of their inherited limitations in mind. This means that usability results should not be considered to reflect the whole picture, but as an important assessment of areas needing more attention.

From error finding to solutions for enhanced UX

The process of user-centric process modelling (UCD) has an emphasis on iteration. It is about producing different design solutions and evaluating them against user requirements and producing new designs if results of evaluation do not meet requirements. Although plain usability evaluation does not usually include product development, it could be nevertheless beneficial to include hypothetical solutions to problems that researcher have encountered. Solutions not only visualize the problem, but act also as a bias for possible future developments.

7.4.2. Interaction

Interaction has been the central element of investigation for as long as Human–Computer Interaction and related research fields exist. Numerous theoretical models have been developed mostly describing its generic stages or phases occurring in a variety of, if not all, situations in which a human interacts with some kind of interactive artefact for some purpose. The model of 7-stages of interaction from Don Norman (1988) is perhaps the most well-known (Figure 13). A human actor with a goal in mind (1) forms an intention to act on the world or environment surrounding her/him (2).
This intention must then be translated into some sequence of concrete actions (3). In stage (4) the actor executes the action sequence against the world. Her or his perception of the state of the world marks stage (5). The actor then interprets the perceptions according the previously formed intention (6) and finally evaluates the result against the initially formed goal (7). Stage 2 to 4 are commonly labeled “gulf of execution” whereas stages 5 to 7 are commonly labeled “gulf of evaluation”.

Figure 13. Seven Stages of Interaction.

Monk (1998) introduces an account describing cyclic interaction. This approach builds on just three components inherent in any interaction sequence: goals, actions, and effects. It recognizes the fact that for a single action of, for example, saving a document on disk multiple interaction cycles are needed that follow after another. Figure 14 illustrates the relationships between goals, actions, and effects.

1. Save document onto a floppy disk
2. Click on menu tab ‘File’
3. The menu ‘File’ drops down
4. Find ‘Save’ option on screen and then specify the ‘Save’ option
5. Move cursor ‘Save’ option on screen and then click it
6. Disk noises, menu tab ‘File’ disappears
7. The document was saved and the original goal has been accomplished

Experience and Interaction

With regard to user and media experience, interaction is commonly considered to be its requirement as the absence of interaction with an interactive (media) artefact will reveal only little or even nothing about its nature,
purpose, or functionality to the potential user (e.g. Beauregard & Corriveau, 2007; Hassenzahl, 2003). Interaction, however, acts also as a driver of user experiences as at least some continuous interaction with a product is necessary for user experiences to unfold. Given the centrality of emotions in user experiences an important question arises: how is interaction related to emotions and vice versa? Clearly, both Norman’s stages of interaction and Monk’s cyclic interaction model represent a rather rational perspective on interaction involving generic stages or components that occur every time a person uses an interactive artifact. Both consider interaction solely at an obvious and observable level of sequences of actions and behavior and cannot account for its properties reflecting its dynamics, e.g. its speed, its progress, or why a person first executes action B and then action A in order to achieve a goal. Evidently, neither approach involves the role of emotions, and thus neither do the introduced approaches allow explaining user experience in its facets nor its dynamics over the time of interaction. Consequently, they cannot describe the dynamics of user experience. Therefore, a different approach is needed to explain users’ experience of interaction as it unfolds over time.

One approach to link interaction and emotions is to take into account the choices that users make when interacting with a media artifact. In other words people’s judgments and decisions cause their emotions during interaction when they compare (judge) the outcomes of their (decided) actions with their intended interaction goals. In order to integrate judgment and decision making and interaction we propose here a change in perspective. If emotional responses are caused by anticipations and their comparison with actual observed consequences in choice situations then it may be beneficial for experience research to view interaction not only as a sequence of actions but foremost as a sequence of judgments and decisions. In other words, choices, represented by judgments and decisions, serve now as the primary unit of analysis in the research of interaction experiences. From this perspective, actions, as described in Norman’s model of interaction, would then be the consequential behavioral response occurring as real-world results of judgments and decisions.

However, what judgments and decisions do exist in interaction? Superficially, one could argue that choice is omnipresent during interaction: we chose what kind of software product we want to use for what purpose, in what order we want to carry out tasks and activities, and so on. This is certainly true but again an obvious observation. What is more important is to look for choice classes that re-occur during interaction; in other words, choices that are building blocks of interaction and user experiences.

Based on Norman’s model of interaction it is here proposed that (at least) the following three classes of choices occur frequently during interaction: First, before an actor engages in any action s/he usually chooses a goal s/he wants to achieve as part of the overall activity s/he is engaged in. This choice is the most important one as it may determine fundamentally the course of actions within a given activity. Second, an actor then selects the appropriate user interface element whose function is expected to achieve the previously chosen goal sufficiently. This “right” element is chosen based on a judgment that integrates the semantics of the textual label or graphical icon of the element with the actor’s goal and her or his prototypical cognitive representation of a function that would help achieving it on the basis of its anticipated outcome (see e.g. Hommel & Elsner, 2009; Storbeck, Robinson, & McCourt, 2006). The third choice is finally the appropriate instrument that allows activating the element and executing its function, e.g. a physical interaction device such as a mouse or a keyboard, or a finger in case of touch-based interaction. The combination of a single instance of all three choices constitutes a single action. Given that interaction involves usually more than one action an actor therefore makes repeatedly these choices throughout the life-time of interaction. Consequently we argue
that in combination with the relationships between choices and emotion they account for and determine most interaction experiences.

**The Role of Effort**

Interaction does not take place without an investment or a cost. In other words, whenever an actor interacts with the world s/he can do so only by exerting some form of effort. Effort maybe purely mental most of the time but may also be physical, i.e. when moving the mouse. The influence of effort on experiences should not be underestimated. Numerous recent studies have prominently shown that even small additional costs change user behaviour profoundly.

Bhavnani and John (2000), for example, have shown that even skilled users of software do not use it efficiently. In fact, people maintain least-effort strategies, even though these incorporate a higher number of actions and take longer to execute than (theoretically) optimal strategies. Payne, Howes, and Reader (2001) argue that people actively and adaptively distribute cognition. That is they often interleave planning and action and “off-load” certain cognitive efforts onto the interface. For example, Payne (1991) showed that people often cannot remember the labels of frequently used menu commands, even in software that was familiar to them. Instead they rely on their recognition memory to judge if a label semantically fits to the meaning of the action they have in mind. If it fits approximately then they (decide to) click it. Gray, Sims, Fu, and Schoelles (2006) have shown that people’s micro-behavior during interaction is constrained by their cost/benefit tradeoffs due to the availability and nature of interactive elements on the user interface. In other words, people optimize the costs of their interactive behavior locally at the micro-level (1/3 – 3 seconds) while neglecting to optimize global costs for the task at hand. More precisely, they adapt their mouse moves, clicks, and keyboard presses on the basis of the topography of available interactive elements (e.g. buttons, links, etc.) in the user interface as long as this adaptation does not violate the global strategy achieving the overall goal of the current activity.

**Interaction Experience and Quality**

To contribute to user experience and human-computer interaction research a predictive model of interaction experience would help to explain users’ emotional responses during interaction with daily graphical user interfaces. Therefore we propose an initial predictive model of interaction experience based on two aforementioned accounts. First, Mellers et al’s (1999, 2001) decision-affect theory with its distinction of anticipated and actual pleasure serves as the basis. It allows predicting emotional responses from users that make repeated choices of goals, user interface elements, and appropriate instruments during interaction in order to carry out a task. Second, to reflect the important role of effort during interaction we expand decision-affect theory by integrating also anticipated and experienced effort given the aforementioned results from Bhavnani and John (2000) or Gray et al. (2006), for example.

However, with respect to choice and interaction the term pleasure deserves a more specific definition. The question is what makes an interaction pleasurable? Taking the assumption that humans usually behave in a goal-directed manner when carrying out tasks we propose to define pleasure more concretely as the degree or magnitude of progress towards the final outcome or end goal of a given task that is experienced by making a (single) choice.

This elaboration results in the initial predictive model of interaction experience. For the progress component the mechanism of emotional response generation works as follows: A comparison of the anticipated magnitude of progress with the actual one results in the emotional response of elation if the actual magnitude is equal or greater than the...
anticipated; otherwise the emotional response will be *disappointment* (according to Mellers et al. 1999, 2001). For the effort component the mechanism is similar: A comparison of the anticipated magnitude of effort with the actual one results in the emotional response of *stress* if the actual magnitude is equal or greater than the anticipated; otherwise the emotional response will be *relief*.

Subjective interaction quality builds upon the initial predictive model of interaction experience and represents a user’s overall evaluation of her or his interaction (and/or user) experience for activity.

In a first step of integration the framework considers both components of progress and effort as necessary. In fact, given that people constantly perform cost/benefit tradeoffs during interaction, progress and effort form a *ratio*: progress represents the numerator whereas effort represents the denominator. In general, a ratio value of around 1 indicates that progress and effort are about equal. Values significantly smaller than 1 indicate that effort is greater than progress, and values significantly greater than 1 indicate that progress much higher than the invested effort. Furthermore, for a *single choice* during interaction a user then evaluates in fact two cost benefit ratios (see Figure 15). The first one is the ratio between the *anticipated* progress and effort whereas the second one is the ratio between the progress and effort *actually* experienced by the user.

In a second step the framework then integrates the three choice classes by combining the single choice ratios into a construct constituting a single action. Subjective interaction quality is then a user’s evaluated average of the resulting emotions from the three choices, ultimately summed over all actions over the life-time of interaction during a task. Thus the framework allows describing and predicting the quality of interaction with an interactive artifact.

**Figure 15. Comparisons of anticipated and actual progress vs. effort within a single choice during interaction.**

### 7.4.3. Interactivity

**Theoretical background**

During the last 15 years a number of researchers attempted to explain and define the terms interactive and interactivity. Especially the latter notion received increased attention by the scientific community. However, scholars discussing the topic noticed the differences in the various definitions along with the resulting confusion and arising
problems (e.g. Heeter, 1989; Newhagen, Cordes, & Levy, 1995; Steuer, 1992). Jensen (1998) points out the multi-discursive nature of the concept interaction. Kiousis (2002) categorizes the literature according to where interactivity is believed to exist by the authors.

The central questions of interactivity research are: Why do people evaluate various media as being differently interactive? What are the determinants of these differences? What are the effects of interactivity? Scholars discussing the notion of interactivity during the past two decades generally agree that the concept emerged along with new media technologies. However, they also make note of the differences that exist in the various conceptualizations along with the resulting confusion and arising problems (e.g. Downes & McMillan, 2000; Heeter, 1989; Newhagen, Cordes, & Levy, 1995; Steuer, 1992). Jensen (1998) classifies the various models dependent on the number of dimensions they provide (one-, two-, three-, and n-dimensional models). Generally, interactivity can be understood having structural and processual/experiential properties (Burgoon et al., 2002; Liu & Shrum, 2002). Kiousis (2002) categorizes the literature according to where authors believe interactivity exists. He distinguishes three schools of thought according to which interactivity is either a dynamic characteristic of information exchange in a given communication setting, a structural attribute of technology, or a human perception.

As one of the pioneers investigating the concept, Rafaeli (1988) considers interactivity as “a process-related, variable characteristic of communication settings” (p. 111). His formal definition of interactivity is based on message exchange and involves relatedness: “interactivity is an expression of the extend that in a given series of communication exchanges, any third (or later) transmission (or message) is related to the degree to which previous exchanges referred to even earlier transmissions” (Rafaeli, 1988, p. 111). This third-order dependency is important as it addresses the dynamic aspects of interactivity (Kiousis, 2002).

Technology-based definitions come from Steuer (1992), for example. He contributes a three-dimensional model of interactivity in where the user is always in control. The speed, range, and mapping capabilities of a medium influence the “extent to which users can participate in modifying the form and content of a mediated environment in real-time” (1992, p. 84). Also Heeter’s (1989) six dimensions of interactivity derived from communication technologies belong to the technology perspective. They are complexity of choice or selectivity, the “amount of effort users must exert to access information” (Heeter, 1989, p. 222), responsiveness of the medium to the user, the monitoring of information use by content and technology providers, the ease of adding information by the users, and the ability of a medium to facilitate interpersonal communication.

Newhagen, Cordes, and Levy (1995) were among the first in introducing a perceptual-based definition of interactivity. Described as a psychological state and linked to self-efficacy, users evaluate interactivity of a medium based on the quality and quantity of feedback they get from the receiver after sending a message. The multi-dimensional models of McMillan and others address the perceptual aspect of interactivity. Downes and McMillan (2000) identify six dimensions of interactivity: direction of communication, time flexibility, sense of place, level of control, responsiveness, and perceived purpose of. Later the model has been reduced offering three dimensions: direction of communication, user control, and time (McMillan & Hwang, 2002).

Currently all models of the three intellectual perspectives fail to provide a solid explanation how interactivity can be coherently understood in other contexts than their own. Thus, Kiousis (2002), for example, concludes that the true nature of the term interactivity may be identified by “combining the cogent aspects of interactivity discussions from the
fields of communication, sociology, psychology, and computer science/design”. Most importantly, however, due to the inherent vagueness of the models’ dimensions the creation of operationalisations, that is concrete influenceable or measurable variables of the real world, has turned out to be difficult. As a result of this confusion and lack of clarity only few studies exists that attempt to empirically verify the validity of models (e.g. Burgoon et al., 2002; Chung & Zhao, 2004; Wu, 1999). If, their results reflect a too narrow focus (Sundar, 2003) or their validity may be questioned (Cho & Leckenby, 1999).

**Interactivity and Experience**

Even though the theoretical discussion of interactivity has been the object of increasing interest during the last two decades the concept is still under-theorized. All presented models are higher level models and thus do not support researchers to study the notion in greater detail. In relation to the introduced conceptualizations of interactivity we point out major problems in the following paragraphs.

First, none of the models or definitions is able to describe interactivity in its entirety. Even though Kiousis (2002) offers a definition consisting of technological, communicative, and perceptual aspects, the model represents merely a fusion of former definitions without specifying relations among them. Furthermore, the definition of Rafaeli (1988) does not take into account the influences of technological variables, whereas the technological models do not address user perceptions or cognitive properties. We argue that a deeper understanding of interactivity can only be achieved if all three aspects and their relationships are considered.

Second, most of the models emphasize on real-time responsiveness of a medium or a system addressing its capability of providing fast feedback to a user as a key dimension of interactivity. However, these issues are not considered when the user seen as a creator of a message. It seems that user responsiveness to a message or a system is assumed to happen mostly in real-time. The work a user has to perform in order to create a response is rarely mentioned. Only Heeter (1989) considers dimensions such as the effort or the ease how users can access information from or add new information to a medium or system. Based on that we argue that if we want to understand why people evaluate various media and systems as being differently interactive then we have to consider also cognitive processes in greater depth, such as judgment and decision making or message production (e.g. Green, 1997).

Finally, third, the inclusion of message production into the discussion of interactivity leads to the consideration of interaction goals. In human-computer interaction (HCI) this has been a long tradition, for example in the area of task-based user interface design, as goals or even goal hierarchies can be derived from given tasks using GOMS (John & Kieras, 1996). Interestingly no studies are known to the authors that address interactivity and integrate or consider explicitly the influences of goals. We argue that interactivity research would be enriched by the explicit inclusion of goals and their influences.

Considering this problems we the take the position of Kiousis (2002) stating that the true nature of the term interactivity may be identified by “combining the cogent aspects of interactivity discussions from the fields of communication, sociology, psychology, and computer science/design.”
7.5. From sensory evaluation to mental impressions on media

Some experimental evidence shows that sensory perception and bodily sensations (such as those associated with sitting comfortably on a cushioned chair, holding a warm cup of tea) can affect our feelings and attitudes (Niedenthal, 2007). Regarding the role of sensory perception in the context of media experience, consider the soft rustle of pages as you browse through a magazine to the section of your interest, perhaps stopping along the way to gaze at an interesting editorial picture or an advertisement that caught your attention. Various sensory attributes of the magazine (such as smoothness, slipperiness and glossiness of the paper, colourfulness and sharpness of the pictures, as well as attributes related to the visual design, and also the sound of the magazine when it is handled) interact to modify the overall subjective media experience. The sensory attributes (which can be affected by the media producers and publishers via factors such as paper choice and layout, for example) of the magazine shape the mental impressions associated with it, and a given combination of sensory attributes can either strengthen or weaken desirable mental impressions, such as trustworthiness.

In the case of new digital media or broadcast media the sensory attributes similarly shape the overall experience. In these cases the set of applicable sensory attributes and the perceptual range of these attributes depend on the media device as well as content.

One of the motivations for measuring sensory attributes is that often a relationship can be found between sensory attributes and mental impressions associated with media products, and also between sensory attributes and technical or creative variables of media devices and content. In some cases it is possible to describe these relationships with mathematical functions fit to experimental data, making it feasible to simulate and predict the effects of different variables on sensory attributes and further on higher-level cognitive and emotional experience dimensions. The experience maps discussed below are a step in this direction, the aim being to extend them with further mathematical modeling, enabling illustrative simulations of how different variables mold the sensory perception and higher-level media experience.

Sensory attributes can thus be understood as an intermediate level between physical properties of the media artifact and the higher-level cognitive and emotional experience dimensions. Color (as described by dimensions of lightness, hue, and chroma) is an example of a sensory attribute whose effect has been widely studied from the points of view of emotion, cognition, physiological response, human welfare, aesthetics, symbolism and cultural meanings in diverse fields ranging from art and architecture to psychiatry (Birren, 1978).

Sensory evaluation methods can be used to define and compare sensory attribute profiles of given media products. Multivariate statistical methods can be further used to analyze and describe how different sensory attributes contribute to the mental impressions associated with the products.

The approach centred on what we call the experience map concept falls mostly under the discipline of experimental psychology. Experimental setups are designed in which observers make judgments of perceived attributes of media samples presented to them in a systematic manner. Statistical analysis of the raw judgment data from the experiments allows numerical scales of perceptual attributes to be built and the location of the media samples on those scales to be estimated. Sensory evaluation research tradition can be traced back to psychophysical theory. Gescheider (1997) describes the fundamentals psychophysical measurement methods. While classic psychophysics studies the
perception of stimuli that vary along a single physically measurable dimension, the *psychometric scaling* methods, such as Thurstone’s Law of Comparative Judgment (Thurstone, 1927), allow perceptual differences between (possibly multivariate) stimuli to be measured without necessarily referring to the instrumentally measured physical differences between the stimuli. Modern psychometrics is widely applied in the measurement of mental properties such as intelligence, attitudes, and personality traits. The approach described in this section is closer to the fields of sensory evaluation and image quality research. In these fields psychometric scaling methods are used to measure attributes of physical objects (stimuli), as perceived by human observers.

Sensory evaluation is widely used in studying sensory perception of products such as foods, beverages, cosmetics, or textiles. Closer to the topic of media experience is the sensory evaluation of paper products such as printed media. Although the term ‘sensory evaluation’ is seldom used in the field of image quality research (‘subjective assessment’ or ‘judgment’ being used instead), the methods in both fields are very similar, both being derived from the classical psychophysics and psychometrics. Image quality includes the perception of moving images. When audio quality is added to video quality, we are in the field of multimedia quality experience.

For the evaluation of printed products a set of sensory attributes that is well suited to describing the perceived differences (at the level of sensory perception) resulting from the use of different materials (paper grades, printing inks, etc.) and pre-press, printing, and finishing techniques has been relatively firmly established (Aikala et al. (2003) and Civille et al. (1990) describe definition of tactile attributes for print media and other paper products, for instance). Some of the visual attributes used in the evaluation of printed products are the same as those typically used with electronic media. Moving images naturally add new dimensions to the visual perception (Winkler, 2005). Different display techniques may further require new kinds of visual attributes to be used to account for the perceptual factors specific to the particular technology. Typically these are display-technology specific image quality impairments (so-called artifactual visual attributes). More work is needed to establish the necessary and sufficient sensory attributes for the description of the new digital media. Stereoscopic display technologies used in 3D cinema and television, as well as in 3D lenticular prints, invoke stereoscopic vision, enhancing depth perception (but possibly also introducing visual artifacts), and affecting dimensions such as presence, naturalness, and interestingness (Seuntiens, 2006; Hakala et al., 2011). Other kinds of special techniques, such as metallic inks or special varnishing in printed products, can be used to enrich the sensory perception and the overall experience (Laine et al., 2009, 2010)

Interactions between different senses, and also interactions between different sensory attributes within a single sense, are known to occur (see Fiore (1993) for an example in the context of sensory evaluation). Lindberg et al. (2009) and Mensonen et al. (2010) discuss experimental approaches to both unimodal and multimodal evaluation of samples.

A number of different experimental methods can be used in sensory evaluation, the choice of method depending on the nature of the media samples, the range of attribute variation within the sample set (for example, methods based on confusion between observations are good for accurately analyzing small perceptual distances between media samples but are unsuitable for large perceptual distances which are better handled with direct rating methods), and available resources, among other things. Typically the observers rank order the media samples, or place the samples on a ruler according to their perceived differences in the given sensory attribute, or judge the samples pair-wise. Usually an interval scale is derived by analysis of the raw judgment data. The numerical differences on an interval scale correspond to the perceived differences between the samples. With established evaluation procedures and a trained sensory
evaluation panel (a group of people selected trained to evaluate the given sensory attributes, according to the guidance of standards ISO 8586-1 (1993) and ASTM committee E –97), the sensory evaluation can be performed relatively efficiently. Same sensory attribute scales (no significant differences between the scales) can be obtained for the same set of media samples from separate sensory evaluation studies with different panels, at different locations (but in controlled conditions), and with different experimental methods. Meilgaard et al. (1999) provide an extensive description of sensory evaluation techniques.

Sensory evaluation by itself does not reveal higher-level psychological dimensions involved in the subjective media experience. In the experience map concept we combine the lower-level sensations to the higher-level mental impressions associated with the media samples. In the psychometric scaling of mental impressions the observers indicate how strongly they associate the given mental impression (an attribute such as trustworthiness, freshness, or relaxedness) with the given media sample using a graphical rating scale.

The point of doing both sensory evaluations and the mental impression assessment is that regularly a connection between the two can be found: typically differences in mental impressions evoked by the media samples can be fairly well predicted by the sensory attributes (assuming the perceived differences arise from the physical differences between the samples). When such a relationship can be found, it can be inferred that an increase or decrease in a given sensory attribute can strengthen or weaken a certain kind of mental impression associated with the product. Further, the location of a new sample on the experience map (and thus mental impressions associated with it) can be estimated based on relatively efficient sensory evaluation. Further still, for some sensory attributes objective metrics can be found that can predict the sensory attribute scale value based on instrumental measurements only.

In the experience map concept we use multivariate data reduction methods such as principal component analysis (from the factor analysis family of methods traditionally used in psychometrics) in order to visualize the perceived differences between media samples (see Jackson (2003) for a detailed description of principal component analysis). Mensonen et al. (2010) provide an example of using the experience map approach to study the effect of sensory attributes on the subjective evaluation of print media samples. For example, the experience map in Figure 16 for 9 media samples (red squares labelled with letters from A to I) with identical content but printed on different paper grades illustrates the most significant perceived differences between the samples. The differences are shown both in terms of selected sensory attributes (blue vectors ending in circles) and mental impressions associated with the samples in subjective evaluation (green vectors ending in circles). For examples, media samples A and B differ from the other samples mainly by feeling more stiff in the reader’s hands and appearing less colourful than the other samples. These samples were also evaluated as being more trustworthy but less relaxed, for example, than the other samples.
The experience map visualization such as the one shown in Figure 13 should not be considered an end-point of analysis. Rather, it can depict relationships in typically highly multivariate media experience data that would not be readily apparent otherwise, and this can serve as a starting point for further analysis. This further analysis can involve further investigation of individual perceptual scales, investigation of interactions between different variables (perceptual, technological, and creative) by means of statistical analysis, and different kinds of visualizations to further explore the data.

Sensory evaluation approach is well suited to studying the effects of the properties of the physical media artifact on the media experience, and can be combined with subjective evaluation of media, as well as measures for the emotional response. As such sensory evaluation does not cover the activities or practices in which people engage when using media, or the social aspects or personal meaning associated with media. Ethnography, surveys and other audience research approaches described elsewhere in this document provide access to the study of these aspects of media experience. Sensory evaluation can be used in conjunction with these approaches as well. For instance, media ethnography might reveal the values that a certain audience segment prioritizes when evaluating media in a given context (a top-down approach); sensory evaluation (a bottom-up approach) could then provide information on how to modify the media product to strengthen attributes associated with the identified values (by selecting the optimal paper grade for a print magazine or modifying the layout of an electronic publication, for instance).

Outlining future extensions to the experience map approach, both quantitative and qualitative data obtained from other kinds of methods could be used in conjunction of this kind of visualization. For instance, descriptive words from interviews could be directly overlaid on the graph. Other quantitative experience scales could be plotted on the graph. While above the perceptual effect of technical variables has been used as an example, the perceived variation to be studied could also result from the creative decisions in the content creation and presentation (layout, color palette, etc.),
or from interactions between different kinds of variables. Consumer groups with different kinds of attitudes and values could be identified and located on an experience map based on their preferences and attributes that they value in media products in a given context. This would combine the experience map (showing perceived differences between media samples) with the preference map concept (showing groups of people with different preferences). For example, specific mental impression dimensions from subjective evaluation (say, trustworthiness and usefulness) could be factored from the data and rotated to align with the horizontal and vertical axes of the graph for the sake of clarity. Media samples could then be plotted in this diagram, along with consumer clusters with different preferences. Sensory attributes could be included as vectors, as in the experience map example shown above, clearly illustrating their contribution to the selected experience dimensions of interest. This would indicate in a straightforward manner how a given modification of the sensory attributes would mold the media experience and whether this modification would make the given media sample more or less preferable to a given group of consumers.

While in this section the emphasis has been on the measurement of sensory attributes, the possibilities for mathematically modelling the relationships between various perceptual, technical or creative variables have been hinted at. Multivariate statistical models fitted to the measured data would allow the interactions between different perceptual attributes to be simulated, possibly providing a useful tool for the development of media products and services. Further, in some instances it could be possible to use mathematical algorithms emulating sensory perception mechanisms to predict and control the perception evoked by a certain instance of media. For example, Laine (2003) has experimented with using colour appearance modelling to predict and control the perceived colour of pictures displayed on computer monitors in varying ambient illumination conditions and also (Laine, 2000) to automatically adjust colour reproduction so as to convey a feel of certain lighting conditions in photographs.

In summary, sensory evaluation can be used as a tool for benchmarking and development of media products from the point of view of sensory perception. The experience map approach illustrates the relationships between sensory attributes and subjective evaluation of media. Various paths are seen for extending and integrating the approach with other methods.

7.6. User dimensions

7.6.1 Personality

Media preferences are likely to be subjective. Various factors such as upbringing, personal history, education and social context are likely to contribute to this subjective component. In the present chapter, however, we discuss findings on the relations between personality traits and media experience based on three psychological views: Eysenck’s personality model, “Big Five” models of personality and the behavioural inhibition and activation (BIS/BAS) model. The first two models and their putative associations with media preferences are illustrated in Figure 17. Both models describe extensive personality traits that supposedly remain stable in an individual regardless of context or time (Pervin, 2002). Given the long history of these models, well established self-rating scales exist for both.
Figure 17. Personality traits and media preferences. Arabic numerals 1-5 refer to personality traits of the "Big Five" personality models whereas roman numerals I-III refer to Eysenck’s traits.

Eysenck’s personality model consists of traits neuroticism (lack of emotional stability; e.g., anxiety), extraversion (e.g., socialness, talkativeness) and psychoticism. The last trait, psychoticism, is of specific interest in the context of media violence. Individuals scoring high in psychoticism are impulsive, sadistic, hostile, aggressive, unemotional and lacking in empathy (H. J. Eysenck & Eysenck, 1991; Eysenck, H. J., Eysenck & Barrett, 1985). It has been shown that high scorers exhibit lower skin conductivity responses to violent videos and find them less disturbing and more humorous than other people (Bruggemann & Barry, 2002), and show less decrease in facial EMG responses indicating positive emotions to violent events in a computer game (Ravaja et al., 2008).

The so-called Big Five personality models are based on the repeated finding that a majority of personality qualities can be reduced to five underlying traits. In comparison to the Eysenck’s personality traits, the Big Five models replace psychoticism with conscientiousness (e.g., self-discipline and planning) and agreeableness (e.g., friendliness) traits, and add openness to experience (e.g. imagination, intellectuality) as a separate trait. Existing media studies have demonstrated that of the big five factors, openness is the most clearly associated with media preferences (Finn, 1997; Kraaykamp, 2001; Kraaykamp & Eijck, 2005). Open personalities appear to favour complex and exciting content both in television and literature and show preference for “not only highbrow activities, but also the reading of detective novels as well” (Kraaykamp & Eijck, 2005). Agreeableness in particular, and conscientiousness and neuroticism to some extent, appear to be associated with an opposite pattern, i.e. preference for more popular entertainment including romantic novels and soap series and aversion for more “elitist” and complex entertainment (ibid). Consistently with the above findings, Woszczynski and coworkers (2002) have hypothesized within the field of human-computer interaction that high neuroticism would be associated with increased computer anxiety whereas high openness would be associated with increased skill in maintaining optimal stimulation level in various computer use contexts. As a consequence, neuroticism and openness would contribute to the experience of playfulness in computer use. Extroversion seems to
have the least effect on media preferences; however, a study by Finn (1997) has suggested that higher extroversion is associated with less time spent on recreational reading, television watching and radio listening.

Behavioural inhibition and behavioural activation systems (BIS/BAS) are considered as the two main motivational brain systems underlying behaviour and affect (Gray 1982, 1991; Pickering & Gray, 1999). The BIS system is assumed to regulate aversive motivation, is sensitive to signals of punishment, non-reward and novelty, and to be associated with increased arousal and attention toward negative cues. The BAS system regulates appetitive motivation, is sensitive to reward and non-punishment signals, directs attention toward the positive cue, and is associated with greater proneness to experience positive feelings when exposed to cues of impending reward (Gray 1982, 1991; Pickering & Gray, 1999). The BIS and BAS systems have also been associated with the Negative Activation and Positive Activation dimensions presented in Figure 14 (chapter 8.2 Emotions). Self-report scales have been developed to assess individual differences in the sensitivities of these inhibitive and activating systems (Carver & White, 1994).

Previous media studies have demonstrated that the BIS/BAS systems are of relevance for the experience of media. For example, in a news reading study by Ravaja and Kallinen (2004), individuals scoring high in BAS dimension showed higher interest ratings and facial EMG responses associated with positive emotions to news messages that were presented with startling background music. That is, high-BAS individuals were more “excitable” to external factors during news reading.

7.6.2. Values

An individual’s personal values are the qualities, traits, or principles that he or she finds important. Generally speaking, values can be understood as a driving force behind a person’s goals, actions, and priorities, in life in general and also in media use. Personal values are a relatively stable aspect of an individual’s mentality, but usually evolve throughout life and are affected by experiences with immediate family, especially early in life, and other social contacts, as well as the prevailing cultural values in the surrounding society. Strong life-changing experiences, such as traumatic events, or changes in social status, may also affect an individual’s personal values.

Schwartz (1992) has conducted influential theoretical and experimental studies of personal values. He divides the personal values, which were found to be similar to but not identical with cultural values, into ten categories (motivational value types). Experimental data from 20 countries confirmed that people in a large number of cultures implicitly distinguish these ten value types when assessing the importance of specific values as guiding principles in their lives. The eleven potentially universal value types are (examples of single values primarily representing each value type are given in parentheses): power (wealth, authority, social recognition), achievement (capable, successful, influential), hedonism (pleasure, enjoying life), stimulation (an exciting life, a varied life, daring), self-direction (freedom, creativity, curious), universalism (equality, social justice, protecting the environment), benevolence (responsible, honest, loyal, meaning in life), tradition (respect for tradition, devout, humble), conformity (obedient, self-discipline, politeness), and security (healthy, clean, sense of belonging).

Universal value structures postulated by Schwartz indicate relations of conflict and compatibility among values. Value priorities or hierarchies, on the other hand, refer to the relative importance of values to individuals (or groups).
Schwartz (1992) conceptually defines values as follows: Values are concepts or beliefs, pertain to desirable end states or behaviours, transcend specific situations, guide selection or evaluation of behaviour and events, and are ordered by relative importance. Schwartz further proposes that values express goals, and can be seen to represent three universal requirements of human existence: needs of individuals as biological organisms, requisites of coordinated social interaction, and survival and welfare needs of groups.

Values can be understood to differ from attitudes by being more general or abstract and by having a hierarchical ordering by importance. The difference between the concepts of trait and value is highlighted by the following example: a person may find creativity important (a value) without being creative himself (a trait), while a creative person may put little importance to creativity as a guiding principle.

From the media experience point of view, it is useful to think of values as those aspects of media experience to which an individual (whether consciously or subconsciously) attributes at least moderate importance as criteria of evaluation. The values that an individual emphasizes are likely to vary from one instance of media use to another. These values may be more specific than the universal values discussed above. When reading, watching, or listening news, trustworthiness or efficiency, for example, may be considered valuable, while pleasure, beauty, excitement, or challenge may be attributed a lot of value when playing a game or watching a movie. Identification of significant values associated with different types of media in different contexts (by different types of people) would allow the media experience to be enhanced by emphasizing the desirable values associated with the media (assuming that the corresponding aspects of media experience can be measured and analyzed, and their connection to the variables in media production can be determined).

8. References


