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Expanding the toolbox: Researching reception of TV programs with a combination of EDA measurements and self-reports in applied audience research

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Abstract:
The aim of this paper is to describe a mixed-methods research approach that provides a diversified perspective on audience reception of TV programs. We combine self-reports and electrodermal activity (EDA) measurements in an applied research context to conduct viewer evaluations of TV programs. This mixed methods approach makes it possible to reveal and capture both the conscious and unconscious emotional reactions of a TV audience, which are often difficult to articulate.

Keywords: audience research, electrodermal activity (EDA), empirical neuro audience research, qualitative, reception studies, television studies, mixed methods, psychophysiological measures, skin conductance (SC), self-reports.

1. Introduction:

At the Danish Broadcasting Corporation (hereafter DR), a great deal of attention is given to how audiences respond to the first episodes of new TV programs. It is commonly accepted within the organization that viewers will form preferences for programs based on their experience of the first episode, and it is therefore very important that the first episodes have the strongest possible appeal to a broad audience. In recent years, there has been an interest in incorporating psychophysiological measurements which deliver real-time data, i.e. methods such as eye tracking, electroencephalogram (EEG) and electrodermal activity (EDA). This article considers how EDA measurements and self-reports can be combined to diversify the perspective that applied audience research can obtain on reception of TV

programs, and how DR Audience Research assists producers in the development of TV programs with the broadest possible appeal.

1.1 *DR Audience Research*

This article draws on on the experience of DR's audience research unit. The Danish public broadcaster has a long history of conducting quantitative and qualitative audience research including pre-tests of new TV programs and evaluations of existing TV programs. This research is intended to help DR enhance program quality and optimize audience reach by ensuring broad audience appeal, minimizing the risk of low viewer numbers. In conducting a typical viewer evaluation at DR, audience researchers and commissioning editors, the channel controller and the head of production decide on a core question for research. Audience researchers then conduct the viewer evaluation. Once respondent recruitment is finalized, audience researchers have five days to complete data collection, data analysis and presentation of results to the production unit. The results are then presented to the commissioning editors, channel controller and head of production: the main findings are encapsulated in charts and bullet points for further discussion in a feedback meeting. DR's audience research is used as a development tool rather than a judgement of a TV program's success: the focus is on developing and improving a TV program based on the results of a viewer evaluation before the show is broadcast (Redvall, 2017). The aim of the research carried out by DR Audience Research is therefore in many ways more strategic than academic audience research, since it does not pursue complex cultural issues and has a relatively low tolerance of discursive ambivalence in the data (Schrøder et al. 2003).

In the past, DR Audience Research used self-reports for viewer evaluations of TV programs. More recently, however, DR researchers found that self-reports about emotional experiences in television drama and dramatized historic documentary might be inaccurate because the respondents do not remember their responses after the screening of a TV program. Television drama and dramatized historic documentary are very much about emotional engagement, so DR researchers decided to consider new methodological designs that would combine both qualitative data and psychophysiological measurements.

1.2 *Contemporary audience research within television studies is dominated by qualitative ethnographic methods*

The primary challenge in conducting audience research within television studies is to understand both the emotional and the rational experiences that occur in the encounter between a respondent and a TV program. In order to do this, much television audience research has prioritized giving voice to the users of media products in order to explore the meaning and uses of the media within in the context of people's everyday lives; thus, audience and reception research can be understood as a contextual form of inquiry (Radway, 1984; Jensen, 2002). Meaning-making does not simply correspond to the processing of information but is an activity which cannot be disconnected from the context

of people's everyday lives (Mathieu, 2012, p.63). One of the main assumptions in audience research is that the response to media content is discursive, and hence available through talk (Schrøder et al. 2003). However, the interest in context and meaning-making has come to overshadow the interest audience researchers have in the moment of reception (Alasuutari, 1999, p.13). In audience research the preferred research method has often been an interview conducted after the TV-experience has ended (Kanjo, Al-Husain & Chamberlain, 2015; Phan & Spipada, 2013), in which respondents are given the opportunity to discuss and reflect on the mediated experience. This backward-looking strategy applies in both qualitative and quantitative methods (Myttom et al., 2016). In a recent literature review, Zaborowski & Dhaenens (2016) argue that as most contemporary reception research within television studies aligns itself with a cultural studies approach, qualitative ethnographic methods have dominated the methodological frameworks. Zaborowski & Dhaenens (2016) found that in academic articles within the field of audience research in TV, in-depth interviews were the method most used, followed by the focus group interview and ethnographic approaches. Other methodological approaches remain rarer, even though laboratory-type experiments have been conducted since the first part of the 20th century, including for example The Payne Fund Studies (1928-33) (Jowett, Jarvie & Fuller, 1996). These types of experiments monitor and measure galvanic skin response, heart rate, and respiration variances in people while they are watching certain kinds of content, including violent media stimuli (Cline, Croft and Courrier 1973; Osborn and Endsley 1971).

1.3 *Problems arising from the extensive use of self-reports in audience research within television studies*

There are a number of problems arising from the use of self-reports as the sole source of data for assessing respondents' emotional experiences. For a start, because a substantial proportion of our subjective experience unfolds below the threshold of consciousness, it is extremely difficult for respondents to remember, register, evaluate or simply talk about these experiences (Kahnemann, 1999; Scherer, 2009; Tan, 1996; Zaltman, 2003). As Joseph LeDoux puts it:

> Emotions are notoriously difficult to verbalize. They operate in some psychic and neural space that is not readily accessed from consciousness… Yet much of our understanding of the way the emotional mind works has been based on studies that have used verbal stimuli as the gateway to emotions or verbal reports to measure emotions (LeDoux, 1996, p. 57, 59).

The second problem that arises from the use of self-reports is that these usually represent a summary of the whole experience after the fact, and do not capture the here-and-now experience (Rotschild et al., 1986; Sukalla et al., 2015). Self-reports are therefore unable to represent the dynamic changes in the viewer's response as the experience unfolds

(Soleymani, 2008). Finally, self-reports about emotional experiences may be inaccurate because the respondent might misrepresent her/his feelings due to a desire to present themselves in a certain way (Picard & Daily, 2005). For example, the respondent may wish to demonstrate courage rather than fear, or may try to please or impress the researcher. Collectively the weaknesses of the self-report mechanism suggest that research should not be based solely on the assumption that a response to a mediated experience can be accessed through verbal statements alone.

1.4 *Mixed methods*

Mixed methods strategies within audience research in TV-studies are not new, and achieve a broader, richer and deeper understanding of the responses under study. According to Greene (2007), a mixed methods approach is often a necessity when the research object is complex and influenced by context (Greene, 2007; Tashakkori and Teddlie, 2010). Interest in mixed methods has thus been growing over several years in the fields of reception studies and audience research, where researchers have argued that a revitalization in methodology is needed (Hallin & Mancini, 2004; Schrøder, 2012; Schrøder et al. 2003). Mathieu et al. (2016) support this point by arguing that a reliance on mixed methods is not only the result of a more complex environment, but also the outcome of an epistemological motivation to transcend the qualitative-quantitative divide within audience research.

If we look to psychocinematics, there are a number of examples of how this can be done. Psychocinematics has used primarily functional magnetic resonance imaging (fMRI) and eye tracking to study the psychological underpinning of the film experience in an empirical way. Within an experimental context, the viewer's experience is analyzed through objective, systematic, and replicable measurements (Shimamura, 2013). Redmond & Batty (2015) and Smith (2013) have both made important contributions to this field of eye tracking screen research, addressing questions such as what influences where a viewer may look, and how individual differences between viewers alter what a viewer sees. Beyond television studies, there is also increased interest in expanding the methodological toolbox with mixed methods approaches incorporating different psychophysiological measures, for example within gaming research/HCI and performing arts. In gaming research, a mixed methods strategy consisting of psychophysiological measurements and self-reports has been used to assess whether gamers are engaged while using an application and what aspects of a game engage them (O'Brien & McLean, 2009), while in performing arts, galvanic skin response has been used to access audience engagement (Latulipe, Carroll & Lottridge, 2011).

1.5 *EDA measurements used to overcome limitations in self-reports when researching TV programs*

With increasing recognition of the limitations of self-reports, an applied audience research method that provides a diversified perspective on audience reception is timely. One

approach to achieving this is to integrate psychophysiological measurements with self-reports: DR Audience Research did so by including electrodermal activity (EDA) measurements in its viewer evaluations. EDA measurements are sometimes linked to neuroscience and the prefix 'neuro' has become ubiquitous in the new millennium, appearing in research, newspaper articles, in blogs and in magazines. There is research on neuro marketing (Bregendahl, Haase & Halberg Madsen, 2011; Dooley, 2012; Lindstrom, 2011), neuro economics (Bernheim 2008; Politzer, 2008), neuro pedagogy (Steffensen & Schilhab, 2012), neuro psychology (Street, 2003; Damasio, 1999; Wirth & Schramm, 2005), neuro mediation (Grabowski, 2015) and neuro media science (Weber et al., 2015). As neuro-scientific methods have become both better known and more technically accessible and affordable, their application has been extended to commercial reception research, for example in the analysis of fast moving consumer goods, financial products, media and telecom (Westoby, Vestergaard & Roepstorff, 2014, p.103). With the risk of being accused of being infected by neuro-mania, at DR we believe that neuro-scientific research methods such as EDA measurement have great potential to offer insights in the field of television audience research. That position seems to be supported by recent research carried out within the field of neuro cinematics in which eye tracking is used to get a deeper understanding of film perception (Hasson et al., 2008; Redmond & Batty, 2015; Shimamura, 2013; Tikka & Kaipainen, 2015 ("in Grabowski, 2015").

2. DR's mixed methods approach to understanding affective responses to TV programs

The approach taken by DR involves the use of sequential mixed methods (Creswell, 2014, p.220). More specifically, the data is collected over a period of time in two consecutive phases. First, the psychophysiological data is collected and analyzed. Then, the self-reports are collected in a second phase of the study and are connected to the outcomes of the first phase. When evaluating viewer experience of a drama series or dramatized documentary, DR Audience Research starts with the quantitative/objective method (psychophysiological measurement), because the result here can be used to qualify the qualitative/subjective method (self-report). For example, the psychophysiological results will show which sequences in a TV program activate respondents emotionally and those which do not, knowledge that can then be used to focus the self-report on the sequences of main interest. In this context, it is extremely important to stress that the self-report is not just used 'to add color to quantitative data' (Gough, 2015, p. 113). Instead the methods operate on equal terms, and both the advantages and disadvantages of both methods are recognized. The goal here is to achieve balance and compromise between the methods (Tashakkori & Teddlie, 2010, p. 11).

As European communication and media research has a very strong attachment to the humanities and has been inspired by semiotics, psychoanalysis, cultural studies, reception studies and ethnography (Jensen, 2002, pp. 19-31 and 163-170; Gough, 2015 p. 107-111), it

is essential to ensure that psychophysiological measurement is not just used to 'add color' to the qualitative analysis, but that they are of equal value. Since few researchers fully master the qualitative, quantitative, observed and self-reported disciplines, critics of mixed methods have argued that there is a risk that mixed methods results are not of a sufficiently high level of quality (Bazeley, 2002, p. 8). On the other hand, research results may be compromised if researchers only apply the methods they have fully mastered. At DR we believe that it is important to show methodological flexibility and apply the methods that best answer the research question. If necessary, researchers should seek assistance or a partnership to be able cope with those parts of data collection, data processing and data analysis with which they are unfamiliar in order to achieve the best outcomes.

3. Methodological approach

Media psychologist Niklas Ravaja (2004) claims that the majority of studies that examine emotional responses to media content using psychophysiological measures are based on a dimensional model that considers the combination of valence and arousal. Arousal is an expression of emotional intensity and activation; that is, alertness, susceptibility to sensory impressions or readiness. In the field of physiological psychology, arousal includes a range of states of consciousness, ranging from unconsciousness to alertness (Lund et al., 2006). Arousal is bivalent, which means that both positive and negative valence can cause high and low arousal. Both valence and arousal are recognized and well-proven measures of emotion both within a neuroscience research tradition and in the field of reception research (Corcoran, 1965; Revelle & Loftus, 1992; Wirth & Schramm, 2005). It is also possible to measure valence with psychophysiological measures, using facial EMG (Mauss & Robinson, 2009). However, at DR we are not willing to use this approach due to the invasiveness of the procedure. An alternative to gaining insight into the phenomenological experience of a TV program is self-reports (Rooney, Benson & Hennessy, 2012). It is therefore important to obtain self-reported knowledge of both the conscious phenomenological experience of a TV program and how scenes triggering high and lower arousal are perceived by the viewer. In short, this dual approach makes it possible to measure arousal while the respondent watches a TV program in order to uncover the unconscious emotional reaction, and then to ask the respondent to describe the experience of the stimulus using open-ended questions to reveal the conscious phenomenological emotional experience.

3.1 *Measuring arousal*

Psychophysiology developed as a sub-discipline of psychology during the early 1960s. Over the decades, it had developed a set of assumptions underlying the collection of bio-electrical measures and their interpretation as indicators of cognitive and emotional processes (Potter, 2017). The collection of psychophysiological measures involves collecting bio-electrical signals generated by the central or peripheral nervous system. The signals collected are dependent upon the hypotheses being investigated, and here the research

relies upon decades of work in psychology and cognitive science demonstrating how specific physiological response patterns correlate with psychological states (Cacioppo, Tassinary & Berntson, 2007). Psychophysiological measurements may correlate with an interest in media content, for example heart rate deceleration during a compelling narrative or increased palm EDA in response to a quarrel. Psychophysiological measurements are resistant to conscious control and this means that they can often provide data free from the response bias sometimes associated with self-report measures (Potter, 2017). As described in Ravaja's (2004) general overview of psychophysiological research and in the more specific overview of EDA in Figner & Murphy (2011), skin conductance measurements provide an indirect measure of the level of arousal of the sympathetic autonomic nervous system. EDA reflects the amount of sweat secretion in the sweat glands in our skin; increased sweating results in higher skin conductivity. Arousal is generally seen as a key component of emotional processes. Data from a skin conductance measurement is collected dynamically during the watching of the TV program. By time-locking data to specific instances in the TV program, questions of reception can be addressed at a very fine-grained level of analysis (Potter, 2017). Operationally, conductance in the skin can be measured by placing two electrodes on the palm of the non-dominant hand and passing a tiny electric charge between the two points. EDA measurements in the form of skin conductance measurements are used on the basis of considerations of cost, ease of use and degree of obtrusion. Skin conductance measurement is relatively unobtrusive, especially compared to consumer EEG, and skin conductance data can be aggregated and visualized in a short time frame. This contributes to minimizing turnaround time, which is of great importance in applied research.

When it comes to the results, individual differences are not at the centre of investigation. Instead we are interested in the aggregated data. This choice comes with advantages as well as disadvantages. The disadvantage is that we cannot go into detailed analysis of the differences in respondent experiences, on the other hand the analysis of EDA data on the aggregate level contributes to a neutralization of variance making it possible to analyse the common response to a TV program. This is of particular interest in this kind of applied audience research, where the task is to appeal to as many viewers as possible. The data is also normalized so all the measurements are directly comparable and not biased due to differences in absolute skin conductance value (Latulipe, Carroll & Lottridge, 2011, s.1851).

3.2 *Self-reporting on arousal*

To uncover the conscious phenomenological emotional experience of a TV program, respondents are instructed to fill out a questionnaire immediately after the screening ends (Heiselberg, 2016). The questionnaire consists of two open ended questions. In the first question the respondents are instructed to note the scenes or sequences that they consider affected them the most – and why. In other words, they must recall events in the TV

program which elicited particularly strong emotions. This instruction is used to obtain the self-reports which reflect the peaks of subjective emotional experience of the most salient and intense events (Barthes & Appel, 2010, p. 178). The goal is to have respondents self-report on their experience of high arousal events, since high arousal events are remembered better than low or medium arousal sequences (Holland, 2013, pp. 266,268). In the second question the respondents are instructed to describe events they have a hard time concentrating on – and why. The goal is to have respondents self-report on their experience of low arousal sequences in which they experienced boredom, or what we have identified as 'flatliner sequences'. The following comment from a respondent provides a concrete example of the experience of boredom as described by the respondents:

> I sometimes had difficulties concentrating because the program got too quiet. I need more illustrative visual scenes instead of having a speaker all the time…. I think I got a lot of info, which I had to digest, more visual communication would have been nice. (Female, 24)
> (Viewer evaluation of *The History of Denmark*, DR Audience Research, 2017)

3.3 *Full length TV programs as stimuli*

In experimental research in television studies, short, controllable stimuli are typically examined to reduce research expenditures and to be able to control experiments (Suckfüll, 2000). Many studies aim to detect psychophysiological changes with a focus on brand memory where respondents see short formats, such as TV advertising (Plassmann et al., 2012; Ravaja, 2004; Shimamura, 2013; Suckfüll, 2013; Westoby, Vestergaard & Roepstorff, 2015; Vecchiato et al., 2010). Skin conductance response and levels have been extensively studied for single event stimuli where characteristics such as time of stimuli, onset curve of the response, peak and half-decay time can be understood (Bryant & Vorderer, 2006; Sukalla et al, 2015). In the research presented here, a completely different approach is desired because emotionally engaging TV programs are expected to have passages with a very large number of stimuli. Skin conductance responses are therefore expected to overlap: often several stimuli can even be present in a single frame, for example sound, picture and editing pace. There are only a few examples of academic research with a psychophysiological approach which at the same time have a full-length audiovisual narrative as a stimulus (Hasson, Nir, Levy, Fuhrmann & Malach, 2004; Heiselberg, 2016; Gregersen, Heiselberg, Langkjær & Wieland, 2017; Suckfüll, 2000). These studies confirm that it is possible to use full-length audiovisual narratives as stimuli even though the research is more costly and it is hard to conduct a clinically controlled experiment. Suckfüll (2000) argues that her research on the film *The Piano* demonstrates the relevance of exploring the ways in which narrative structures are perceived at a subconscious level, and shows how film analysis and psychophysiological measurement can be used together to investigate the effects of moments of impact within a narrative structures and the effects of

narrative structures associated with protagonists. In DR Audience Research full length TV programs are always chosen as stimuli.

4. A brief case study showing the potential of the mixed methods approach

4.1 *Procedure*

The skin conductance measurements are recorded in a lab with three workstations present. A respondent is seated at each workstation which consists of a 17-inch laptop with quality headphones and external keyboard and mouse. The laptops are fitted with Tobii X2-30 Eye Tracker Compact Edition, eye-trackers and a varioLAB-mini device to measure skin-conductivity levels. The only reason to collect eye tracking data is that the varioLAB-mini cannot run without it. Respondents first wash their hands and are not given any food or drink prior to data collection. Each respondent is fitted with standard disposable electrodes connected to a signal amplifier and to the varioLAB-mini device, which measures skin-conductivity levels. Data-collection is managed with the use of the Biometric Software suite and Tobii Studio.

4.2 *Recruitment of participants*

The participants are usually recruited from DR Audience Research's own internet panel of approximately 10.000 members. A total of forty respondents for each test are recruited (Kivikangas et al., 2011; Field, 2012). Recruitment parameters are based on gender, age, educational level and prior appreciation of TV programs from The Danish Broadcasting Corporation. The purpose of the sampling strategy is to get a heterogeneous sample that covers the major segments of Danish television viewers, that is, a stratified purposive sampling.

4.3 *Stimulus*

In this particular study, each respondent was shown a one-hour episode of a dramatized historic documentary entitled *The History of Denmark* (original title: *Historien om Danmark*) which aired on DR1 in 2017 in prime time. This TV series bears a certain similarity to the British series *A History of Britain*, and runs chronologically from the Stone Age to the beginning of the 21st century. The ambition was to create a TV story with modern forms of expression including dramatized visualizations, history experts and a host (the well-known Danish actor Lars Mikkelsen) who appears on location and in different historic time periods. *The History of Denmark* has been defined as a dramatized documentary since it originates from the journalism or a current affairs department and uses techniques such as scripting, staging and actors (Nicholas & Price, 1998, p.132). The episode that was shown as a stimulus was a first cut production of the fourth episode. All testing was done in 2016 prior to the airing of *The History of Denmark*.

4.4 *Data processing: initial procedures and separation of phasic and tonic component and normalizing the phasic component*

The next step is the identification of aggregated skin conductance responses (SCR). Skin conductance readings can be divided into tonic and phasic components (Figner & Murphy, 2011). The most common measure of tonic components is the skin conductance level (SCL). SCL is not directly related to stimuli, but indicative of the general level of arousal. This measure describes the overall conductivity of the skin over longer time intervals, typically ranging from tens of seconds to tens of minutes. The phasic component, on the other hand, is measured by way of skin conductance responses (SCR). A single SCR is a discrete and short fluctuation in skin conductance that lasts several seconds and usually follows the characteristic pattern of an initial, relatively steep rise, a short peak, and then a relatively slower return to the baseline. The main reason for running the tonic-phasic separation is thus to separate the event-related parts of the signal (i.e. the phasic component) from their moving baseline (that is, the tonic component). In the data analysis, the focus is on phasic responses due to their relation to specific events, and because these can be operationalized across shorter time intervals than SCL. Since the interest is in whether event structures (operationalized as situations) can be seen to contribute to arousal, the phasic component of the data is indubitably the most relevant component to pursue.

Due to the nature of skin conductance, the magnitude of SCR readings can vary a lot from respondent to respondent; the ability of an individual's body to conduct a current and the level of sweat produced is the most obvious source of variation. In order to be able to compare across individuals, the phasic measurements are normalized to vary between 0 and 1, a so-called min-max normalization (Larose & Larose, 2014). The aim of this normalization is to control for between-subject variations in baseline and amplitude. One result of this normalization is that all the measurements become directly comparable and no single respondent's measurement can weigh significantly higher due to a higher absolute skin conductance value (Latulipe, Carroll & Lottridge, 2011, s.1851). Without normalization, averaging measures would be somewhat problematic. After normalization, the TV program is segmented into scenes and an aggregated timeline-based analysis of viewer reactions is produced.

4.5 *Analysis of peaks, dips and flatliners in EDA-data*

Many respondents argue from a common-sense point of view that a well composed TV program has an arousal peak at the beginning and at the end in an attempt to initially engage viewers and to make sure that they return to watch the next episode. Moreover, almost all existing models of dramaturgy build on the Aristotelian notion of a progression through a series of acts toward a climax (for example, Blum 2001; McKee 1999; Thompson 2003). However, most models of dramaturgical progression, including all modern Aristotelian versions, employ a more complex structure in the gradual build towards a climax. Here drama is structured to build a curve with dips and peaks even within the

various stages or acts (Gregersen et al., 2017). In **Figure 1** this gradual build but also the rise and fall during progression of the episode can also be seen. Since it is not possible to analyse all data points in the EDA data set, the procedure is to identify and analyse the maximum SCLs (emotional arousal peaks), because these represent the extremes of how respondents become emotionally activated as they watch the TV program.

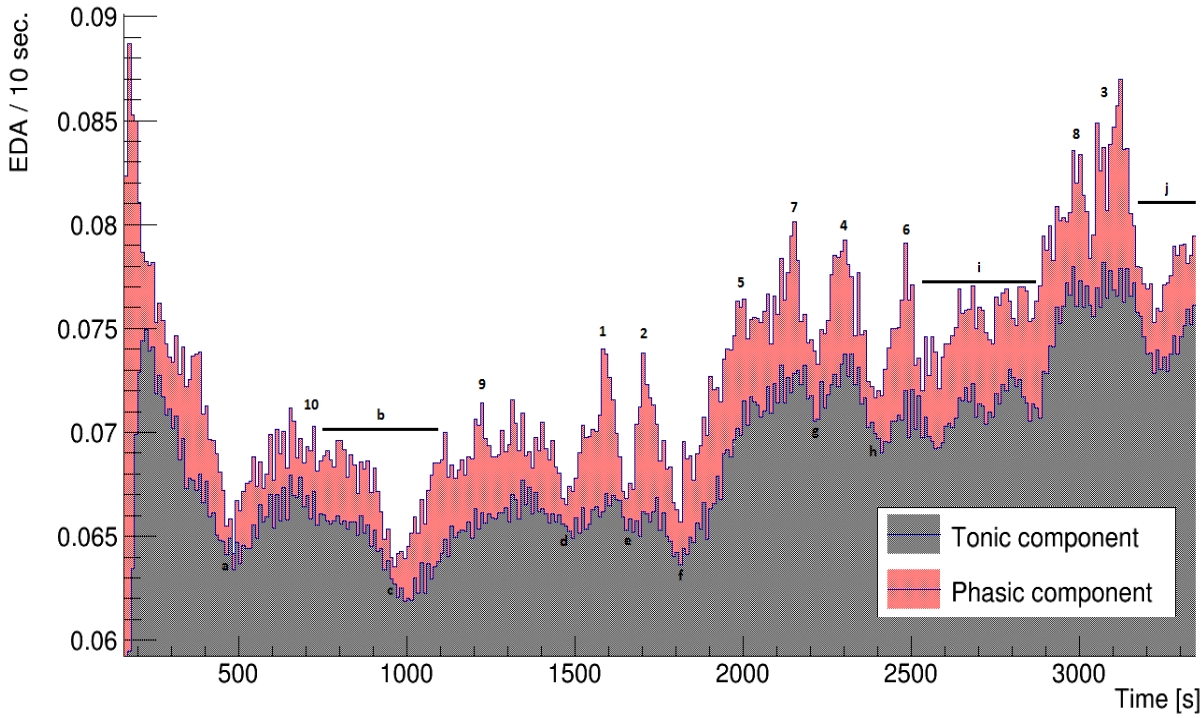

Figure 1: A zoom of the distribution of the phasic and tonic component of the EDA signal for all respondents divided into bins of 10 second video sequences. The History of Denmark episode 4. DR1, 2017.

The phasic EDA graph from the test version of the fourth episode of *The History of Denmark* shows several peaks. Looking at the three scenes with the highest relative increases in arousal it is clear that peak 1 and peak 2 attain the highest levels of arousal across respondents. This is the scene in which the Danish Queen Ingeborg is told that her newlywed husband, Philip the II of France, has changed his mind about their marriage and wants to send her back to Denmark. This episode takes place on the morning after the wedding. The scene is arousing because the viewer gets a very clear picture of how Queen Ingeborg experiences the situation, feeling betrayed, abandoned and alone. Peak 3 occurs towards the end of the episode and is the second highest peak relatively speaking. In this scene the viewers are taken back to 1286 and the murder of King Erik Klipping. This happens inside Finnerup Barn near Viborg. Erik Klipping bleeds to death after receiving 56 stab wounds, and nine of the realm's most powerful noblemen were outlawed for the murder and forced to leave the country.

The scenes with the lowest levels of arousal (emotional arousal dips) can also be important to identify (in **Figure 1** the arousal dips are marked by letters). These short-lasting dips are not the main area of interest for DR, because it is assumed, that viewers will accept a short period of low arousal and not consider skipping to another program. Instead the research interest centres around 'flatliner sequences'. These are the longer lasting, low-lying sequences where the arousal curve flattens out. This is where respondents overall, have very few fluctuations in arousal. In **Figure 1** this is demonstrated through the visualization of the phasic component of arousal that includes three flatliner sequences (b, i, j). Flatliner sequences are of specific interest because they give an indication of where the TV program may be weakest in terms of holding the attention of the viewer. A lengthy sequence where there is no progress in the action, and where respondents do not experience major emotional fluctuations can potentially be worrisome, because there is a risk that viewers will zap to another TV channel if they are bored. A fundamental assumption within media psychology is the importance of immediate gratification in the entertainment experiences (Sukalla et al, 2015; Tan, 2008; Zillmann, 2002). This suggests that TV audiences want to be kept on the edge of their seats, or to be moved to tears (Bartch, 2012), and that it is important not to bore audiences over longer periods of time. If the viewer is to experience an emotional reaction with a high or medium level of arousal, he/she must be presented with emotional content that awakens, maintains and/or intensifies emotions (Sukalla et al., 2015).

4.6 *Analysis of self-reports*

The strategy for the analysis of self-reports is to identify and count those scenes which respondents state have influenced them the most. Inspired by content analysis, respondents' answers from the questionnaires are sorted into well-defined categories which make it possible to see the frequency of a recurring theme (Bjørner, 2015). The coding results in a hierarchy of the sequences as described by the respondents in self-reports. Studies from DR Audience Research show that typically respondents remember and self-report on sequences with high and medium levels of arousal. Respondents do not remember and cannot comment on sequences with low arousal (Heiselberg, 2016). This supports the claim within neuro-scientific research that stimuli which elicit high levels of arousal are encoded better than stimuli which elicit low levels of arousal. High arousal stimulus is stored automatically, whereas low arousal stimuli must be connected to existing knowledge or to the episodic memory to be encoded which complicates the process (Holland, 2013).

4.7 *Results*

As stated earlier, previous studies typically show a strong correlation between self-reports and peaks in arousal, and this is supported by our study of audience responses to *The History of Denmark.* The scene which caused the highest levels of emotional arousal was

also the scene on which most respondents commented; the scene in which Danish Queen Ingeborg learns her newlywed husband Philip II of France has changed his mind about the marriage. However, in every study conducted by DR Audience Research, we have also discovered scenes that have relatively high levels of arousal that are not captured by the respondent's self-reports. In *The History of Denmark* these include the scenes about the kidnapping of the former Danish king Valdemar II The Victorious and a description of Jydske Lov, an early version of the formation of the Danish Constitution (Heiselberg 2016; Heiselberg & Løvschall-Jensen, 2017 in review). This demonstrates how a mixed methods approach provides a diverse perspective on the reception of TV programs and greater precision in research results, and how it can assist in developing more arousing TV programs. Particular events or actions in sequences with dips in arousal level or flatline sequences in arousal level are typically not talked about by respondents in self-reports, apparently because these are not remembered (Holland, 2013, p. 466). On the other hand, many of the respondents can articulate sequences which make them bored in general terms. In the case of the episode that was shown from *The History of Denmark,* respondents did mention boredom in general terms. Sequences that were dominated by a voice over, sequences where the action was described but not shown and the enumeration of historic figures and dates were mentioned as examples of sequences that the respondents found boring. Furthermore, some respondents stated that the ending of the episode was boring or that it fizzled out, but only in general terms rather than pointing to a specific action or event.

5. Diversifying the perspective in audience research

At DR Audience Research, and in other audience research intended to optimize media content, a methodological approach that diversifies the perspective that research can offer on reception is clearly needed. Using only one approach will always create a knowledge gap since there are aspects of the research object that may be overlooked. **Figure 2** (below) illustrates the different methods that can be used for viewer evaluations in audience research within television studies.

Qualitative audience research is traditionally located in the left two areas of the quadrant. Experimental research and psychophysiological measurements are located in the upper right quadrant. The advantage of combining methods across the two halves of the quadrant, in this case SC measurements and self-reports, is that while psychophysiological measurements can identify television viewers' unconscious emotional experience synchronous to the TV program, qualitative self-reports can identify and track the meaning of the conscious emotional experience after it has ended (Reason, 2010, p. 22). Thus, the combination of methods offers two complementary perspectives that help to capture the nature of the viewing experience.

As a final comment in relation to **Figure 2**, I would like to draw attention to the development of two distinctive approaches to audience research which have sought to combine quantitative and qualitative approaches within a single implement: The Q-

Methodology (Davis et al., 2011) and The QualiQuant methodology (Barker & Mathjis, 2012; Höijer, 2008). These approaches have emerged within a mediatized society characterized by digitization and convergence and sit somewhat outside the spectrum that I review in Figure 2.

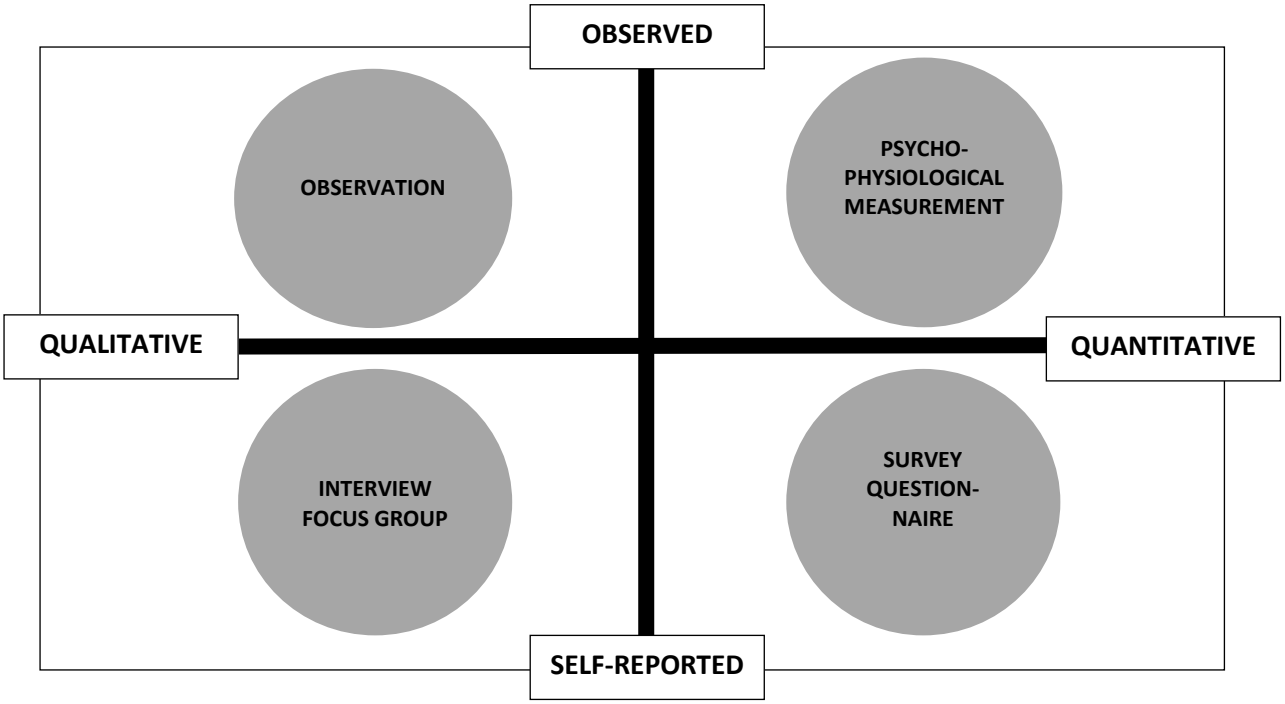

Figure 2: Current methods for audience research in television studies and a placement of psychophysiological measurements. Model adapted from Mandryk, Atkins, Inkpen, 2006.

6. Conclusion

The great advantage of using a mixed methods approach including both skin conductance measurements and self-reports is that it becomes possible to access both the conscious and the unconscious emotional experiences of watching a TV program. The unconscious effect of a TV program may produce a psychologically relevant effect that needs to be considered as seriously as the conscious affects (Suckfüll, 2000). Aggregated data from psychophysiological measurement such as skin conductance reveals the unconscious viewer reactions to emotionally arousing TV experiences, while the self-reports can reveal the conscious reflection of the respondent as to why this might be the case. The skin conductance measurement provides a analytically specific and accurate measure of arousal, the intensity of the emotional experience, moment-by-moment throughout the reception of a TV program. The self-report in the form of a qualitative questionnaire provides a subjective articulation of the phenomenological experience. This approach therefore makes it possible to identify high arousal scenes, low arousal scenes, and long, low-lying flatliner sequences as well as to understand why this should be the case.

This research design is used in viewer evaluations of TV programs within applied TV-audience research at DR in order to create more compelling TV programs for viewers. In practice, research results are used in the editing room to modify both sound and image. As

an example of this application, flatliner sequences in *The History of Denmark* were modified *before* the program was aired, and other TV programs have been modified to contain a high-level arousal peak in the first few minutes of the program. In addition, there are numerous examples of TV programs being edited because of what has been said in self-reports. As DR Fiction-producer Camilla Hammerich said in an interview about *Rides Upon The Storm* (DR1, 2017): 'There were quite a few sex scenes, because we wanted to show the physical side of the drama series so it was not too narrow-minded. But the viewers thought it was too much, so the sex scenes were reduced a bit.' (Ringgaard, 2017) (author's translation).

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