EMOTION: THE COMMANDER OF THE REMOTE CONTROL? A PSYCHOPHYSIOLOGICAL APPROACH TO UNDERSTAND VARIATION DECLINE IN TV RATINGS

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ABSTRACT
Emotional arousal has long been thought vital for maintaining viewers in long-form serial fictions, but the dynamic nature of audience emotional arousal has made it difficult to examine and relate to viewer ratings and channel hopping. This study provides a method for comparing moments of affect with TV viewer ratings during exposure and explores the role of arousal for TV ratings, applying an innovative mixed-method strategy, combining TV ratings and psychophysiological measurements, SCL (Skin Conductance Level). This is applied to measure audience-responses to the Danish public service fiction series Bankerot (Bankrupt, DR1, 2014-2015). While we expect a positive correlation between emotional arousal and levels of TV ratings based upon previous findings, our results show the opposite: increase in arousal leads to significant decline in TV ratings, indicating the potential of this approach to help improve theory in future studies.

1. LONG-FORM SERIAL FICTIONS AND MOMENTS OF AFFECT

Satisfying viewer ratings are crucial for TV broadcasters, regardless of whether they are commercial or public – aiming to attract advertising and subscribers, or aiming to maintain a public-service role in a democracy and to sustain the population's willingness to pay a license fee. One way of achieving satisfying viewer ratings is by offering long-form serial fictions of high quality, since they occupy top positions in ratings, possibly due to viewers' emotional engagement with the narrative (Bignell 2012). Today's long-form serial fictions demand a high level of commitment from viewers over many hours and their multilayered composition also demands close attention. To obtain this high level of commitment and engagement in long-form serial fictions, emotional engagement with the narrative is key (Gorton 2009). Within TV studies, the research interest has typically been centered around what texts signify and much less around texts exerting an affective impact on the viewers who encounter them (Gorton 2009). Given the abundance of emotional long-form serial fictions available and given the theories of affect well developed in, for example, film studies, it is surprising that television, a medium long associated with intimacy and emotional excess, has so long been left on the sidelines of debates on affect in visual media (Gorton 2009). Recent studies have focused on an 'emotional turn' in relation to television drama series, for example *Emotions in contemporary TV series* (Martínez and González 2016). In this book and in the study of emotion in television in general, the tendency has been to turn to models within film studies to theorize emotion. Film studies scholars' work has been influential in allowing television scholars to think about how emotion may play a role in television viewing as well. However, there are considerable differences between the two, and neglecting those often leads to problematic comparisons between the two media (Gorton 2017). Television is not simply a child of the film industry, since television's antecedents are also firmly rooted in radio and theatre. Because of this, theoretical models that are designed to think about a 2-hour narrative do not perfectly translate to long-running television series (Gorton 2017). Thus, we refrain from turning to research conducted by film scholars to get an understanding of the role of emotion in long-form serial fictions, but instead rely on research on emotion within the area of television studies itself. In this endeavor, Nelson's (2016) work exploring the idea of a specific 'affective viewing' experience afforded by

complex TV in the form of the 'high-end', niche-marketed, series-serials of TV is highly relevant. Nelson explains how TV fictions have developed remarkably over the past twenty years, and that both the programs made and the conceptual frameworks for understanding TV fictions have shifted almost beyond recognition. He underlines the importance of emotions in long-form TV fiction, when he argues that it is "moments of affect" (Nelson 2016: 29) that attract and engage the viewers, and not so much the linear narrative drive and whodunit element. He defines a moment of affect in long-form serial television viewing as: "an unusually intensive encounter in a process of dynamic interplay between feeling and cognition mobilized by textual complexity and a concern with being in the world, in both the context of the fiction and the viewing context" (Nelson 2016: 30). Nelson uses a scene from *Mad Men* (AMC, 2007-2015) as an example:

> The overt success of those at the core of the incident (a successful advertising pitch, for example) may be suffused with a sense of the disappointment of another character, who has been excluded, thwarted or overlooked in career terms, or in romance. Together, these mixes of thoughts and feelings as experienced constitute, what I signify by "moments of affect", of which there are many in *Mad Men* (Nelson 2016: 46).

He argues that it is during the affective moments, viewers get hooked and engaged in the storyline and the characters, and what makes the viewers come back to watch more episodes. Nelson continues to argue that 'moments of affect' constitute a significant structuring principle to sustain engagement in long-form serials. This assumption has so far remained untested, however, since it has not been possible to empirically study it without measuring emotional responses during exposure.

2. EMOTIONS, EMOTIONAL AROUSAL AND LONG-FORM SERIAL FICTIONS

To examine moments of affect in TV series, this paper suggests integrating an approach from cognitive psychology where affect has long been empirically examined. Within this field, there is a consensus to separate affect into components of emotions and mood (Gazzaniga et al. 2014: 427), where mood is considered longer lasting, whereas emotions

are generally caused by a specific event and are often more intense. Emotions can be divided into three parts: the autonomic or physical reaction to – in this case – the TV series; change in behavior; and the feeling or conscious awareness of the emotion (Breedlove and Watson 2013: 471). Furthermore, emotional responses are usually viewed as either discrete (e.g. joy, sadness) or dimensional, where emotions are divided into an arousal and valence component. The latter model has, in recent years, received much empirical support. In general, arousal is regarded as a vital component for the emotional experience, and studies have found arousal to affect attention (Citron 2012), memory (Lang et al. 1999) and decision-making (Gazzaniga et al. 2014). Since arousal is a fundamental element in evoking feelings and in changing behavior, we also consider it a fundamental element in eliciting moments of affect in response to long-form serial fictions.

While arousal in the following sections is described as emotion, it is important to note that this study is limited to only one aspect of emotion, the physical reaction of arousal, and while other aspects (such as the cognitive or subjective, conscious feeling) are important and all modifies the emotional experience, this approach makes it possible to capture changes in the physical reaction to emotions on a moment-to-moment basis and as such allows us to compare variation in arousal to viewer ratings.

Although the role of arousal has not – to the authors' knowledge – been examined in relation to ratings for TV series in particular, arousal has been studied in relation to other areas within television studies. For example, how arousal intensifies responses to TV commercials (Lang 1990), how arousal influences learning after exposure to high-arousing TV content (Zillmann 1991), and how arousal influence the allocation of processing resources to arousing TV messages (Lang et al. 1999). In theory, emotional arousal is a vital element in maintaining viewer interest, which thereby also provides satisfying TV ratings. However, we know little of its role in actual decision making such as tuning away from a TV-series, presumably because there has been a lack of suitable methods for measuring this.

3. **THE ROLE OF EMOTION IN DECISION-MAKING AND TRANSPORTATION**

Decision-making is likely to be an important part of the potential correlation between emotions and TV viewer ratings: before we make a decision – such as to continue watching the TV series, or to look for other alternatives on other TV channels, or to turn off the screen altogether – we first compute the value of each of the options (e.g. the benefits of the TV series the viewer is currently watching) and make a comparison of the different values (e.g. content from other competing TV channels). The aim is to choose the option that will maximize value compared to the costs required to obtain that reward, e.g. to obtain the likelihood of highest possible reward (Gazzaniga et al. 2014). In our case, this means that, before deciding on what to watch, the viewer searches for the viewing option which will feel satisfying and rewarding. But the decision-making process is not a once-off activity. It is an ongoing process that allows for revision along the way. Consequently, it does not stop when the viewer has chosen a TV program to watch – it continues during watching, and therefore, the viewer constantly evaluates weather the TV program still feels satisfying and rewarding. If not, there is always something else to watch on other TV channels, and with the advent of streaming platforms this paradox of choice has increased. In decision-making, reward often refers to dopamine release, and this means that succeeding in making the right TV content choice is associated with great well-being Decision-making has been found to be influenced by a range of internal variables, such as mood and motivation (this includes emotions), and external variables (such as costs). Studies show that emotions can indeed increase the perception of reward and thus motivate decisions in terms of avoidance or engagement behavior (Gazzaniga et al. 2014, Eysenck and Keane 2015). In other words, while increase in arousal may lead to engagement behavior when watching TV series, arousal can also lead to avoidance behavior. The question is when emotional responses will increase or decrease emotional engagement and make the viewer stay tuned. According to the theory of moments of affect, events which elicit high levels of arousal will increase narrative engagement and hence engagement behavior, but according to narrative transportation theory this process also depends on the degree of narrative transportation.

Narrative transportation in TV is the degree to which a viewer becomes engaged with the storyline. It is a phenomenon whereby viewers feel so involved in a storyline that it can influence their attitudes and behavior, even after they have finished watching (Green and Brock 2000). According to literature on narrative transportation, viewers who are drawn into a story will identify with story characters and imagine events, and subsequently, viewers are

transported into the narrative world (Green & Brock 2000). Narratologists advocate that narrative transportation involves attentional focus, emotional response, working memory and imagination (Green and Brock 2002, Buselle and Bilandzic 2008).

Much research on narrative transportation focuses on the fit between story object and story plot rather than the fit between story object and the viewer (Gordon, Ciorciari & van Laer, 2018), and thus, there is limited knowledge of how viewers respond to different story objects in narrative transportation. As Appel and Malečkar (2012: 26) observe, "what is still lacking [...] are answers to the question of how transportation affects persuasion", in our case persuasion to continue viewing a long form TV series. Gordon, Ciorciari and van Laer (2018) underline that it is close to impossible to find an answer to Appel and Malečkar's question, since the contemporary understanding of narrative transportation relies on consumer self-reports of knowledge, attitudes and behaviors, with associated issues of bias (this is described in further detail in the following section). Narrative researchers recognize this problem, as they acknowledge that many of the constructs associated with reflection and interpretation in narrative persuasion occur outside human awareness, and it is therefore difficult to measure them using self-report methods (Moyer-Gusé 2008). The approach suggested by this paper may provide a way forward.

4. **METHODS PREFERRED IN AUDIENCE RESEARCH WITHIN TELEVISION STUDIES**

The primary challenge in conducting audience research on long-form serial fictions is to understand both the emotional and the rational experiences that occur in the encounter between a respondent and a fiction series. In order to do this, much television audience research has prioritized giving voice to the users of television in order to explore the meaning and uses of the content within in the context of people's everyday lives (Radway 1984, Jensen 2002). However, the interest in context and opinion formation has come to overshadow the interest television audience researchers have in the moment of reception (Alasuutari 1999). In television audience research, the preferred research method has often been an interview conducted after the TV experience has ended (Kanjo et al. 2015, Phan and Sripada 2013), in which respondents are given the opportunity to discuss and reflect on the experience. This backward-looking strategy is applied

in both qualitative and quantitative methods (Myttom et al. 2016). Most contemporary reception research within television studies aligns itself with a cultural studies approach, and qualitative ethnographic methods have dominated the methodological frameworks (Zaborowski and Dhaenens 2016). Other methodological approaches remain rarer, even though laboratory experiments have been conducted since the first part of the 20th century, including for example The Payne Fund Studies (1928-33) (Jowett et al. 1996). Typically, these approaches monitor and measure galvanic skin response, heart rate, and respiration variances in people while they are watching certain kinds of content, often violent media stimuli (Cline et al. 1973, Osborn and Endsley 1971).

To sum up, emotional arousal may play a large role in viewer ratings. However, traditional methods are unlikely to capture the dynamic and changing emotional states during exposure, capturing only the conscious experience after the TV series has been seen. Therefore, the aim of this study is to apply an innovative mixed-methods strategy examining whether a combination of traditional methods (TV audience ratings) and psychophysical methods measuring emotional arousal on a minute-by-minute basis is able to solve this fundamental challenge, potentially providing a deeper understanding of the role of emotions and moments of affect in TV series.

5. **METHOD**

As mentioned above, television studies have relied heavily on self-reports when studying emotional experiences, but self-reports might be held in doubt because respondents cannot remember all the different emotions they experienced during a screening of a TV program, or they might misrepresent their feelings due to self-representation (Picard and Daily 2005). Another approach is applying psychophysiological measurements which provide the ability to measure the responses of the respondent dynamically, without interrupting respondents as self-reports do (Soleymani et al. 2008). The majority of studies that examine emotional responses to media content using psychophysiological measures are based on the dimensional model mentioned earlier. In this study, we limit ourselves to studying only the intensity of the experienced emotion (arousal) and not valence, because emotional arousal has been found to be "a critical factor contributing to the emotional enhancement

effect for many types of information" (Kensinger 2004: 242), because it is processed in the brain region amygdala which evaluate and orchestrate emotional responses and select stimuli for enhanced processing. Valence seems to rely on other regions on the brain, and while it may be able to increase processing relative to neutral stimuli, it seems likely to play a minor role than arousal (Kensinger 2004). Skin conductance (also known as electrodermal activity) has long been used to measure emotional arousal, also in media research. Emotional arousing stimuli activate the sympathetic nervous system, which leads to increased sweating in the skin through the eccrine sweat glands. These are mainly located around the hands and feet. Sweating is a potent conductor for current; thus, when one electrode applies a small current that is captured by another, it is possible to measure skin conductance. The measurable variation in skin conductance occurs approximately one to four seconds after the eliciting event. If participants are in a room with constant temperature and humidity, increased skin conductance is thought to be a convincing measure of increased emotional arousal (Potter and Bolls 2011). Furthermore, it provides two advantages over self-reports: it can capture emotional arousal on a subconscious level, and it provides a moment-to-moment measure of arousal.

While self-reports are usually able to capture highly arousing scenes, skin conductance also captures periods of rise and decline and periods of low arousal with little variation, which has been termed 'flatliners' (for instance if participants are bored) (Heiselberg 2016). Skin conductance has been used to study structural aspects such as editing pace and cuts (e.g. Lang et al. 2000).

5.1 Experimental setup and procedure

The data collection took place in a lab with three workstations consisting of a 17-inch laptop with quality headphones, external keyboard and mouse. The laptops were fitted with Tobii X2-30 Eye Tracker Compact Edition and a varioLAB-mini for measuring skin conductance. The lab is without windows, air-conditioned, without distracting interior and to avoid disturbance between participants a small intersecting wall was set up between workstations. A research protocol was followed to eliminate known sources of bias. Before arriving at The Danish Broadcasting Corporation (DR), respondents were asked not to wear heavy make-up around the eye region. The respondents had, furthermore, been screened for pacemaker and eye diseases. Upon arrival at DR, an effort

was made to create a relaxed atmosphere and respondents had time to settle, so any prior stress or arousal was reduced. Water but no coffee, tea or snacks was offered until after the measurements. Respondents were also asked to wash their hands and not use moisturising lotion after washing. Mobile phones were turned off or set to flight mode in order not to disturb or interfere with the measurements. The electrodes were placed approximately one minute before skin conductance recording began. The respondents were provided with verbal instructions and a short instruction on screen was shown. After the introduction, a baseline measurement was recorded by showing a series of pictures representing low- and high-arousal stimuli of positive and negative valence. To minimise arousal after the series of baseline pictures a five-second black screen was inserted between the baseline and the stimulus material *Bankerot*, as previous experiments have shown that respondents are aroused at the beginning of a screening because of the unusual context. During the data collection the researchers left the lab, but respondents were observed via cameras, and could thus raise their hand if in need of any help.

5.2 Measuring physiological arousal

Skin conductance was measured during screening using a varioLAB-mini. Two electrodes (Ag/AgCl, ø24mm, pre-gelled adhesive tape) are placed two to three cm apart on the palmar area of the hand with a Velcro-band to further secure them during measurements, and the skin conductance signal is increased using an amplifier (Covidien/Kendal H124SG). Data collection was managed through the use of the software Biometric Software suite (Dr. Hornecker Software-Entwicklung und IT-Dienstleistungen, Version 2.0) and Tobii Studio (Version 3.3.1).

Skin conductance is traditionally divided into tonic (slow changes) and phasic (quick changes) arousal; however, emotionally engaging television fiction series typically have several structural aspects present at the same time, for example sound, picture and editing, and therefore, skin conductance responses are also expected to be overlapping. Because of the likely interaction between these for long-lasting emotional stimuli such as a fiction series, we chose to measure the total aggregated level of skin conductance for all respondents over time, indicating both their emotional response to the stimuli and their relative increase/decrease in arousal. In other words, rather than measuring fast changes in arousal (phasic), we primarily capture participant mood changes,

as the longer lasting emotions (e.g. character and narrative engagement) are more important for viewer engagement in long form TV serial-fictions compared to shorter lasting emotions (e.g. responses to unexpected events such as gunshot). In addition, viewer ratings are measured on a minute-to-minute-basis as described below, and therefore, it allows for a direct comparison between arousal and viewer ratings which are also a measured as an average for each minute.

5.3 Viewer ratings

TNS Gallup measures TV viewing in TV owning households in Denmark using its TV Meter on behalf of DR among other Danish broadcasters. Gallup TV Meter equipment logs all TV viewing in 1000 selected households corresponding to 2200 individuals. The viewing habits of these individuals are logged around the clock on an ongoing basis. Data on viewer habits – who watches which channels and when – are transmitted daily to TNS Gallup. Overall, viewer ratings can be determined as the audience share or rating (Bignell 2012). Because we are interested in the emotional influence on viewer ratings rather than the competition between programs, this study will focus on the latter. Viewers' conscious and subconscious motives for changing channels may be manifold. For instance, commercial breaks on other TV channels may explain a short rise and fall in ratings, viewers may change to another channel if they have planned to watch a specific program, or they may merely "zap" in search of an interesting program to watch. In general, an increase in viewer ratings while a TV series is aired cannot be caused by the program content itself, but by viewers opting out of other programs on competing channels. As such, we are mainly interested in examining viewers leaving the TV series by turning off the TV or switching channel (viewer dropouts). However, ratings for viewer dropouts are based on a very small subset of the sample when it is based on a minute-by-minute change. This means that the estimated viewer dropouts are uncertain. Therefore, we have chosen to focus on overall viewer ratings measured per minute. Because DR is a public service broadcaster there are no commercial breaks, and in general, viewer ratings for Thursdays in 2014 from 8.30 p.m. to 9.23 p.m. (i.e., when the first two seasons of *Bankerot* were aired) show a general increase in viewers for DR1 in average. To account for viewers leaving the program because of zapping, for example due to commercial breaks on other channels, we only included viewer ratings for viewers who viewed five consecutive minutes of *Bankerot.*

5.4 Analysis of skin conductance data

The data correction, processing and analysis consisted of four steps. First, the data was normalized. As each respondent has different baseline levels of skin-conductance, it is conventional to correct for individual differences (Braithwaite and Watson 2015). As this study aims to analyse variations in skin conductance levels and not absolute values a different approach was taken. The skin conductance-data of each respondent was normalised to unity before mean skin conductance level values were calculated across the sample. This ensures correct relativistic comparison of skin conductance level variations between respondents. Second, to assess the effects of emotional arousal on the number of viewers, we applied an OLS regression model, where we pooled the two episodes, creating a single time series with episode 1.02 following episode 1.01. We accounted for the time series nature of our data. Since viewership is only available at a minute-unit level, we aggregated the arousal data to a minute level and used average scores for each minute. Third, preliminary analyses using Dickey-Fuller tests demonstrated that the dependent variable (number of viewers in 1000s) was non-stationary and thus needed to be differenced. Differencing also removes autocorrelation in the residuals. For the analysis, it means we estimate effects on changes in viewership. Formally, we test the alternative (non-directional) hypothesis that emotional arousal affects viewer ratings against the null hypothesis that there is no effect. We added the episode (dummy variable with second episode as reference category) as an additional control variable.

Fourth, since the effects of arousal may be delayed (e.g. considering alternative options, making the decision and behavioral response such as finding the remote), we checked the cross-correlation function for lags 0-3 to select the most appropriate delay (i.e. demonstrates the largest effect size). For both episodes, using a lag of two minute (t-2) turns out to yield the largest effects. This means that we look at the effect of arousal two minutes earlier on changes in viewer ratings.

5.5 Stimulus material: Bankerot

The Danish fiction series *Bankerot* is categorized as a drama/comedy and was directed by Henrik Ruben Genz, Annette K. Olesen and Mikkel Serup. It tells the story about a former

cook, Dean, and a former wine connoisseur, Martin, who try to restore a restaurant to solve their problems: Dean owes money to criminals after being released from jail for committing insurance fraud (he started a fire at an earlier restaurant). Martin, on the other hand, risks losing custody of his son. His wife died years earlier in a traffic accident that left his son mute and Martin increasingly apathetic. Because Martin is unable to get a grip on his life, a school psychologist from his son's school fears he is not able to take care of his son and, by starting a restaurant, Martin will prove to the psychologists that he can take care of them both. Martin's father is the most obvious investor for the restoration of the restaurant, but their relationship is terrible, and Martin has not seen him since the death of his wife. *Bankerot* features two seasons of eight episodes, where the first two episodes (which will be examined in this study) were aired in primetime on the 16th of October 2014 from 8.30 p.m. to 9.23 p.m. on the Danish TV station DR1. The viewer rating for *Bankerot* was 539,626 for the first episode, and 575,116 for the second episode based on a sample of minimum 1000 viewers. The last episode in the first season was aired six weeks later and received estimated 283,577 ratings. As mentioned, because DR is a public service broadcaster there were no commercial breaks during *Bankerot*. As stated to the authors by DR, the target audience of *Bankerot* is Danes 15 years of age or above.

5.6 Respondents

This study included 40 respondents (25 were female) recruited via e-mail and later phone from DR Panelet, a panel of 10,000 Danes run by the Audience Research Department at DR. Respondents were excluded if they reported having watched *Bankerot* before. Average age is 51.3, ranging from 21 to 71 years (reflecting the age of the target audience of *Bankerot* as described by DR). Respondents received a gift certificate of 100 DKK for their participation. Self-report data from one respondent was excluded due to cognitive difficulties, and three skin conductance datasets were excluded from further analysis due to technical problems, leaving data from 36 participants for further analysis.

6. **RESULTS**

Results consist of two elements: skin conductance data from the screening of respondents watching *Bankerot*; and viewer ratings from when *Bankerot* was originally aired.

6.1 Skin Conductance data
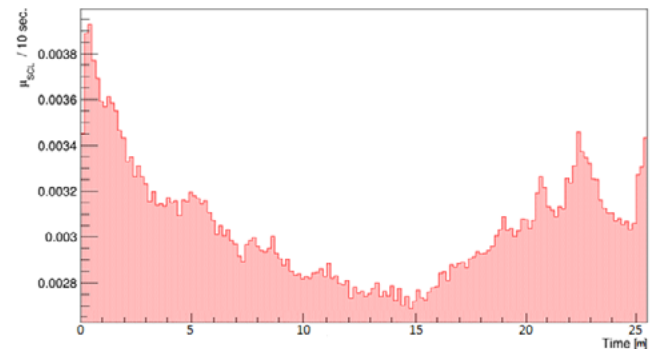
Level of skin conductance for episode 1

FIG. 1. RESPONDENTS' SKIN CONDUCTANCE, WHILE THEY WATCHED EPISODE 1.01 OF *BANKEROT*, DISPLAYED IN TEN-SECOND BINS. ARROWS INDICATE PEAKS.

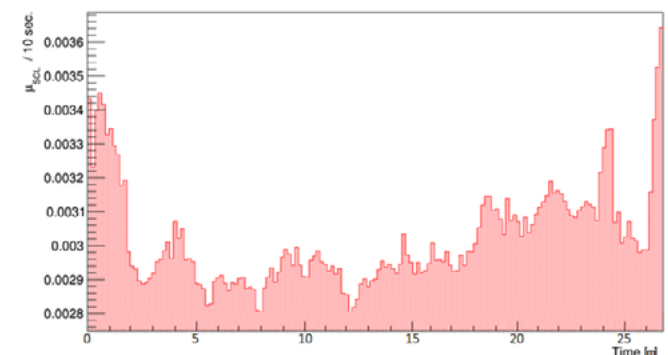*Level of skin conductance for episode two*

FIG. 2. RESPONDENTS' LEVELS OF SKIN CONDUCTANCE, WHILE THEY WATCHED EPISODE 1.02 OF *BANKEROT*, DISPLAYED IN TEN-SECOND BINS. ARROWS INDICATE PEAKS.

As shown in Fig. 1, episode 1.01 begins with a relatively long-lasting decline in arousal followed by a flatline sequence (low levels of arousal with little variation) and a rise toward the climax of this episode. This suggests that this episode did not elicit high levels of emotional arousal for respondents apart from the very beginning of the episode and – in part – towards the end. The early peak in arousal is likely to be caused by the unusual context around the respondent rather than by the narrative: Previous experiments in DR have shown

a similar trend of such early peaks in arousal, most likely because the respondents are not familiar with the surroundings. Because we are unable to control for whether arousal is due to the novelty of the settings or stimuli, we will conduct additional analyses to check whether the observations for the first three minutes of episode 1.01 change the results.

Episode 1.02 has, as shown in Fig. 2, very small fluctuations in arousal until the seventeenth minute. Towards the end, a build-up towards the climax is seen as both an increase in total skin conductance and larger peaks in skin conductance.

6.2 Viewer ratings

To be able to compare levels of arousal with viewer ratings, we now turn an analysis of ratings for the first two episodes of *Bankerot*. Viewer ratings are displayed in Fig. 3 and Fig. 4. To eliminate "zappers" (i.e., TV audiences changing channels many times within short intervals), we only include viewers who watched these episodes for five minutes consecutive (see Viewer ratings for specifics), and to increase comparability with skin conductance data, they are displayed in minutes (starting from zero). Note that rises in viewer ratings cannot directly be compared to rise in arousal because viewers have not seen the episode before tuning in. Indirectly, a rise in arousal may cause viewers not to tune away, thus affecting a rise in viewer ratings; however, this is not examined in this study.

Viewer ratings for episode 1.01

FIG. 3. ESTIMATED VIEWER RATINGS OF EPISODE 1.01, WHEN IT WAS AIRED IN PRIMETIME IN 2014. TO BE INCLUDED, VIEWERS HAD TO HAVE WATCHED FIVE CONSECUTIVE MINUTES.
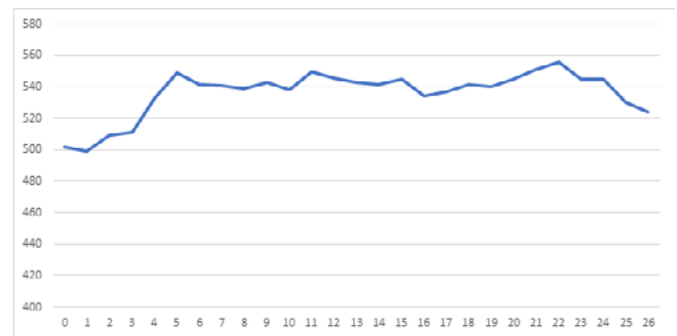
Viewer ratings for episode 1.02

FIG. 4. ESTIMATED VIEWER RATINGS OF EPISODE 1.02, WHEN IT WAS AIRED IN PRIMETIME IN 2014. TO BE INCLUDED, VIEWERS HAD TO HAVE WATCHED FIVE CONSECUTIVE MINUTES.

6.3 Predicting decrease in TV-ratings based on arousal

As noted earlier, skin conductance and TV-ratings are correlated using a regression analysis. In the regression analysis it is explored whether arousal as an independent variable can predict viewer behavior. In other words, we investigate if arousal decrease, increase and/or flatline are likely to effect viewer ratings, and how. Table 1 report the results of the regression analysis predicting viewership based on arousal.

	Change in viewership (in 1000s)			
	B	SE	p value	b
arousal (*t-2*)	-13138.0*	6414.4	.046	-.28
episode (2=reference)	4.30+	2.51	.093	-.24
Constant	44.68*	19.56	.027	
R^2	.13			

Note. N=49, + p<.10, * p<.05.

TABLE 1. PREDICTING CHANGE IN VIEWERSHIP.

We find that increased arousal yields less viewers. The result is significant (p-value .046), and this is remarkable, given the low number of observations. A .0001 increase, which is quite common, yields 1314 less viewers. On average, the change in viewership was slightly higher in the first episode compared to the second one (B=4.30, SE=2.51, p=.093). We thus reject the null-hypotheses of no relationship between

arousal and viewership. Overall, the model predicts 13 percent of the variance in the change of viewership was caused by changes in arousal. While this leaves a lot of the changes in viewership unexplained, we consider it a substantial result. It is hard to predict viewership, let alone minute-to-minute changes therein and that our simple model accounts for a more than negligible part of the variance is noteworthy.
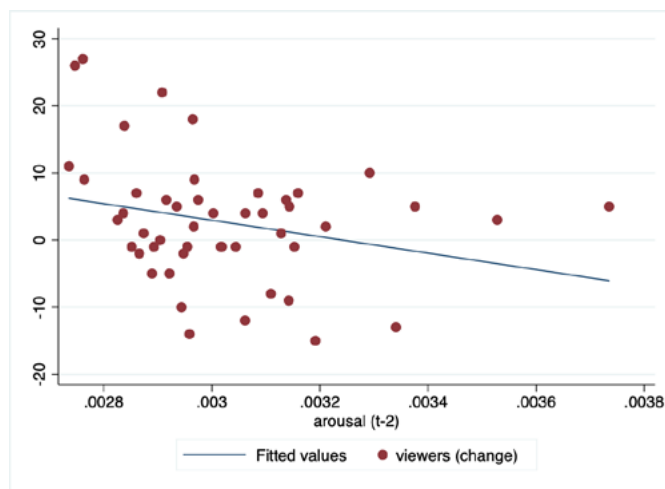

FIG. 5. REGRESSION GRAPH.

Fig. 5 provides a graphical depiction of our regression model. It reveals the absence of large outliers. Other requirements and assumptions of a regression analysis are also met: autocorrelation is absent in the residuals (Ljung-Box Q-test over 4 lags is 9.18, p=.06, failing to reject the null-hypothesis of no autocorrelation in residuals), as is heteroskedasticity (Breusch-Pagan test is .36, p=55, confirming the null-hypothesis of constant variance). Furthermore, Fig. 6 reveals that the residuals are roughly normally distributed, which is again confirmed by the joint Skewness/Kurtosis test (c^2=.78, p=68, failing to reject the null-hypothesis of normality).

We see an effect for all three lags we considered (e.g. increase in arousal causes decrease in viewer ratings in the following minutes), but the effect is largest two minutes after the increase. As mentioned, the early peak in episode one which lasts approximately three minutes might be caused due to the unusual circumstances in the lab setting and could bias the results. As such, we re-ran the analysis without the first three minutes and found that effect is even stronger when the first three minutes are neglected.
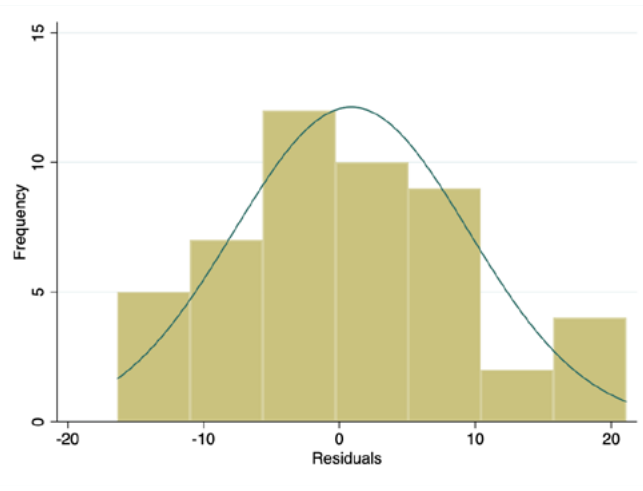

FIG. 6. DISTRIBUTION OF RESIDUALS.

To summarize, literature within TV studies indicates that moments of affect are vital to maintain viewer engagement, however we did not find evidence of such. In fact, the result of the regression analysis shows the opposite: After a period with an increase in arousal, we see a decrease in viewer rating, and the strongest effect occurs two minutes after an increase in arousal.

7. DISCUSSION

This explorative study examines the relationship between emotional arousal and viewer ratings in TV long form serial fictions. To accomplish this, we provide an innovative mixed-method strategy, combining TV ratings and psychophysiological measurements, SCL (Skin Conductance Level) measuring emotional arousal on a minute-by-minute basis. Traditional self-report methods are not capturing the dynamic emotional states during TV exposure and, besides, they capture only the conscious experience. Our mixed-methods strategy solves this fundamental challenge and provides a deeper understanding of the relation between arousal and TV ratings.

The mixed-methods approach was applied to the Danish fiction series *Bankerot*. Results showed that, after a period with an increase in arousal, there is a decrease in viewer ratings, and the strongest effect occurs two minutes after the arousal peak. This result seems to contradict the literature on TV series and emotions and highlights the complex role of arousal. A possible explanation for this result is that deci-

sion-making involving emotional responses can cause both engagement and avoidance behavior, and in our case, it is most likely that the result is caused by the latter. The question is why. Here we turn to the theory of narrative transportation. If a TV series succeeds in narratively transporting a viewer by eliciting emotional responses, then engaging behavior is increased. However, the question is whether a poor fit between viewer needs and preferences and the story object are also able to elicit emotional responses, for example due to frustration of plot holes or character flaws. If so, it may prevent narrative transportation and thus decrease engaging behavior. While high levels of arousal are likely to reflect engaging behavior for the TV series, periods of low arousal in *Bankerot* indicate low engaging behavior, and consequently the viewer is distracted by internal stimuli (such as boring mood or low motivation) which can lead to either avoidance-behavior from this TV series or motivated-behavior for seeking other opportunities if the TV series does not live up to expectations or does not fulfill one's current emotional needs. This can cause increase in arousal, leading to fall in viewer ratings. Here we focus on the internal variable, since skin conductance is recording in a lab without distractions. The point is that a TV series' ability to transport the audience should – if successful – lead to a good fit between the viewer and the story object and hence, to engaging behavior. On the other hand, if the TV series provides a poor fit, the TV series triggers a negative emotional reaction, and this increases the probability of switching channels or turning off the TV.

In terms of the findings, important limitations should be considered, including: 1) a limited sample size is studied (we hope to replicate this study on a larger scale with multiple TV series to generalize the findings across TV series and populations in future studies); 2) this study did not examine the whole emotional experience (i.e., the cognitive component and the valence dimension) but only the intensity of the experienced emotions (arousal), since highly arousing events have been linked to better attention and memory amongst other similar events. In future studies, we recommend examining how differences in emotional valence (i.e., whether the audience's emotional response is positive or negative) may affect reception, and other components such as culture or human interaction could be included as well. Our hope is to pave the way for future research which goes in the same direction, and which could potentially become a powerful tool in predicting fall in TV ratings. This would be of the greatest value to the TV industry in developing new long-form serial fictions.

8. **CONCLUSION**

The purpose of this study is not to generalize the findings, but merely to explore the potential of an approach investigating the connection between TV ratings and psychophysiological measures of arousal. Typically, television studies rely heavily on self-reports when studying emotional experiences, but self-reports are biased due to respondent's misremembering emotions and to social desirability response bias (Picard and Daily, 2005). To avoid these biases, this explorative study has successfully provided an innovative mixed-methods design for comparing moments of affect with TV ratings during exposure by combining TV ratings and psychophysiological measurements of arousal (SCL).

The results from *Bankerot* show the complexity of emotions and arousal, adding to our understanding of the path between a TV series' narrative, the emotional reaction and the behavioral response. This does not only hold academic value but may also be a powerful tool in predicting TV ratings in applied media research. In this study, we chose to focus on emotional arousal, but other psychophysiological measures also hold interesting potential when combined with TV ratings to measure valence (such as facial EMG), motivational behavior (EEG) and attention (eye-tracking). For example, combining measuring arousal and valence may also reveal the degree to which positive and negative emotions may enhance or decrease narrative transportation.

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