

17. Viewers Viewed: Facial Expression Patterns while Watching TV News

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Abstract. Based on the "Cultivation of emotions" approach in media psychology we explore the emotional processes that occur while people are watching TV-news. Investigation of media reception is done by combining both timeline data of TV-news (describing formats and content of TV-news by using a computer assisted media analysis) and data about facial expressions as indicators of emotional appraisal processes (EmFACS) and searching for hidden patterns with the aid of THEME. Our results show a large number of temporal patterns in facial expressions data. A remarkably high proportion of these patterns can be interpreted as cognitive appraisal-processes according the assumptions of Scherer and colleagues. Furthermore, we find patterns between the formal aspects of TV-news and the facial expressions of the viewers, suggesting that there seems to be a connection between the presentation of TV news events and the emotional processes of the viewer.

Keywords: Facial expressions; TV news; emotional appraisal process; EmFACS; TV viewers.

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17.1 Introduction

Emotions are vitally important in human life. The most impressive stories – in theatre, in literature, in arts, in movies or in our daily life - we tell each other are stories of feelings and emotions [1]. Undoubtedly, media attempt to attract the audience by emotions. But little is known, by now, how the audience processes media stimuli emotionally [2-4]. In our studies we examine the elicitation and differentiation of emotional responses induced by media, especially TV-news. Because emotions are complex phenomena, the study of emotions must meet specific requirements: “They involve the need to (a) study ongoing processes over time, (b) study multiple systems and their interaction (cognition, physiology, expression), (c) adopt experimental approaches using well-controlled manipulations, and (d) formalize predictions“ [5, p. 95].

The essential focus of this paper is on the temporal course of changes in emotional subsystems. We regard facial expressions as observable indicators of unobservable emotional processes [6]. Investigation of media reception is done combining both timeline data of TV-news (describing formats and content of TV-news by using a computer assisted media analysis; [3, 7, and 8]) and data about facial expressions of the viewers (coded by EMFACS; [9, 10]) and searching for hidden patterns with the aid of THEME. THEME is used as a method to analyse the temporal and sequential structure of facial expressions in order to get deeper insight in the emotional processing of TV viewers. This contribution outlines the theoretical background of the studies, the method and some results. Exemplary patterns of facial expressions are presented to show potential outcomes of THEME-analysis.

17.2 Theoretical background: The component-process-model of emotion

In recent years, the psychology of emotion has been strongly marked by appraisal theories. One prominent representative of appraisal-theory is Klaus R. Scherer [11]. In order to deal with the dynamic nature of emotion, Scherer conceptualizes emotion as a process rather than a steady state. Emotion is defined “as an episode of interrelated, synchronized changes in the states of all or most of the five organismic subsystems in response to the evaluation of an external or internal stimulus event as relevant to major concerns of the organism” [11, p. 93]. “The major aspects of this process are threefold: first, evaluation of the relevance of environmental stimuli or events for the organism’s needs, plans or preferences in specific situations; second, the preparation of actions, both physiological and psychological, appropriate for dealing with these stimuli; and finally, the communication of reactions, states, and intentions by the organism to the social surround” [12, p. 557]. The component-process-model of Scherer distinguishes between five subsystems of an emotion: (1) the cognitive appraisal, (2) the physiological arousal, (3) the motoric system, most notable the facial expression as part of this system, (4) the subjective feeling, and (5) the motivational system. Each of those components has a specific function for the originating emotion:

1. The function of the cognitive (appraisal-) component is the processing of external and internal stimuli and thereby evaluating objects and events. “Events or internal changes trigger cycles of appraisal running through the evaluation checks ... until the monitoring subsystem signals termination of or adjustment to the stimulation that originally elicited the appraisal episode” [11, p. 99]. Individuals constantly evaluate the ongoing situation concerning to relevance (in detail: novelty check, intrinsic pleasantness check, goal relevance check), implications (in detail: causal attribution check, outcome probability check, discrepancy from expectation check, goal/need conduciveness check, urgency

check), coping potential (in detail: control check, power check, adjustment check) and normative significance (in detail: internal and external standard check). The resulting patterns of appraisal are associated with specific emotions, such as joy, fear, sadness or anger.

2. The (neuro-) physiological arousal component is responsible for the regulation and the management of the functional systems of the body; particularly to generate and provide energy and resources for intended actions.

3. The motoric component of an emotion serves the aim of expressing and communicating each reaction and each intention of behaviour. Thereby, the reaction to a stimulus can be seen in distinct facial and gesture alterations.

4. The motivational component serves to prepare and process concrete actions.

5. The monitoring system, as a component of subjective experience, mirrors the subjective emotional states of an individual. In this subsystem, the alterations/changes of all components are represented.

The model assumes that within an emotional episode there is a component patterning process driven by the cognitive appraisal. The individual appraises an event on a series of sequential stimulus evaluation checks (relating to relevance, implications, coping potential and normative significance). The result of each check modifies the state of each subsystem in the direction of an adjustment to the event. In other words each subsystem gets into a synchronized state of modifications that is typical for the just experienced emotion. The pattern of an emotional reaction is an accumulated result of all these modifications of the status of the subsystems and their synchronisation. The cognitive component that drives the component patterning process is not accessible to direct observation. But each stimulus evaluation check evokes an adequate reaction in the other subsystems. Thus each appraisal has a corresponding reaction in facial expression. For several outcomes of stimulus evaluation checks Scherer and colleagues [6, 13-16] predict related changes in facial expressions. For example, appraising an event as novel is related to raising the eyebrows or frowning, appraising an event as (intrinsic) pleasant is related to pulling the lip corners upwards and raising the cheeks (like in smiling). If a certain appraisal does indeed result in a change of facial expression, as proposed, facial expressions are observable indicators of unobservable emotional processes.

17.3 Objectives

Even though there is a “widespread acceptance of appraisal theory as an appropriate explanation for the elicitation of many, if not all, types of emotional reaction and experience ... the process of appraisal has remained relatively unexplored” – Scherer stated in 1999 [17, p. 764], this is still the case nowadays, and particularly for the case of using media. The aim of our studies is to better understand the nature of the emotional processing of media stimuli. According to the component-process-model of Scherer, we assume that the emotional processing of stimuli is done in certain sequences – the so called “stimulus evaluation checks”, this means “that appraisal occurs in a sequential, serial fashion: and ... that there is a definite, invariant order in which the different stimulus evaluation checks are processed in the repetitive, recursive process that constitutes appraisal” [17, p. 765]. The process of appraisal itself is as a cognitive process not accessible to direct observation and not or only with difficulty accessible to verbalization. But each appraisal evokes an adequate reaction in the other subsystems and so has a corresponding reaction in facial expression. Taking sadness as example, Kaiser and Wehrle [6, p. 292] postulate the following appraisal pattern and related action units: (1) suddenness low, (2) familiarity low related to AU4+AU7 (brow lowering and lids tight), (3) outcome

probability very high, (4) conduciveness obstruct related to brow lowering and lids tight (AU4+AU7), (5) urgency low, (6) control very low related to inner brow raise, lip corner depress, lid droop and eyes down (AU1+AU15+AU41+AU64), (7) power very low related to lip stretcher (pulling the lips back laterally) and jaw drop (AU20+AU26). If one accepts these assumptions, then there should be recurring, organized sequences of facial expressions. Furthermore, one can assume that there is a relationship between (formal and content) aspects of the media stimuli and the facial expressions (as indicators of cognitive appraisal). So, we have to ask: What kinds of (hidden) structure exist in facial expressions, and how can we discover effects of independent variables on such structures? The purpose of the study presented here is to analyse the temporal and sequential structure of facial expressions in order to explain the elicitation of emotional responses induced by media.

17.4 Method

Participants were 33 students (19 to 37 years-old). They were videotaped while watching eight news reports from German television (chosen for this study because of their potential to induce emotions; [18]). The news reports were subject to a media content analysis. Content analysis is not confined to text it can also be applied to audio-visual communication. Media content analysis is focussing on quantifying descriptions of what is portrayed or communicated by a movie (audio visual media). Thus it lays important foundations for the examination of effects on the audience. Different from the transcription of speech only there are no binding transcription rules for visual aspects of communication. With the transcription of media communication the problem of transcription is getting even worse: aspects of the portrayed event or news story are interwoven with composition aspects that determine what the audience sees and hears (objects, camera-perspective, camera distance, duration of a single take/shot, etc.). Thus media staging is describable as a complex communicative message that interconnects content and formal presentational techniques. In other words presentational techniques (plot and style) may produce a "narrative form-content-correspondence pattern" within which effects of the film are unfolding [19]. The media content analysis of the news reports focuses on (1) formal visual presentational characteristic (cutting, shot size, camera movement, camera perspective, etc.) and (2) content characteristics that are typical for news reports (issue, location, type of violence, etc.) producing a time series of lasting events with one shot or take as the unit of observation [3, 7, and 8]. By means of this, we can exactly describe the situational context that is presented to the subjects. The facial expression of the viewers was coded using EMFACS (Emotional Facial Action Coding System; the evaluation system EMFACS captures only those action units that have been empirically proven to be connected with emotions) [9, 10, and 20-23] (see also chapter 10, this volume). FACS and EMFACS are objective, reliable tools for the measurement of every single movement in the face. The smallest visible units of muscular activity of the face, the so called "action units" (AU), are derived from a map of all the movable muscles. The focus on an anatomical basis ensures to get a purely descriptive account of the observation, abstracting away from any interpretation, and therefore the objectivity of the observation of the facial activity is assured. The action units referred to by numbers are coded along the timeline as events that report the apex of the observed facial behaviour. Although EMFACS also reports laterality and intensity of each action unit those specifications were unconsidered for THEME-analysis. The EMFACS coding thus produces a second time series of events that is synchronized with the data from the media content analysis. By means of the synchronized time series data we can look at the dynamic process of media reception as a kind of "as if"-interaction between the media and the spectator with the viewers reacting to the ongoing

(mass) media communication of the news reports. The analysis of the temporal and sequential structure of facial expressions is based on the process of T-pattern detection [24, 25]. The data of all 33 subjects representing different observation periods were joined in a single data file. Coding included data of selected formal and content features of the news reports. The data were analyzed on a significance level $p = .0005$.

17.5 Results: T-patterns in facial expressions

Our results show a high number of non-random temporal patterns in the event time series of facial expressions. The detected patterns indicate that the facial expression of TV-news viewers is highly temporally structured. The analysis shows different kinds of patterns: patterns connecting certain types of facial expressions (thus indicating a sequence of cognitive emotional processing) and interactive patterns involving features of the media stimuli and facial expressions (thus indicating specific emotional reactions to specific features).

17.5.1 T-Patterns connecting types of facial expressions

We find T-patterns that combine a sequence of certain facial expressions. The example in figure 17.1 shows one of the most frequent patterns. The pattern combines the AU-Combination 14+17+24 (dimpler + chin raiser + lip presser) to a subsequent AU14 (dimpler = tightening the corners of the lips, squeezing inward). Another very frequent pattern connects AU2 (outer brow raise) to AU7 (eye lid tight). Figure 17.2 shows an example of a more complex pattern. Within this pattern AU14+AU17 (dimpler + chin raiser) is connected to a subsequent AU14 (dimpler). At level 2 of the detected T-pattern the AU1+AU2 (inner and outer brow raiser) is integrated with this pattern. This kind of patterns may represent parts of appraisal sequences.

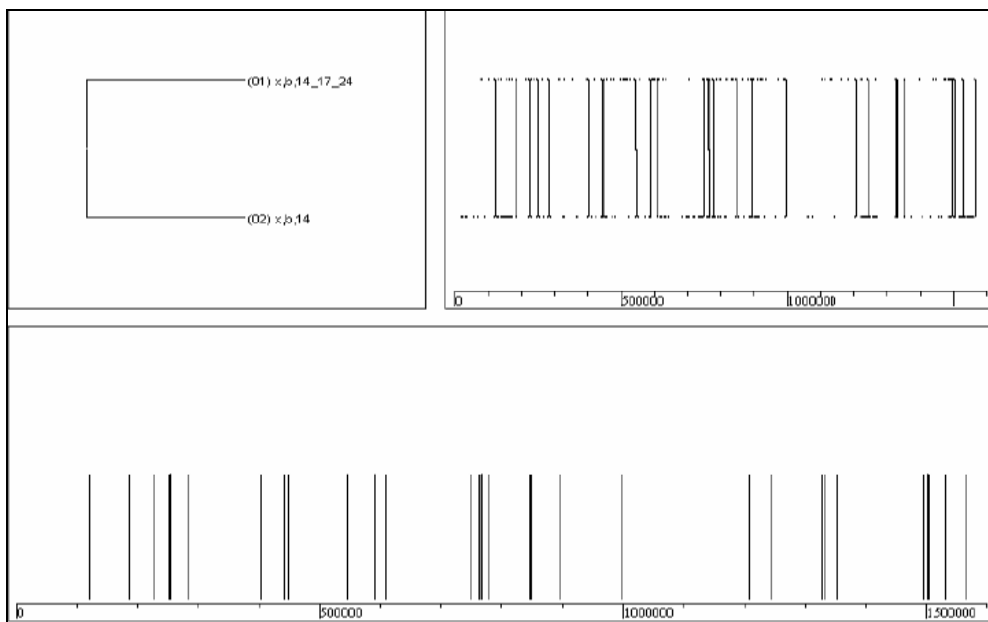


Figure 17.1 Example of a T-pattern connecting types of facial expressions: action unit combination AU14+AU17+AU14 is linked to a subsequent AU14.

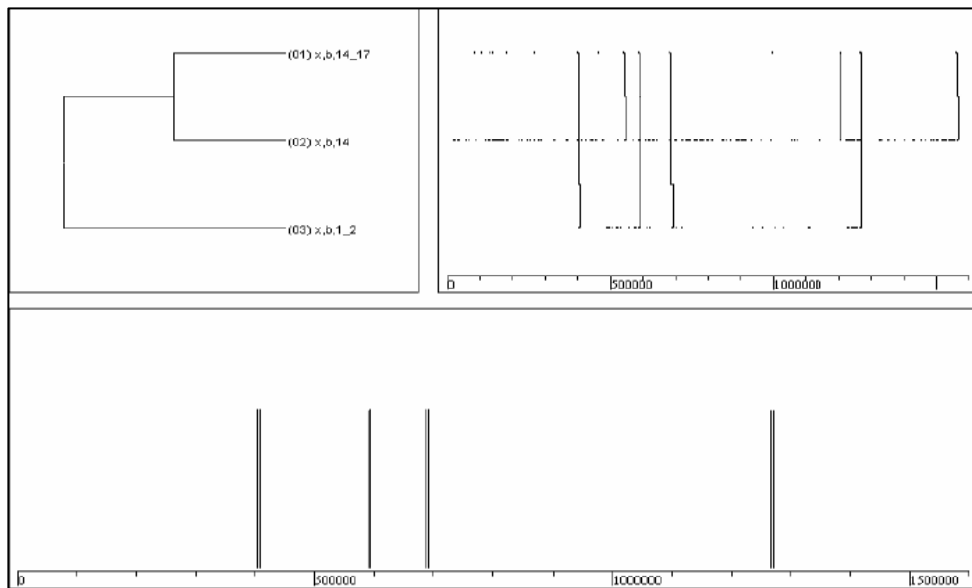


Figure 17.2 Example of a more complex T-pattern connecting types of facial expressions: AU14+AU17 is connected to AU14 and at level 2 to AU1+AU2.

17.5.2 T-Patterns associated with the course of a news report

We find T-patterns that are connecting the end of the news report with the facial behaviour of the viewers. The temporal structure of the news report seems to initiate a temporal structuring of the facial expressions of the audience. At the end of each report there is an animated globe as a kind of separator between different messages. The presenting of this globe – and therefore the end of the report – is connected via a T-pattern, for example, with the expression of AU14+AU55 (dimpler and head tilt left) (see figure 17.3). Such patterns could be even more complex, as figure 17.4 shows. T-Patterns that contain the media content event "globe" and a subsequent facial expression may allude to a cognitive-affective appraisal of the before presented news content.

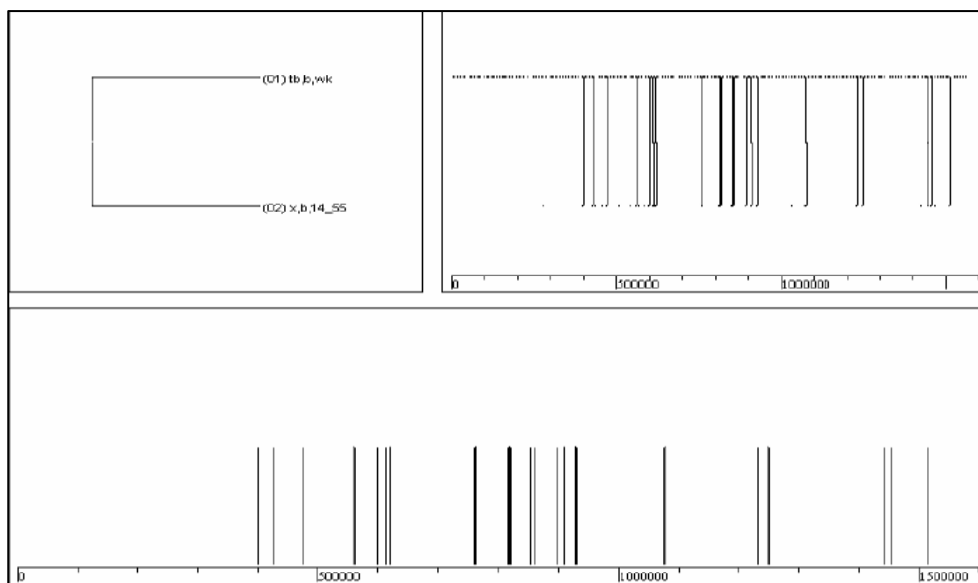


Figure 17.3 Example of T-pattern connecting facial expressions to the course of the news report: AU14+AU55 is connected to the presenting of an animated globe (wk) at the end of the news report.

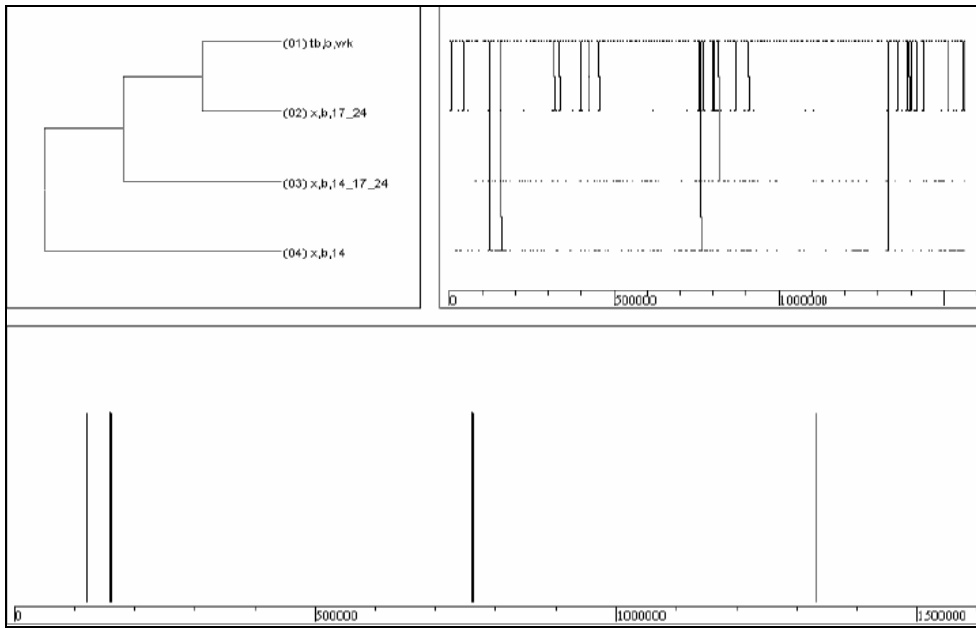


Figure 17.4 Example of a more complex T-pattern connecting facial expressions to the course of the news report: AU17+AU24 is connected to the presenting of an animated globe (wk) at the end of the news report, at higher levels AU14+AU17+AU14 and AU14 are linked.

Another evidence for the existence of a concluding appraisal of the media content may be found within patterns not after the end of the message (when the animated globe is presented), but within the last seconds of a news report just before the animated globe is fading in. An example is shown in figure 17.5, connecting AU20 (lip stretcher = pulling the lips back laterally) to the presenting of the globe. Again, this kind of patterns can be more complex (Figure 17.6).

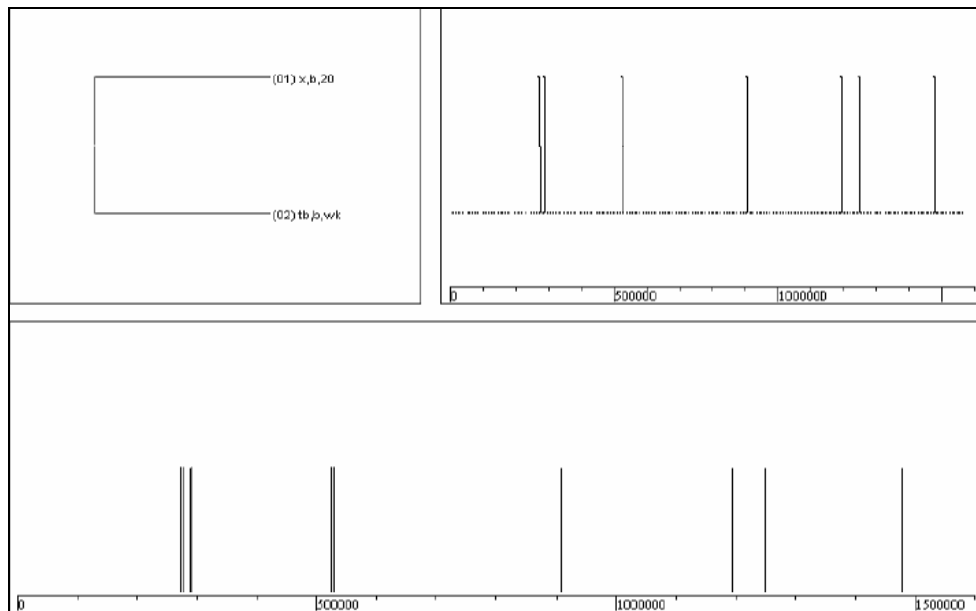


Figure 17.5 Example of T-pattern connecting facial expressions to the course of the news report: AU20 is connected to the subsequent animated globe (wk) at the end of the news report

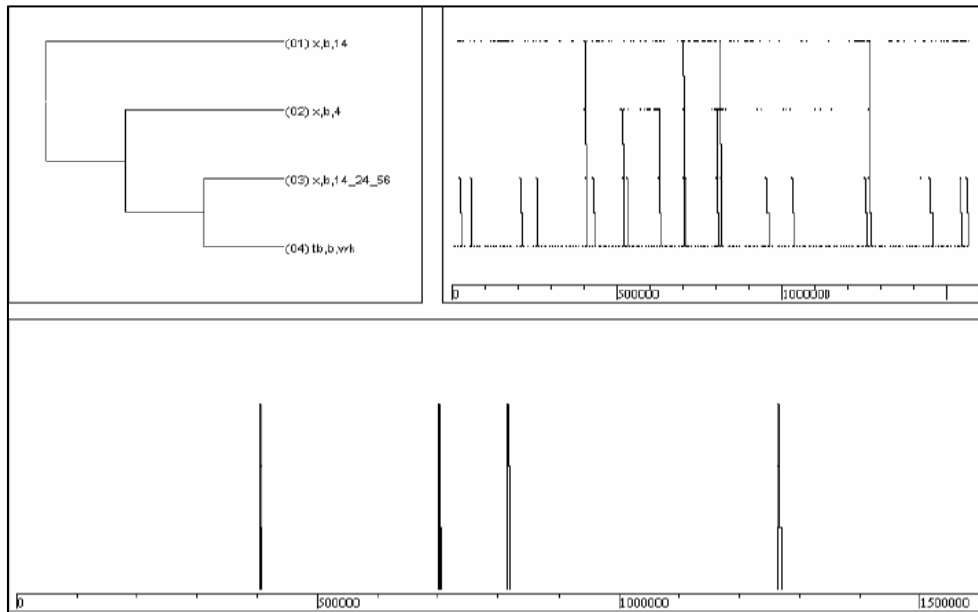


Figure 17.6 Example of a more complex T-pattern connecting facial expressions to the course of the news report: AU14+AU24+AU56 is connected to the subsequent animated globe (wk) at the end of the news report, at higher levels AU4 and AU14 are linked.

17.5.3 Patterns connecting facial expressions to formal features

Further patterns connect facial expression to some formal features of the news. For example, the expression of AU14 (dimpler) is connected to the beginning of the anchorman speaking. It could be supposed, that certain form variables give a kind of cue that provokes appraisal processes.

17.5.4 Patterns connecting facial expressions to certain points in a certain news report

T-patterns, connecting facial expressions to certain points in a certain news report as exemplified in figure 17.7, may demonstrate how verbal information of a news report at a certain point of the told news story generates an appraisal process that is observable through the detected pattern. When we look at what happens at the time in the news report when the pattern occurs, it seems that important information is presented at this time that makes it possible for the viewer to finish the whole or parts of an ongoing emotional appraisal.

Summing up, we find patterns as sequences of facial expressions, patterns linking facial expressions to the course of news reports, patterns connecting facial expressions with form variables, and patterns associating facial expressions with certain points of the story that is presented in a news report.

17.6 Conclusion

Using THEME, we analyzed facial expressions of TV-news viewers in relation to form and content aspects of presented media events. Facial expressions, taken as observable indicators of unobservable appraisal processes, allow the study of emotional processes along the timeline. Considering the multi-functionality of facial behaviour [6, 26-28] we asked: Can facial expressions serve as indicators for processes of cognitive appraisal? Is there a sequence of emotional processing (a sequence of stimulus evaluation checks)?

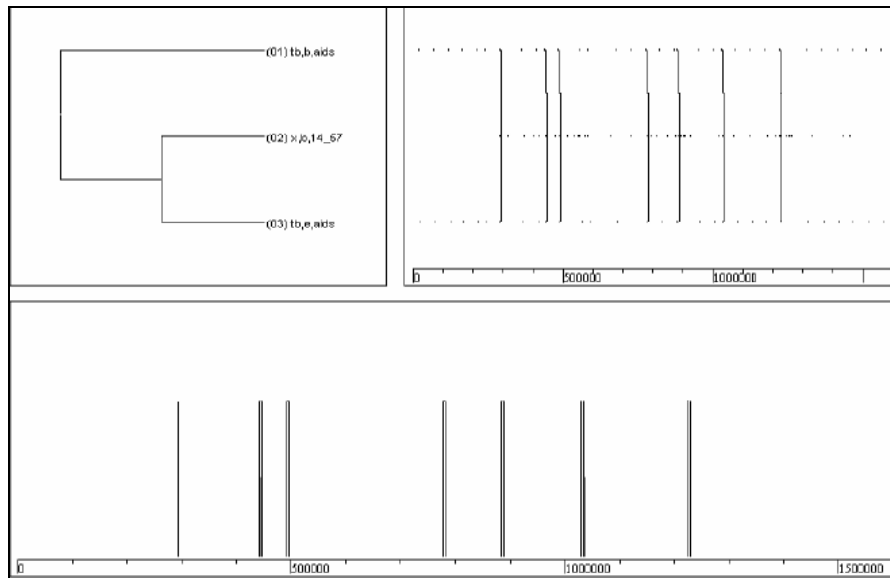


Figure 17.7 Example of a T-pattern connecting facial expressions to certain points in a news report: AU14+AU57 is connected to the beginning and end of a report about aids

Our results show a large number of temporal patterns in the facial behaviour data. We find patterns as sequences of facial expressions. These patterns may be interpreted as parts of appraisal sequences. These results indicate that there seems to be a sequence of emotional processing. Furthermore, we find patterns linking facial expressions to the course of news reports, patterns connecting facial expressions with form variables, and patterns associating facial expressions with certain points of the news story. It seems that the temporal structure as well as formal and content variables of news reports may initiate cognitive-affective appraisal processes.

Due to the fact that Scherer and colleagues propose only some facial behaviour outcomes of certain stimulus evaluation checks [6, 13-16] we are now examining if some of our often found facial expressions (see figure 17.8) may be related to emotional experiences or cognitive appraisals. Looking at the very first preliminary data, we find that AU14 is by most of our subjects associated with a feeling of scepticism (for interpretation of AU14 see also [8]), AU14+AU17+AU24 is linked to a kind of frustration, AU14+AU17 may signal disappointment, while AU1+AU2 is interpreted as some sort of astonishment or amazement (for interpretation of AU1+AU2 see also [29]).

Outlining the results of our studies, we want to illustrate how the study of the temporal structure of facial expressions can help to get a deeper insight into the structure of emotional processing. Using THEME has the potential to make a significant contribution to this examination of emotional processing. It may explain the elicitation and differentiation of emotional responses induced by media. Within the realm of media psychology the analysis of the temporal structure of facial expressive behaviour while using media can contribute to a better understanding of emotional processes of viewers while watching TV, going to the movies or using the Internet.

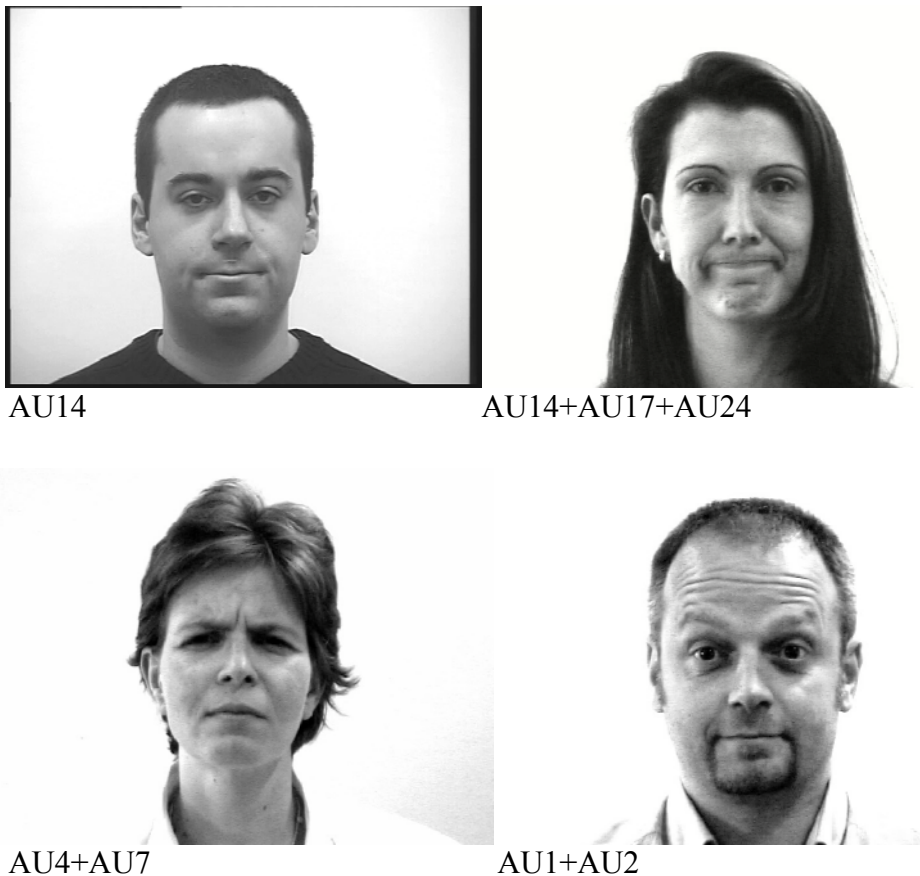


Figure 17.8 Examples of frequent action units or action unit combinations expressed by viewers of TV news

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