

Emotions elicited by a road safety campaign

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Abstract

In advertising campaigns that aim to improve health related behavior, so-called fear appeals are a commonly used strategy. Empirical studies in fear appeal research nearly exclusively use self-report measures to operationalize the emotion fear. The presumption within these studies is that the advertisements elicit the emotion fear, and in consequence the conclusion is that the elicited fear is responsible for effective persuasion. In this contribution a study is reported in which multiple methods are used to explore the emotions elicited by a road safety campaign. The observation of facial expressions and physiological measurement (heart rate and skin conductance) are combined with self-report measurement. The results open up a more comprehensive view on so-called fear appeals, because not only fear but also other emotions such as surprise, disgust and contempt are observed. In conclusion, the authors argue for more integrative attempts in methodological terms and for a more differentiated view on the various emotions that are elicited by campaigns in health communication in order to further develop theoretical models in this field.

Keywords: emotional processes, emotion regulation, facial expression, fear appeal, physiological measurement

Introduction

Emotions elicited by a road safety campaign
Governments and public institutions attempt to protect the population from the consequences of unhealthy behavior by way of social marketing campaigns. So-called fear appeals are often used to influence health-related behavior. The negative consequences of an unhealthy behavior are accentuated: Pictures of smokers' lungs, serious injury and death as a result of traffic accidents, etc. dominate the content of such campaigns. The assumption is that the emotion *fear* is a driving factor when the intention is to change attitudes and subsequently behavior: for example, to stop smoking or to drive more slowly. The search for variables that determine the effectiveness of persuasion using fear appeals poses a great challenge for researchers as well as for the developers of the campaigns. What are the characteristics of the cognitive and emotional activities of the recipients when confronted with public service announcements containing shocking images? Why do fear appeals often fail to persuade in the intended direction?

First, theoretical approaches describing the complex mechanisms underlying the reactions to fear appeals are discussed, and the commonly used methods in fear appeal research are outlined. In the next step, a study that uses the observation of facial expressions and the registration of physiological data is reported. These data acquisition methods provide insights into the cognitive and emotional processes during the reception of advertisements. In the study the effects of three commercials designed for a German road safety campaign were examined. The results are discussed in the light of theories of emotion and emotion regulation. Finally, conclusions

for further research are drawn.

Fear Appeal Research

Theoretical considerations

Fear appeals may simply be defined as "persuasive messages that arouse fear" (Witte & Allen, 2000, p. 591). Lennon, Rentfro and O'Leary (2010) define fear appeals in a more pronounced way as "a persuasive communication attempting to arouse fear, promoting precautionary motivation and self-protective action (p. 97)". A further element of fear appeals is that the communicative message suggests a possibility of avoiding the threat. This element is a constitutive element of different models that try to conceptualize variables responsible for the effectiveness of fear appeals (Rogers, 1975/1983; Witte, 1992): Without an instruction to deal with the threat, no attitudinal and behavioral changes are to be expected.

A variety of theoretical models that attempt to identify and explain the key variables in persuasive communication using fear appeals is available: The Extended Parallel Process Model (EPPM) by Witte (1992) combines several existing approaches of fear appeal research in a coherent way. According to Witte (1992) the emotion *fear* is the key motivator of human behavior. Witte integrated four further variables into her model, which are all components of Rogers' Protection Motivation Theory (1983): severity, susceptibility, response efficacy and self-efficacy. All four variables are characteristics of the message. Severity and susceptibility relate to the perceived threat, while response efficacy and self-efficacy refer to the perceived effectiveness of the suggested action. Up till now, the EPPM has influenced research in this area decisively.

Research has yielded contradictory results

regarding the suitability of fear appeals for persuasion (LaTour & Rotfeld, 1997; Witte & Allen, 2000; Ruiters, Abraham, & Kok, 2001; Hastings, Stead, & Webb, 2004; Mowen, Hariss, & Bone, 2004; Rossiter & Thornton, 2004; Brennan & Binney, 2010; Meneses, 2010). Ben-Ari, Florian, and Mikulincer (2000) attributed the inconsistency of the results to the fact that different theoretical models and different research methods were implemented in the studies. Lewis, Watson, Tay, and White (2007) mentioned the difficulty of assessing the enormous complexity of the relationship between fear appeals and persuasion as another reason for the inconsistent results.

Basically, the effectiveness of fear appeals in all models, discussed since the 1950s, is explained by the elicited fear. Witte (2000) defines fear as "a negatively valenced emotion, accompanied by a high level of arousal" (p. 591). And, Ruiters, Abraham and Kok (2001) characterize fear as an unpleasant emotional state, which is caused by the reception of threatening messages (p. 614). It is important to note that fear must be distinguished from anxiety. Often both terms are used interchangeably, even in scientific discourse. Anxiety is seen as a long-term affective state. The person concerned is less able to respond appropriately, since she or he feels confronted with complex, ambiguous or indeterminate threatening stimuli. On the contrary, fear refers to a hazard that can be clearly identified. An individual is more easily able to respond appropriately to the threat.

The presupposition that other emotions may also play a role has been largely neglected in this field of research. However, one recent study has shown that often not only fear is elicited, but also disgust, and that disgust can itself increase the effectiveness of the message (Morales, Wu, & Fitzsimons, 2012). In addition, the authors of this study assume that fear appeals may elicit other emotions of negative valence besides disgust, and that those emotions might also influence the persuasive effects of health communication.

As fear - or more generally, emotion - plays the key role in the theoretical discussions and empirical studies in fear appeal research, it is surprising that knowledge coming from psychological research on emotions is seldom integrated into these models.

Emotions in Psychology

Emotions are a very complex construct. Gross and Thompson (2007) provide the following definition: An emotion is "a person-situation transaction that compels attention, has particular meaning to an individual, and gives rise to a coordinated yet flexible multi-system response to the ongoing person-situation transaction" (p. 5). The emotional responses result in changes in different response systems. They influence subjective feeling, physiology, and behavior, including facial expressions (Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). The unique combination of reactions located

on these different levels leads to action tendencies (prepares the organism for actions). Emotions serve an organism as an important criterion for the allocation of attention. If necessary, active processes (such as thinking) are interrupted by means of an emerging emotion.

The processes that occur in the emergence of an emotion are defined by Scherer (2001) in his Component-Process Model. He proposes that the experience of an emotion is not based on an event itself, but depends on how an organism rates an event for his well-being and survival. The main criteria for the evaluation process in Scherer's model are called Stimulus Evaluation Checks (SEC). These include an appraisal of the relevance of an event and the implications this event may have for an individual. Besides further Stimulus Evaluation Checks (e.g., the implications of an event for an individual), the normative significance of an event may also be evaluated by an individual.

Methodological considerations

The results of fear appeal research are almost exclusively based on self-report methods (Popova, 2012). Participants rate how 'frightened', 'scared', 'anxious', 'worried' or 'uncomfortable' they feel about a specific health threat (Mc Mahan, Witte, & Meyer, 1998; Ruiters, Verplanken, Kok, & Werrij, 2003). Besides some impreciseness in the operationalization of fear, social desirability must be taken into consideration. Particularly concerning sensitive topics, such as is often the case in health communication, social desirability can lead to biased results (Ravaja, 2004).

Physiological Measurement. To the knowledge of the authors, in fear-appeal research only one single study exists that uses physiological measurements: Ordoñana, González-Javier, Espín-López, and Gómez-Amor (2009) measured skin conductance (SC) and heart rate (HR), to analyze the relationship between self-report and physiological reactions to fear appeals. The measurement of physiological parameters, such as HR and SC, provides very valuable information. In terms of an appropriate operationalization, the possibility of detecting unconscious processes is one advantage of these kinds of measures (Poels & Dewitte, 2006). Physiological measurement allows getting a (temporally) detailed picture of individual, continuous reception processes. A further benefit is the possibility of exactly determining certain moments of arousal linked to specific sequences of the stimulus material. The measurement of SC provides information about the activation of the autonomic nervous system (ANS) (Dawson, Shell, & Fillion, 2000; Ravaja, 2004). SC measurement is considered the most widely used method for detecting changes in the ANS (Boucsein, 2001). SC measurement monitors the conductivity changes in the skin that vary according to the activity of the perspiratory glands. Enhanced activation of the ANS results in an increased activity of the perspiratory glands. SC is seen as a reliable indicator of arousal (Ravaja, 2004). One advantage of measuring SC is the high sensitivity to minor changes in mental states (Boucsein, 2001). HR is defined as the number of heart beats per minute. It serves as an indicator of different phenomena such as attention, activation and cognitive or physical effort (Poels & Dewitte, 2006). It is

important to distinguish between an increase in heart rate (acceleration) and a decrease in heart rate (deceleration) (Ravaja, 2004), since the two phenomena indicate different processes. Acceleration can be related to an emotional activation, to anxiety, to defensive responses, or indicates a general mobilization of resources (Baltissen & Boucsein, 2005). Deceleration indicates relaxation, an active stimulus reception or expectations and orientation to new stimuli (Ravaja, 2004). Accordingly, by measuring HR the valence of the corresponding emotion can be predicted (Micu & Plummer, 2010). The possibility of drawing conclusions about specific affective states, however, is very limited.

Facial expressions. The facial expressions of an individual contain information about their cognitive and emotional states. Ekman (1987) postulates that the expressions of so-called basic emotions in human faces are biologically determined and therefore universal. The results of numerous studies proved this assumption to be correct (Ekman, 2007). The basic human emotions are anger, surprise, disgust, fear, sadness and happiness. For each of the basic emotions certain corresponding facial expressions exist. Ekman and Friesen (1975/2002) developed the Facial Action Coding System (FACS) for a precise encoding of facial expressions. FACS is a reliable coding system, which is anatomically derived. So-called Action Units (AU) are the descriptors of each movement of each facial muscle. Mostly, more than one muscle is activated in each facial expression. This results in a combination of different AUs that indicate certain internal states. The identification of AUs can serve as a basis for further interpretations of cognitive and emotional processes. Scherer and Ellgring (2007) postulate that facial expressions can indicate the different stages of the appraisal processes defined in the Component Process Model. And, Bleuel and Suckfüll (2011) have identified specific AUs that indicate different emotion regulation strategies. Poels and Dewitte (2006) analyzed the use of different methods for the study of emotions associated with advertising effects. They found only one single study that applied FACS in advertising research (Debraix, 1995).

The study

To elaborate more thoroughly on the emotions elicited by fear appeals, the authors of this contribution have re-analyzed data gathered in the context of a multi-method study, which was designed to prove hypotheses about differential effects of movies and advertisements (Suckfüll, 2013; Suckfüll, Weickenmeier, Schütte, & Schulz, 2011). Three road safety commercials were part of the stimuli used in this study. They were produced for the campaign 'Runter vom Gas!' (in English: 'Slow down!'), an initiative of the Federal Ministry of Transport, Building and Urban Development and of the German Road Safety Council. The study was conducted in a laboratory for integrated reception research (IR^{lab}) at the Berlin University of the Arts. The advantage of the

laboratory setting is the opportunity to collect process data systematically and efficiently. Measurement of physiological parameters (HR, SC) was combined with observations of facial expressions and body movements. The participants were confronted with their own reactions during interviews which took place after reception.

Participants

154 persons participated in the study. A total of 36 persons had to be excluded (for reasons of fatigue, sickness, chewing, quality of the footage, etc.). Therefore, the data of 118 participants were included in the analysis (age ranges from 18 to 52 years; 66.9 % female and 33.1 % male). The participants watched one of the three road safety spots: 39 participants saw Spot 1, 37 people watched Spot 2 and 41 participants were confronted with Spot 3.

Stimulus Material

The stimulus material included a four-minute commercial block with a total of nine commercials which included one of the three spots of the road safety campaign 'Runter vom Gas!' (in each condition the next-to-last spot). The participants were randomly assigned to one of the three experimental conditions. The three spots are briefly described below (see also Suckfüll, Weickenmeier, Schütte & Schulz, 2011). Like most campaigns promoting road safety, the 'Runter vom Gas!'-initiative uses shocking motifs (Ben-Ari et al, 2000; Klimmt & Maurer, 2012). They illustrate the threats posed by speeding, and suggest possible responses to avoid these threats.

Spot 1: *Picture-Frame*: In the beginning, the 27-second spot shows a deserted apartment that is obviously inhabited by a family. At some point, the camera zooms in on a family portrait. Suddenly the family (on the photo) is thrown against the glass of the picture-frame as if in an accident. The noise of a car horn, screeching tires and a loud crash can be heard. In the end, the sentence "Every year in Germany around 5.000 people die in traffic accidents. Slow down!" is displayed.

Spot 2: *Family-Day*: The background music of the 31-second spot is sad and stands in contrast to the cheerful nature of the main protagonist of the spot, a four-year-old girl. An elderly woman and the girl are going for a walk on a sunny winter day. The girl holds flowers in her hand and accompanies the old woman towards a road, where a car passes by in the foreground. The little girl kneels at the side of the road and puts flowers on the ground, then stands up, waves and says "Bye mom, bye dad". Now a wooden cross with the engraved inscription "Peter and Heike" is shown. Finally, the same sentence as in the spot *Picture-Frame* is displayed.

Spot 3: *Motor-Bike*: This spot lasts 32 seconds. The images show a motorcyclist speeding on a highway. The spot is mostly animated and works with sounds that have a menacing effect. The highway evolves into a horror scenario: The road surface scarifies, barbed wire grows from branches, etc. The background music is a slowly rising drum roll and as the spot proceeds, the scenes change faster and faster. At the end of the spot, the words "Killer number one: Excessive speed!" followed by the slogan of the campaign "Slow Down!" appear.

Procedure and Data Collection

While the participants of the study watched one of the three spots (embedded into the block of commercials), their heart rate and their skin conductance were measured. At the same time, the faces of the participants were videotaped. Data recording was conducted individually for each participant. The conditions of the situation were standardized for all participants. During the session the experimenter sat in the adjacent room and observed the participants via cameras. The participants filled out a questionnaire in order to gather information about the likeability and the unprompted recall of the spots. The study concluded with an interview, in which the subjective impressions and feelings of the participants were asked about. For

the present contribution, the physiological data and the facial expressions were analyzed in detail. One trained coder (the second author of this contribution) coded the facial expressions according to the Facial Action Coding System. The apex, the persistence and the intensity of the Action Units were coded.

Results

The descriptive analysis of the facial expressions during the road safety spots revealed that most facial expressions could not be interpreted in terms of basic emotions as suggested by Ekman and Friesen (2002). The movements of the facial muscles are not very strong. In most cases the intensity is coded with 'B'. This is a slide movement according to the FACS manual. The results are summarized in Table 1.

Table 1 Overview of the key findings

Stimulus	Picture-Frame	Family-Day	Motor-Bike
Sample Size	n = 39	n = 37	n = 41
Likeability	2.69 (SD = 1,54)	2.35 (SD = 1,25)	2.73 (SD = 1,30)
Unprompted Recall	45.45 %	54.17 %	44.00 %
Number of Action Units	4.33	7.55	6.59
Facial Expressions	AU 01: 0.24 (9) AU 02: 0.32 (12) AU 04: 0.13 (5) AU 07: 0.13 (5) AU 09: 0.00 (0) AU 10: 0.03 (1) AU 14: 0.34 (13) AU 24: 0.53 (20)	AU 01: 0.33 (13) AU 02: 0.38 (15) AU 04: 0.41 (16) AU 07: 0.54 (21) AU 09: 0.08 (3) AU 10: 0.08 (3) AU 14: 0.62 (24) AU 24: 0.67 (26)	AU 01: 0.29 (12) AU 02: 0.37 (15) AU 04: 0.46 (19) AU 07: 0.68 (28) AU 09: 0.05 (2) AU 10: 0.12 (5) AU 14: 0.51 (21) AU 24: 0.42 (17)
Skin Conductance (SC)	SC: 3.11	SC: 3.67	SC: 2.5
Heart Rate (HR)	HR pos: 0.55 HR neg: 0.84	HR pos: 1.54 HR neg: 0.26	HR pos: 1.3 HR neg: 0.80

Note. All values are average values (except for Unprompted Recall). *Likeability*: from 1 = "very good" to 6 = unsatisfactory. *Unprompted Recall*: percentage of recipients who remembered the spot after the reception. *Facial Expressions*: E.g., AU 01: 0.24 means that the participants, who have watched the spot *Picture-Frame*, showed AU 01, the inner brow raiser, 0.24 times on average. The average is derived by dividing the total number of coded AU 01 by the number of recipients of the spot *Picture-Frame*. In brackets the total number is indicated. SC: number of significant skin conductance responses. *HR pos*: number of significant heart rate accelerations. *HR neg*: number of significant heart rate decelerations

The questionnaire, which the participants filled out after reception, determined the likeability of the spots on a rating scale from 1 ('very good') to 6 ('unsatisfactory'). The participants liked Spot 2 *Family-Day* most (mean: 2.35). The commercial *Picture-Frame* follows with a mean score of 2.69. The lowest score was determined for spot 3 *Motor-Bike* (mean: 2.73). The spot with the highest values for unprompted recall was again the spot *Family-Day*. Accordingly, the spot with the lowest average score for likeability was most seldom recalled.

Many facial expressions were coded, which indicate the emotion *surprise*. These facial expressions are the Action Units AU 1, the inner brow raiser, and AU 2, the outer brow raiser. The combination of AU 1 and AU 2 occurred during the reception of all three spots. Moreover, the combination of AU 1 and AU 2 occurred very often compared to the frequency of the other facial expressions. Also, Action Units that refer to the basic

emotion *disgust* were discovered. AU 10, the upper lip raiser, indicates disgust and was found for each spot. AU 9, the nose wrinkler, is also a sign of disgust. This Action Unit was coded for the spot *Family-Day* and for the spot *Motor-Bike*, but not for the spot *Picture-Frame*. However, it has to be pointed out that the frequency of these Action Units is quite low.

In the facial expressions many indicators for different strategies to regulate emotions were detected. Each participant confronted with the commercial *Picture-Frame* displayed several Action Units, which can be considered as indicators for the regulation of emotions. Most frequently, AU 24, the lip presser, was coded. This Action Unit can be seen as an indicator for the regulation strategy *suppression* (Bleuel & Suckfüll, 2010). The frequency of AUs is higher for the spot *Family-Day* (compared to *Picture-Frame*). The motorcycle-spot differs from the other spots: AU 7, the lid tightener, is the most coded Action Unit for this spot. In many cases this facial expression coincides with AU 4, the brow lowerer.

According to Scherer and Ellgring (2007), this combination is a sign for a specific appraisal: The combination of AU 4 and AU 7 can be interpreted as an indicator for an event appraised as new and unexpected.

Looking at the facial expressions and the physiological data for certain time intervals also yielded interesting results. It is noticeable that the endings of the different spots provoked a variety of reactions. Especially, towards the end of the spot *Picture-Frame* (after the crash, and during the textual resolution) a lot of different AUs were coded. In addition, an increased number of significant reactions occurred in the physiological data. The same is true for the *Family-Day* commercial: Facial reactions of the participants accumulated at the end of the spot, and HR as well as SC responses increased (the little girl says goodbye, the cross is shown, textual resolution). The spot *Motor-Bike* again differs from the other spots. The frequency of Action Units and significant physiological reactions was constant during the reception processes.

Discussion

The results indicate that the commercials which tell a story and use unexpected resolutions (*Picture-Frame*, *Family-Day*) provoke more emotion regulation, are better remembered, and are more positively evaluated. The distinctive facial expressions, observed at the end of these spots, refer to the resolution of the small narratives. The huge number of appraisals of relevance (AU 4 and AU 7 as indicators of unfamiliarity), that occurred in the faces of the viewers of the *Motor-Bike*-spot may be interpreted in the sense that the recipients were less captivated by the content: Fewer emotions evolved that needed to be regulated. Emotion regulation is an integral part of emotional processes: Emotions are elicited *and* regulated within a continuous appraisal process. The elicited emotion itself is in part subject to re-appraisal on the basis of new information given in the next scenes of an audiovisual media offer (Suckfüll, 2013, p. 328).

The measurement of emotions via

physiology and facial expression provides additional benefit, because it allows for more detailed interpretations. The results of the multi-method study suggest that the emotion *fear* simply does not appear at least throughout the reception of the spots: The physiological measurements demonstrate considerable arousal induced by fear appeals, but no typical facial expressions occurred that could be definitely ascribed to the specific emotion *fear*. In the interviews conducted after reception, only six participants said that they felt anxious. On the contrary, 27 participants rated the surprising resolution as positive, and 21 participants said that they were shocked.

AU 14, the lip corner depressor, is the second most coded Action Unit for each of the spots in the study. Research on moral emotions reveals that the unilateral AU 14 is seen as a covariate of the emotion *contempt*. Rozin, Lowery, Imada, and Haidt (1999) postulate that contempt, anger, and disgust are related, yet distinguishable, emotional reactions to the moral violations of others. Their empirical results suggest that contempt is a reaction to violations of community. This is in line with assumptions of Scherer and Ellgring (2007), who report evidence that Action Unit 14 is linked to appraisals of events that violate internal standards (norm compatibility-check). In the context of the present study the authors suggest the following interpretation: To drive too fast means to risk not only one's own life, but also the life of others, and causes harm for the bereaved. To appraise such behavior as violating norms of our society elicits moral emotions, which can be very effective.

These results challenge the basic assumptions of existing theories and models in fear appeal research. Future research should investigate the relevance of surprise (in terms of narrative), and contempt and disgust (in terms of morality). To provide a theoretically sound basis, insights from emotional psychology have to be incorporated into existing theoretical models. The Stage Model of Processing of Fear-Arousing Communications (De Hoog, Stroebe, & De Wit, 2005), which integrates dual process models into the EPPM, may be used as a starting point for these attempts. Conceptually, emotions elicited during reception must be differentiated from emotions that arise after reception.

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