EMOCIONES

FACIAL ACTION CODING SYSTEM (FACS) – PRACTICAL APPLICATION

Sistema de Codificación de Acción Facial. Aplicación práctica

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Resumen

Facial Action Coding System FACS (Sistema de Codificación de Acción Facial) es uno de los mejores métodos para describir objetivamente la actividad facial. Esta herramienta permite describir la expresión facial, diferenciar los cambios en la acción muscular y debido a esto; distinguir las emociones (Ekman, Friesen, Hager, 2002). FACS tiene muchas aplicaciones prácticas, en este documento se presentan sólo algunos pocos de ellos. El primero es el análisis de la expresión facial de las personas deprimidas (Cohn, et al., 2009; Girard et al., 2014). La segunda es la descripción de los comportamientos faciales que caracterizan la respuesta al dolor (Rahu, Grap, Cohn, Munro, Lyon, Sessler, 2013). El último ejemplo de aplicación de FACS presentado en este trabajo es la caracterización de la sonrisa y la felicidad (Gunnery, Hall, Ruben, 2013; Messinger, Fogel, Dickson, 2001).

Palabras clave: FACS, emoción, expression facial

Abstract

Facial Action Coding System FACS is one of the best methods of describing facial activity objectively. The tool enables describing facial expression, differentiate changes in muscular action and due to that distinguish emotions (Ekman, Friesen,

Hager, 2002). FACS has loads of practical applications, in this paper are presented only few of them. First one is analysis of depressed people's facial expression (Cohn, et al., 2009; Girard et al., 2014). Second one is description of facial behaviours that characterize the pain response (Rahu, Grap, Cohn, Munro, Lyon, Sessler, 2013). The last example of FACS's application presented in this paper is characterization of smile and happiness (Gunnery, Hall, Ruben, 2013; Messinger, Fogel, Dickson, 2001).

Keywords: FACS, emotion, facial expression

INTRODUCTION

FACS is extensive descriptive system for measuring facial action. Furthermore, FACS is more comprehensive than any of the previous systems. Every facial action can be described by FACS, because it makes it possible to measure asymmetries when various actions appear on each side of the face (Ekman, Friesen, Hager, 2002). The tool finds application in many areas of research, because it enables define movements detected on the face. Thereafter, when facial expression alterations are codded, there exists the prospect of comparing results and identifying emotions. Seven universal emotions – anger, fear, disgust, contempt, surprise, sadness, and happiness are coded by FACS. Additionally, complex emotions are examined as well. FACS can be used to identify differences of a facial expressions in humans and other species. This paper presents several practical applications of FACS in research.

1. FACS – TOOL'S DESCRIPTION

The Facial Action Coding System (FACS) divides facial expressions into parts called action units (AUs). Action units are facial movements that are attributed to the contraction of different muscles (Girard et al., 2014). For example, pure anger is codded as: 4 + 5 + 7 +23. It means that in this action are involved:
4 - Brow Lowerer (muscular basis: Depressor Glabellae; Depressor Supercilli;

Corrugator);

5 - Upper Lid Raiser (muscular basis: Levator Palpebrae Superioris);

7 - Lid Tightener (Orbicularis Oculi, Pars Palebralis);

23 - Lip Tightner (Orbicularis Oris).

Sadness: 1 + 4 + 15

1 - Inner Brow Raiser (muscular basis: Frontalis, Pars Medialis)

4 - Brow Lowerer (Depressor Glabellae; Depressor Supercilli; Corrugator)

15 - Lip Corner Depressor (Triangularis)

Action Units can perform singly or in combination of several of them in case of complex expression (Ekman, Friesen, Hager, 2002). Moreover, FACS coding procedure also give the means to code the intensity of each facial action on a five-point scale (A-E). The most common method to code is onset, apex, and offset of the action. The coding steps are: 1) coding each expression independently; 2) If there is a disagreement on codes then the two coders check the video again together and try to find which muscle movement was absent or present. Action Units can be reliably identified by trained FACS coders. Standard training lasts around one month (Ekman, Rosenberg, 2005).

2. FACS AND EMOTIONS

Using FACS is possible to conceptualize person's emotions. This technique enables to evaluate emotions in real-time. A good example for speculation when FACS code emotions is a survey conducted in 1985 by Ekman, Friesen, and Simons with three conditions. In the first one the role of expectations by telling participants was examined, when they would be startled. In the second one the suppression of startle expression was checked and in the third one investigated was how well the startle expression can be simulated. The startle for many researchers is the extreme version of surprise (Plutchik, 1962, 1980). On the other hand, some differences between them are described by Ekman. In the research 22 caliber blank pistol shot was used to elicit the startle reaction. In the first group where participants knew the pistol would be fired and in the second where procedure was explained for the participant, the difference between inhibited and

anticipated startle reaction in either the muscular components or latency was not found and only a very small diminution in intensity could be observed (Ekman, Friesen, Simons, 1985). In the third one where the person simulated to be startled was revealed that facial musculature can not produce the immediate response, which is the feature of the startle. It is easy to note that expression is false, because duration of emotional expressions is longer. Moreover, anticipation can have big impact on surprise, here it diminished the intensity of the startle reaction. Researchers were trying to find out if the startle can be named as emotion or not. They emphasized that startle as emotion is uniformity in facial appearance and has brief latency (duration is similar as for surprise). What distinguishes startle from the emotions is facility to elicit it, it is one of the first responses to every subject and it can not be fully inhibited. The last reason which was highlighted is that startle can not be really simulated with the correct latency. One important evidence is the subjective experience of how it feels to be in one exact state-be startled (Ekman, Friesen, Simons, 1985). It is a good explanation of the question what exactly is the emotion and when it can be said that emotions are observed and coded with FACS.

3. FACS – PRACTICAL APPLICATION

Facial Action Coding System can be used in many different ways to explain and understand facial expression. Patient's needs and general state can be read from his face. In many situations person does not want to say what he or she feels and the only way to learn about it is to analyse nonverbal signals. FACS can find application in many areas of research, next three subsections are several examples of it.

3.1. Depression

The relation between nonverbal behaviour and severity of depression was described in several papers. Depressed participants were video recorded, subsequently facial expressions and head pose were analysed using FACS. In survey about nonverbal social withdrawal in depression the change over time in depression severity was shown. When severity was high, fewer affiliative facial

expressions – AU12 (Lip Corner Puller) and AU15 (Lip Corner Depressor) were obsereved as well as more affiliative facial expressions - AU14 (Dimpler). The analysis affirms that depressed people use nonverbal communication to show their needs and maintain interpersonal distance. Individuals were sending more positive nonverbal signals during recovery time. Use of FACS in this research can be crucial, because many studies describe facial expressions as ‘’positive expressions’’ and ‘’negative expressions’’ or characterize single facial expression as smile to represent different category. It leads to wrong conclusion that all facial expressions in one category are equivalent. Nonverbal behaviour plays a big part in social interactions and shows person’s intentions. In this study depressed participants were being followed over the course of treatment; they were watched during a clinical interview and objectively-defined nonverbal behaviours were measured many times (Girard et al., 2014). Several facial actions were examined: AU12 – lip corner puller (known as smile expression), AU14 – dimpler (signal of contempt), AU15 - lip corner depressor (sadness), AU24 - lip pressor (anger), moreover amplitude and velocity of head motion were checked. After the analysis of video with 33 adults from a clinical trial for treatment of depression were found that AU12 and AU15 were reduced during high severity interviews and AU14 was increased. Furthermore, head pose was different between interviews (head amplitude and velocity were decreased). These results can pose a good base for further findings, because was described which exact facial expressions had changed instead of general, broad description. In another research about detecting depression from facial actions and vocal prosody, facial expression in response to the questions from HRSD was examined. Action Unites which were chosen for coding have been associated with depression in previous research. Some action units can be positive or negative predictors for depression. AU14 (dimpler) was considered as the most accurate in detecting depression, because it strongly differentiates depressed and non-depressed. The next sign can be shape – ‘’it was found that several AU are more reliably detected by appearance or a combination of shape and appearance than by shape alone’’ (Cohn, et al., 2009:5). FACS in this case gave mean to define facial action and relate it with

vocal behaviour and clinical diagnosis of depression. Moreover, it was emphasized that depression can be detected from nonverbal communication (Cohn, et al., 2009).

3.2. Pain

Nonverbal communication during the pain perception was analysed in a lot of research, separately for infants, children, and adults, including the elderly. Expression of pain can have big impact on social context because it can determine the reaction of receiver (Craig, Hyde, Patrick, 1991). FACS was used for comparing and explaining facial expression as a signal of pain during endotracheal suctioning in noncommunicative critically ill patients. Fifty patients were video recorded to characterize the pain response. The pain response usually activates upper facial expressions in noncommunicative critically ill patients (Rahu, et al., 2013). Facial actions which were reported many times were: AU4 - Brow Lowerer (muscular basis: Depressor Glabellae; Depressor Supercilli; Corrugator), AU6 - Cheek Raiser (Orbicularis Oculi, Pars Orbitalis), AU7 - Lid Tightener (Orbicularis Oculi, Pars Palebralis), AU10 - Upper Lip Raiser (Levator Labii Superioris, Caput Infraorbitalis) or AU25 - Lips Part (Depressor Labii, or Relaxation of Mentalis or Orbicularis Oris) and AU43 - Eyes Closed (Relaxation of Levator Palpebrae Superioris). Fourteen actions units were checked (in frequency, duration, and intensity of correlation with total scores on the Behavioral Pain Scale) and ultimately five of them were chosen as a pain-relevant facial action units. These action units included: AU1 - Inner Brow Raiser (muscular basis: Frontalis, Pars Medialis), AU4 - Brow Lowerer (Depressor Glabellae; Depressor Supercilli; Corrugator), AU9 - Nose Wrinkler (Levator Labii Superioris, Alaeque Nasi), AU52 - Head Turn Right and AU53 - Head Up. Was found strong correlation between brow lower (AU4) with the total the Behavioural Pain Scale (BPS) scores. The next discovery showed that there are no correlations between FACS pain intensity scores and patient factors (age, sex, race, diagnosis, duration of endotracheal intubation, length of stay in the intensive care unit [ICU], use of analgesics and sedatives, sedation level, and severity of illness), but there was strong correlation

between FACS pain intensity scores and the Richmond-Agitation Sedation Scale RASS (Rahu, et al., 2013). Moreover, this research gave opportunity to complete list of facial actions that provide pain information: brow lower, orbit tightening, nose wrinkling, and eye closure (Prkachin, Solomon, 2008). As a result of studying facial actions of noncommunicative critically ill patients researchers added to Prkachin and Solomon list: brow raiser, mouth opening, head position, and nasal dilatation often occurred during suctioning (Rahu, et al., 2013). The next example is the paper about suicide where 17 participants were recorded during session with psychiatrist, where they were asked five questions. One of them was: Do you still wish to attempt to end your life? (Heller, Haynal, 1997) and during this question facial behaviour was coded. Several facial expressions were observable in suicidal patients and it distinguished them from nonsuicidal patients. The difference can be observed as well in upper face as suicidal depressive patients show reduced activity in this part. In conclusion, it can be said that suicidal patients behave differently. The distinction is seen in activity, mobility, duration and diversity of repertoire. Moreover, asymmetric expressions are typical for them but their facial activity is limited. Still, it is difficult to describe typical sign of suicide and more analysis have to be made (Heller, Haynal, 1997).

3.3. Smile and Happiness

Happiness and Duchenne smile in FACS is coded as: 6 + 12; 6 - Cheek Raiser (muscular basis: Orbicularis Oculi, Pars Orbitalis); 12 - Lip Corner Puller (Zygomatic Major). In the survey about smile, participants were asked to imitate given photographs of Duchenne and non-Duchenne smiles. Videotapes were without audio content to minimalize bias between coders. AU6 was coded when AU12 was with high intensity (Ekman, Friesen, Hager, 2002). Approximately 2% of the coded expressions codes were randomly given, when coders couldn't resolve discrepancies. In research was measured intensity at FACS A-E scale. Results of research show that many participants could produce a Duchenne smile during acting out role-plays and that it is an individual difference. It means that genuine-looking expression can be made without feeling of positive affect. Moreover,

Duchenne smiles are perceived as more genuine and people who are able to put on false expressions can use it in everyday social context (Gunnery, Hall, Ruben, 2013). The group which is a good category of genuine facial expressions are infants (Figure 1). In research about smile among the youngest 13 infants between 1 and 6 months of age took part. Babies were recorded during playing with their mothers on observation session. For coding was used Facial Action Coding System for infants and young children (Oster, 2006). Actions Units which were the most important are AU12 - Lip Corner Puller and AU6 – Cheek Raiser (Figure 2). To find out which type of smiling were more likely, researchers additionally were checking duration of smile. Summary of this survey is that smile can be associated with various positive emotions because some types of smiling are more positive and occur more in specific, almost the same time of interactions. Furthermore, interaction is a good stimulus for smile in group of infants, but still some kinds of smile occurs more than others (Messinger, Fogel, Dickson, 2001).

4. CONCLUSIONS

In this paper only several examples of FACS application were presented. Many possibilities and fields exist, where it could support analysis. One of the areas where it can be useful is psychotherapy: patients' facial mimicry and facilitation of communication. As showed above, depression was coded by FACS and further research could focus on describing other mental disorders. Facial Action Coding System is one of the best methods to code facial expressions. It enables to compare results between different research and provides connection between findings. Good example of that is that FACS can be used to compare facial repertoires across species due to its anatomical basis. Ekman and Friesen, using knowledge from Darwin and Duchenne, studied facial movements for more than forty years and it brought great improvement in facial actions' analysis. It Has to be emphasized that FACS has an anatomic base and its reliability is high. The tool has a lot of advantages which can encourage researchers to use it. One drawback which should be mentioned is that FACS can be used only by researchers who went through special training and passed exam. Preparation time lasts around one

month. Furthermore, every coding is supposed to be done by at least two certificated coders.

In conclusion, FACS is comprehensive, detailed and as far the best tool to examine facial movements and even if it takes a lot of time to become certificated coder, it is worth learning.

5. BIBLIOGRAPHICAL REFERENCES

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6. FIGURES AND TABLES

Figure 1. AU12 (Lip Corner Puller)

Figure 2. AU12 (Lip Corner Puller) + AU6 (Cheek Raiser)