



## Pain and negative emotions in the face: judgements by health care professionals

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### Abstract

Facial expression of pain has rarely been researched in the context of facial expression of negative emotions with which it may occur. The main aim of the study was to investigate how pain expression resembled or differed from that of other negative emotions (fear, anger, sadness, surprise, disgust and embarrassment), using multidimensional scaling, a dimensional approach to understanding relationships among emotions. As possible misidentification of facial expressions by participants could distort those results, a judgement study as a categorical approach was conducted to examine the accuracy of identification of pain and negative emotion facial expressions. The sample was health care professionals. Identification of pain was good (unbiased hit rate 58.8%), but less than all other negative emotions. Confidence in ratings approximated accuracy of identification. Multidimensional scaling revealed two dimensions: the first distinguished embarrassment from all other emotion expressions; the second separated pain, sadness and anger from fear, surprise and disgust. Possible explanations for these findings were sought in patterns of facial action units, and in the messages conveyed by the expressions according to Fridlund's Behavioural Ecology View. © 2002 International Association for the Study of Pain. Published by Elsevier Science B.V. All rights reserved.

**Keywords:** Facial expression; Pain; Pain behaviour

### 1. Introduction

Investigation of facial expressions has a long tradition in emotion research. In the last 50 years, research in facial expression of emotion has followed two particular lines of investigation (Wagner, 1997): component studies, in which muscle actions constituting the expression are identified and quantified, usually by the facial action coding system (FACS: Ekman and Friesen, 1978), and judgement studies, which address the information conveyed by the global expression. The latter provide strong evidence of at least five discrete expressions of emotion (happiness, fear, anger, sadness and disgust) which are universally recognised, and to which many would add surprise and contempt (Ekman, 1992; Ekman and Friesen, 1986). However, the exact number of distinct emotional expressions is still undetermined. Keltner and colleagues, for example, initiated research concerning the self-conscious emotions and found evidence for the distinctiveness of the facial expres-

sion of embarrassment (Keltner and Buswell, 1996). In contrast to the categorical approaches to emotional prototypes some researchers describe dimensional models of emotion such as Russell (Carroll and Russell, 1996). However, studies by Young et al. (1997) support a categorical rather than a dimensional account of emotions.

Although many emotion theorists assume pain not to be an emotion and have only rarely included pain facial expressions, there are good reasons why the methodologies of these studies provide appropriate tools for investigation of the pain face and why the pain face should be considered in connection with established facial expressions of emotions. The emotional quality of pain is emphasised in the widely used definition of pain (International Association for the Study of Pain, 1979). Furthermore, viewed from an evolutionary perspective, facial expressions signal emotional experience (Prkachin, 1997). This is further supported by the 'Behavioural Ecology View' of faces proposed by Fridlund (1994, 1997), a complementary approach to facial expressions derived from modern accounts of the genetic and cultural evolution of signalling behaviour. The Behavioural Ecology View of faces constitutes a model in its view of how facial expressions evolved, what they signify and how they function in our everyday lives, in contrast with

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research emphasising the centrality of emotions in explaining facial movements. The latter may be described as 'Emotions View', in which facial movements are directly linked to emotions and facial expressions of emotions are reflex-like readouts of those emotions (Buck, 1994). Fridlund, on the contrary, regards facial expressions as social tools which are 'read' according to the context of the interaction in which they occur. As he assumes that faces exert their influence in the particular context of their occurrence, they may only be interpreted within this context. For instance, rather than describe a face as 'sad', Fridlund would say that this face signals the attempt to recruit help and care. Accordingly, a pain face would signal suffering and attempt to gain relief from pain and emotional suffering.

The facial expression of pain has been investigated not in the context of emotion, but as a class of 'pain behaviour' (Craig, 1980; Fordyce, 1976), other classes of which include verbal communication of pain, paralinguistic vocalisations, distinct movements or postures, and visible physiological changes (Craig, 1992; Craig and Prkachin, 1983; Craig et al., 2001). Facial expression is, socially, the most prominent of these (Craig et al., 2001; Prkachin et al., 1983; von Baeyer et al., 1984).

Component study methodology has identified specific facial movements associated with pain, including lowering the brow, narrowing the eyes by tightening the lids and raising the cheeks or even fully closing the eyes, raising the upper lip, deepening the nasolabial fold and wrinkling the nose as well as opening the lips and mouth in varying degrees. This is consistent across a range of experimental pain modalities (Craig and Patrick, 1985; Galin and Thorn, 1993; LeResche et al., 1992; Patrick et al., 1986; Prkachin, 1992), and across different clinical pain conditions (Craig et al., 1991; Hadjistavropoulos and Craig, 1994; LeResche, 1982; LeResche and Dworkin, 1988; Prkachin and Mercer, 1989).

Using the FACS, the expression of pain can be differentiated from the standard emotion expressions, with some of which it shares certain facial action units as displayed in Table 1 (Craig, 1992; LeResche, 1982). Judgements by observers show identification of pain expression to be well above chance level (Keltner and Buswell, 1996; LeResche and Dworkin, 1984); further, it can be distinguished from other emotions in photos (Boucher, 1969; Haidt and Keltner, 1999; Keltner and Buswell, 1996), and other emotions are seldom mistaken for pain when it is not a stimulus but provided as a response option (e.g. Carroll and Russell, 1996). However, the pain face has also found to be blended with other facial expressions of emotions such as disgust, contempt, anger, fear, and sadness (LeResche, 1982; LeResche and Dworkin, 1988). In a study by Hale and Hadjistavropoulos (1997) patients undergoing a routine blood test were videotaped. Not only facial expression of pain but also facial expressions of disgust, anger, fear, and happiness varied significantly across the conditions (baseline, swabbing, and venepuncture).

One focus of the study of pain expression has been observers' underestimation of pain by reference to the sufferer's evaluation. In a study by Prkachin et al. (1994), observers estimated the amount of pain experienced by patients with shoulder injuries, from the patients' faces seen on videotape: compared with patients' own ratings, facial actions coded with the FACS provided a sensitive measure of pain whereas observers' judgements systematically underestimated patients' pain by as much as 80%. While direct facial measurement provides a more sensitive measure of pain than observers' judgements, attempts to enhance observers' sensitivity to facial expression of pain by training (e.g. Galin and Thorn, 1993; Solomon et al., 1997) have been disappointing. Medical and paramedical professionals in particular appear to show an underestimation bias in the course of clinical work (Choiniere et al., 1990; Teske et al., 1983; Zalon, 1993), although accurate assessment of pain is a prerequisite for adequate treatment.

Facial expression of pain, therefore, has been established in terms of facial action units in relation to other emotions, but judgement studies of pain expression have focused on authenticity or estimation of pain, not (apart from in the embarrassment studies of Keltner and colleagues) the accuracy of distinguishing pain from other emotions. The present study addressed three questions concerning facial expression of pain and other negative emotions as perceived by health care professionals. Our main aim was to identify the dimensions on which pain expression resembled or differed from that of other negative emotions (fear, anger, sadness, surprise, disgust, embarrassment), using multidimensional scaling (MDS) of similarity–dissimilarity comparisons. Possible interpretations for similarities and differences drew on the Emotions View and Fridlund's Behavioural Ecology View. As possible misidentification of facial expressions by participants could distort the results of the similarity–dissimilarity comparisons, a judgement study was conducted to examine the question: to what extent each of the standard facial expressions could be identified correctly by participants. The results of this judgement study also addressed the third question of the extent to which underestimation of pain by health care professionals might be due to their not recognising pain faces, due to their confusing pain with other facial expressions of emotion and/or due to their being less confident in identifying pain, although it could not constitute a direct comparison of these mechanisms.

## 2. Method

### 2.1. Participants

Medical and nursing staff working for Accident and Emergency (ER) Departments in two London hospitals were asked to volunteer as participants, since they are exposed to pain faces daily. They were approached before,

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