

## Correspondence of emotional self-rating with facial expression

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### Abstract

Emotional processing abilities are difficult to measure psychometrically. Ultimately their quantification has to rely on 'subjective' judgment thereby leaving open the problem of response biases. Assessments of autonomic arousal similarly provide a mere unspecified measurement of a specific emotion. A standardized mood induction procedure capable of obtaining reliable happy and sad mood changes in healthy subjects was used to demonstrate the effectiveness of this procedure. We performed a two-part experiment using a rater-based analysis of facial expressions. This entailed analyzing the emotion portrayed in the faces. The faces of 24 healthy subjects were videotaped during the mood induction procedure of happiness and sadness, respectively. A group of 20 raters naive to the experimental task and conditions rated the facial expressions on six basic emotions. Results showed that ratings corresponded with the facial expressions, which were reflecting the mood of the task condition. Subjects' facial expressions together with self-ratings demonstrate the successful applicability of this standardized mood induction procedure for eliciting happy and sad mood. © 1999 Elsevier Science Ireland Ltd. All rights reserved.

*Keywords:* Emotion; Mood induction; Facial expression rating

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### 1. Introduction

The ability to experience, express and discriminate emotions is fundamental for living organisms. However, emotional processing abilities are

difficult to measure psychometrically compelling their quantification to rely on 'subjective' judgment. There exists a large number of possibilities for registering a subject's experienced affective state. Verbal descriptions of an emotion, rating scales, standardized checklists, and questionnaires are but a few possibilities. Because emotion research does not at present propose any preferential measuring technique, and mood experience is

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inherently a subjective event that depends on self-reports for its verification, self-ratings appear to be most feasible in assessing emotional experience despite susceptibility to demand characteristics and other response biases (Berkowitz and Troccoli, 1986).

There likewise exist a number of mood induction procedures, ranging from recall of personal events to presentation of emotional material. The Velten procedure (Velten, 1968), for example, which relies on self-referent emotional statements, is disadvantaged by its reduced applicability: 30–50% of the subjects fail to show the intended mood induction effect (Gerrards Hesse et al., 1994). Emotions can also be induced by the presentation of visual material, particularly pictures containing emotional content. Lang et al. (1988) introduced the International Affective Picture System which consists of colored slides of various kinds of emotional and neutral stimuli. This method of mood induction appears to have been evaluated most thoroughly with respect to its effectiveness; each slide has been rated on the dimensions of valence, arousal, and dominance by many raters of different cultural background. In addition, extensive data exist from studies with simultaneous measures of physiological and behavioral indices (Lang et al., 1990, 1993; Bradley et al., 1993). Film clips are often used to induce changes in mood and attempts are made to find a standardized set (Philippot, 1993; Gross and Levenson, 1995) capable of producing predictable emotions. However, film clips often elicit emotional blends and their social relevance is equivocal, e.g. individuals respond differentially to different films, especially across cultures. This material is often not comparable with respect to number of actors, brightness of visual stimuli, degree of verbal communication, music, loudness, etc. Confounding the issue is the difficulty film clips pose when applied in neuroimaging studies. Taken together, these problems may produce uncontrollable activations in various cerebral regions. Sokolowski (1992) summed up the problems and aims in experimental mood induction procedures as follows: first, the induced emotion should be of sufficient intensity and authenticity to subjects. Only then are studies on emotion able to investi-

gate consequences of emotions on interesting dependent variables, i.e. cognition and behavior. Second, subjects should be neither conscious of their mood changes nor of the purpose of the study so as to prevent them from controlling their behavior and cognitions or from developing certain expectations. In addition, guidelines in experimental research for methods, fulfillment of criteria for economics, repeatability, comparability, and ethics ought to be considered.

The lack of sufficiently reliable, valid, and comparable mood induction methods comprising controlled stimulus material led us to develop our mood induction procedure. This procedure included ecologically valid and socially relevant emotional stimuli, which are controlled, comparable (Schneider et al., 1994a), and simultaneously applicable in neuroimaging. Straight angle monochromatic photographs of happy and sad facial expressions varying in intensity made up the stimuli (for details, see Erwin et al., 1992). This method demonstrated small intraindividual variability and high retest reliability. In general, making subjective ratings more objective requires the inclusion of a number of criteria. Evidence for the validity and objectivity of this standardized mood induction procedure comes from its already successful employment in several neuroimaging studies. Characteristic valence-specific regional cerebral and autonomic effects have been demonstrated measuring regional brain activity with a  $^{133}\text{Xenon}$  clearance method,  $\text{H}_2\text{O}^{15}$  Positron Emission Tomography (PET), and functional Magnetic Resonance Imaging (fMRI; Schneider et al., 1994b, 1995a, 1997, 1998). Its successful employment has also been demonstrated in schizophrenic patients (Schneider et al., 1995b, 1998).

The aim of this study was to help in validating our standardized mood induction procedure. We set out to demonstrate the effectiveness of mood induction at a behavioral level taking into account its already established success at a subjective and autonomic level. Mood changes should, with this procedure, become visible in facial expressions of subjects and for raters (judging the facial expressions) who are naive to the task and

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