



Components of Emotional Meaning: A sourcebook

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CHAPTER

10 The “mirror of the soul”: The Expression component

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Abstract

Emotions are often recognized on the basis of typical expression patterns. We operationalized this component by features representing mostly facial and vocal expression. The separate analysis of these features yielded three facial factors (FROWN VS SMILE, JAW DROP/EYEBROWS UP, and EYES CLOSED/TEARS), and two vocal factors (VOCAL ENERGY and FIRM VS PERTURBED SPEECH). The reflection of these factors in the four overall dimensions of the emotion domain confirms the suggestion from earlier research that facial expression is best suited for communicating emotional valence whereas vocal expression is better able to convey the affective dimensions of arousal and of power. Entering the combination of the three facial and two vocal factors into a multiple discriminant analysis yields a respectable rate of 57% classification accuracy

Keywords: [facial expression](#), [vocal expression](#), [gestures](#)

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One finds abundant quotes in the literature that describe the bodily expression of emotion as the “mirror of” or “a window to” the heart or the soul, implying that they reveal the innermost feelings of a person to the public at large. In the affective sciences, the Expression component of emotion has always been considered part and parcel of the emotion episode package, probably largely due to the (sometimes) dramatic nature of the display, the ease of observation, and finally the important value as a social signal of reaction and action intention. Historically, expression, starting with Darwin’s (1872) pioneering volume “The expression of the emotions in man and animals,” has been the origin of a revival of the interest in the behavioral analysis of the emotions and has greatly influenced the work of discrete emotion psychologists (Tomkins, 1962; Ekman, 1972, 1992; Izard, 1971, 1994) who have been instrumental in establishing the “basic emotions” tradition, which is largely based on the assumption that a small number of fundamental, evolutionary old emotions have unique prototypical facial expressions.

In consequence, there now exists a huge amount of literature on facial expression. Much of it is concerned with the recognition of posed expressions for basic emotions, which is not a very good test of the unique prototype hypothesis, as recognition can be achieved on the basis of only a partial aspect of a configuration (*pars pro toto*-principle). So far, one finds only very few studies in which the *production* of facial expressions in emotion episodes is systematically studied (see Scherer, Clark-Polner, & Mortillaro, 2011, for a comprehensive review). In consequence, while the assumption of marked differences in facial expression patterns for different emotions is highly plausible, strong empirical evidence remains to be established. The same is true for vocal expressions, which have been studied much more rarely.

If different emotions were indeed to have unique expression signatures, the internal representation of these features are likely to form a part of the semantic meaning of emotion words. To investigate this possibility it is important, in the context of the GRID study, to examine the extent to which expression features in different modalities, especially the face and the voice, differentiate emotion terms.

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Facial expression. The problem we faced in constructing the facial expression component part of the instrument is that there is no established vocabulary for emotion specific facial expressions other than “to make an angry, sad, happy, etc. face” which is not very useful for our purposes. There is a widely accepted scientific classification of expressive facial movements, the Facial Action Coding System (FACS, Ekman & Friesen, 1978) which proposes more than 40 so called *action units* which consist of groups of muscle contractions. This complex system requires expert training and is clearly not appropriate for our purpose. We thus had to resort to identifying the most frequently used descriptions of facial movement in everyday language that are relevant to emotional expressions (many of which have also been used by Ekman and his collaborators to refer to the action units designated by numbers or anatomic muscle descriptions; see Ekman & Friesen, 1978). Below is the list of features we chose to cover the facial part of the Expression component (with brief illustrations of the major muscles involved in the movements referred to by the popular description):

- smiled (m. zygomaticus)
- felt his/her jaw drop (m. masseter)
- pressed his/her lips together (m. orbicularis oris)
- felt his/her eyebrows go up (m. frontalis)
- frowned (m. corrugator)
- closed his/her eyes (m. orbicularis oculi)
- opened his/her eyes widely (m. levator palpebrae superioris)
- had tears in his/her eyes
- did not show any changes in his/her facial expression

We chose those movements that were frequently shown by actors enacting different emotions in expression portrayals (Scherer & Ellgring, 2007a) and the verbal descriptions of which are frequently used in everyday contexts. We consider these partial movements of the face as building blocks, which may not be unique for certain emotions, but can occur as building blocks in different configurations for different emotions.

Vocal expression. Even though Darwin (1872) also mentioned the great importance of the vocal expression of emotion, often highlighted in classic treatises of rhetorics, there is—compared to facial expression—a dearth of empirical study (see Scherer et al., 2011, for a detailed review). Here the situation for the choice of verbally descriptive features is even more complicated, as vocalizing and speaking are continuous phenomena, which, contrary to a facial expression, cannot be identified as a static configuration (and shown in a photo).

Furthermore, the scientific description of the emotional modulations of the voice have mostly used acoustic variables such as fundamental frequency, harmonics, formants, and energy distribution in the spectrum (see Juslin & Scherer, 2005) that are not accessible to lay raters. However, there have been some efforts to develop rating systems for voice quality and vocal expression using verbal descriptions from natural languages such as high-pitched, rough, or breathy (see Gobl & Chasaide, 2003; Laver, 1980). While many of these voice descriptors are also quite technical and require training, there are some that seem, more or less, in popular use and thus ideally suited for our purposes. We chose the following set of features that comes closest to the acoustic variations generally found for vocal emotion expressions (Scherer, Johnstone, & Klasmeyer, 2003), indicating the major acoustic-phonetic dimension involved.

Intensity/energy:

- spoke louder
- spoke softer.

Phonation regularity:

- had a trembling voice
- had an assertive voice.

p. 158 *Vocalization length:*

- fell silent
- produced a short utterance
- produced a long utterance.

Intonation:

- changed the melody of his/her speech.

Motor disturbance:

- had speech disturbances.

Tempo/speech rate:

- spoke faster
- spoke slower.

None:

- did not show any changes in his/her vocal expression.

Gesture, posture, and body movement. Gestural expression of emotion, also a favorite topic of ancient treatises on rhetoric, has been studied even less frequently. In particular, attempts to create descriptive coding systems have not yet converged on an easily applicable set of descriptive categories (but see Dael, Mortillaro, & Scherer, 2012; Wallbott, 1998). We have therefore refrained from attempting to propose features for hand and arm gestures but have included a number of features that are frequently referred to in connection to emotional expressions in posture or body *movements*. These were not meant to describe actual purposeful behavior, such as aggression, but rather reflecting action tendencies as expressed in posture or body movements such as

leaning forward or backward (all implying a strong motivational component). In addition, we included one item on the quality of movement—abruptness. The chosen features are:

- moved toward people or things
- withdrew from people or things
- moved against people or things
- made abrupt body movements
- did not show any changes in gesture or movements

Emotion regulation. In addition to asking about the nature of the expressive behaviors that are considered to be characteristic for the emotional states designated by the 24 words studied here, we also included four features to cover typical patterns of emotion regulation, especially expression regulation, for the different emotions. The following items were used to assess these features:

How likely is it that the person

- tried to control the intensity of the emotional feeling
- showed a stronger degree of emotion than he/she actually felt
- showed a weaker degree of emotion than he/she actually felt
- hid the emotion from others by smiling

We decided to analyse facial, vocal, and body movement expression ratings separately and to then compare their respective contribution to emotion term differentiation. Below we first examine the internal factorial structure of these three feature domains and their mapping into the overall structure. We will then compare the relative contribution of these factor sets on the discrimination of the 24 emotion words, followed by a brief discussion of the role of emotion regulation.

10.1 Results and discussion

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The internal structure of the Expression component

Facial expression. The scree plot (see Figure SM 1)² resulting from the factor analysis of the facial expression features across all emotion words and all samples pointed to two or three main factors. As the investigation of stability of the factor structure across four language groups confirmed the presence of three stable factors (see Table SM 1), we chose this solution. The three factors account for 74.6% of the overall variance. The VARIMAX rotated three-factorial solution is shown in Table 10.1.

Table 10.1 Loadings of the facial expression features in a three-factorial VARIMAX rotated structure

Facial expression features	FROWN VS SMILE	JAW DROP/EYEBROWS UP	EYES CLOSED/TEARS
frowned	0.93	−0.07	−0.13
pressed lips together	0.92	−0.16	0.03
smiled	−0.93	0.08	−0.21
had the jaw drop	−0.14	0.76	−0.09
opened her or his eyes widely	−0.27	0.74	−0.41
had eyebrows go up	−0.17	0.64	−0.58
did not show any changes in face	−0.12	−0.63	−0.42
closed her or his eyes	−0.02	−0.18	0.76
showed tears	0.02	0.02	0.82

Factor 1 is constituted by items generally representative of a positive (smiling; signaling agreement or social approach tendency) vs negative (frown, indicating incomprehension and disagreement, or lip pressing, showing aggression tendencies) facial reaction syndrome. Factor 2 is made up by items related to unexpected stimulation (jaw drop) often followed by information search (opening eyes widely and eyebrow rise), as suggested by Darwin (1872). Factor 3 clearly reflects withdrawal into oneself (closing eyes) and weeping (tears). We will refer to these three factors as FROWN VS SMILE, JAW DROP/EYEBROWS UP, and EYES CLOSED/TEARS; high values indicate a higher proportion of the respective expression. It should be noted that there are fairly high negative cross-loadings on the third factor for “eyes wide” and particularly “eyebrows up” which is due to the fact that these facial actions are not compatible with “closing eyes.”

The mean facial expression factor scores for the 24 emotion terms (listed in Table SM 3) are plotted in Figure 10.1 and Figure 10.2. These graphs allow examining the relative position of the 24 emotions in the three-dimensional space formed by the facial expression factors. As one would expect, Figure 10.1 shows a clear separation between positive emotion terms characterized by smiling, and negative emotion terms characterized by the absence of smiles and a tendency toward frowning. Within each of these valenced clusters there is a spread on JAW DROP/EYEBROWS UP dimension with respect to the likelihood that the respective emotion has been elicited by new and possibly unexpected events. Thus, the terms joy and happiness seem to be used more frequently in the case of somewhat unexpected good news, whereas contentment is a reaction to an expected or enduring state of affairs. A similar distinction can be made on the negative side, with fear, anger, disappointment and jealousy being elicited generally by new and possibly unexpected events whereas sadness, guilt, shame, and contempt seem to consist of enduring reactions to events that have happened some time ago or were at least, in part, predictable. As expected, surprise (which has a neutral position on the valence dimension) occupies an extreme position on the dimension related to new information to be processed. Figure 10.2 again shows the clear separation of positive and negative emotion terms with the large spread of the negative emotions on the EYES CLOSED/TEARS dimension being attributable to a control factor—more withdrawal and tears in the case of events that are difficult to control, particularly in the case of sadness, despair, fear, and being hurt, as compared to contempt, hate, anger, and irritation where an individual usually feels at least some power over the source of the negative event.

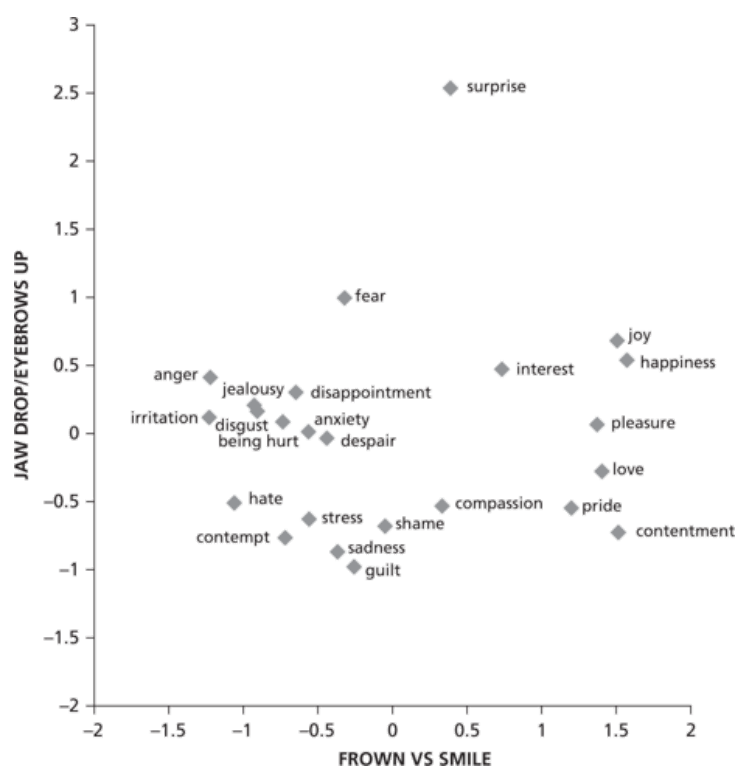


Figure 10.1 Plot of the average factor scores for the 24 emotion words on FROWN VS SMILE and JAW DROP/EYEBROWS UP.

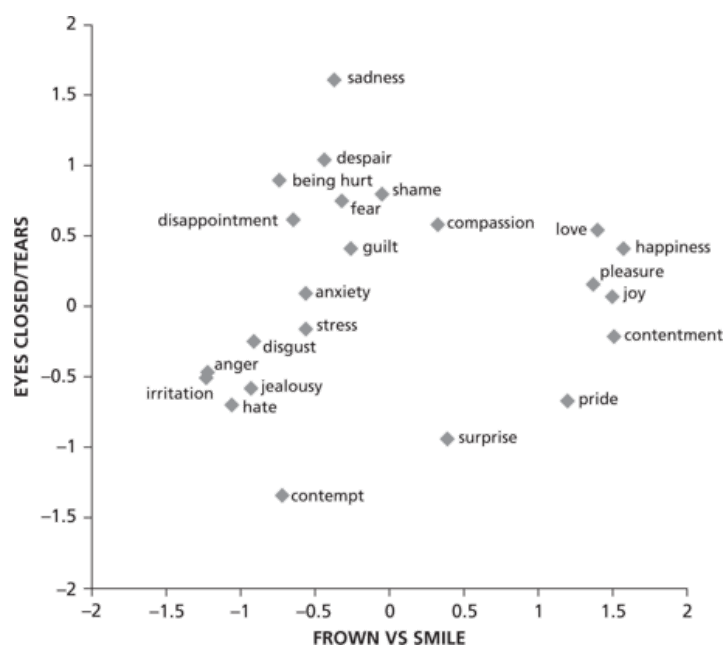


Figure 10.2 Plot of the average factor scores for the 24 emotion words on FROWN VS SMILE and EYES CLOSED/TEARS.

Vocal expression. We now turn to the factorial structure of the vocal expression. The scree plot (see Figure SM 2) pointed to two main factors and the investigation of stability of the factor structure across four language groups also showed two stable factors (see Table SM 2). The rotated factor structure for this solution is shown in Table 10.2. The two factors account for 65.4% of the total variance. Factor 1 contrasts a comparatively loud voice (spoke louder) and fast speech ↵

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(spoke faster) with soft voice (spoke more softly) and slow speech (spoke slower), as well as “fell silent.” This factor is best characterized by an underlying factor of energy or dynamism in voice and speech, varying between low (soft and slow speech) and high (loud and fast speech). Factor 2 is mostly determined by “trembling voice” and “speech disturbances,” indicating a high degree of phonation and articulation irregularity. The item “had an assertive voice” loads in the opposite direction on this factor, suggesting an underlying quality of regularity of phonation, which gives the impression of a firm, smooth voice as compared to trembling or stuttering voice and speech. In consequence, we will refer to these two factors as VOCAL ENERGY and FIRM VS PERTURBED SPEECH.

Table 10.2 Loadings of the vocal expression features in a two-factorial VARIMAX rotated structure

Vocal expression features	VOCAL ENERGY	FIRM VS PERTURBED SPEECH
spoke faster	0.89	-0.17
increased the volume of voice	0.86	-0.29
changed the melody of her or his speech	0.46	0.01
fell silent	-0.74	0.52
decreased the volume of voice	-0.85	0.20
spoke slower	-0.87	0.06
produced speech disturbances	-0.06	0.88
had a trembling voice	0.18	0.86
produced a short utterance	0.26	0.35
did not show any changes in vocal expression	0.50	-0.65
produced a long utterance	-0.42	-0.65
had an assertive voice	-0.43	-0.69

The mean vocal expression factor scores for the 24 emotion terms (listed in Table SM 4) are plotted in Figure 10.3. The figure shows the positive emotions in a cluster that is characterized by a firm voice and medium vocal energy. The negative emotions, clustered together in the upper half of the graph (marked by a tendency toward more speech perturbation), are horizontally aligned on the VOCAL ENERGY dimension in the sense of more or less control and power, being characterized by higher or lower vocal energy, respectively. Presumably, fear has higher vocal energy than sadness because while power is low, there is some control (e.g., the possibility to flee). In contrast, in sadness there is little control or power.

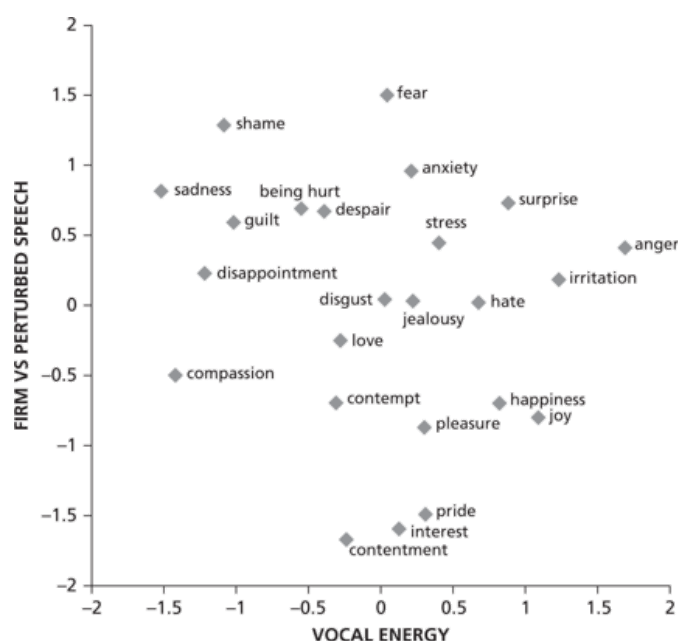


Figure 10.3 Plot of the average factor scores for the 24 emotion words on VOCAL ENERGY and FIRM VS PERTURBED SPEECH.

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Body movement. As we could not find commonly understood gesture descriptors likely to be applicable to the emotion concepts studied here and as bodily movement is represented by only four items, the analysis of the internal structure for the domain is of more limited interest in this case (with respect to variable reduction) than in the case of vocal and facial expression. A PCA points to two factors accounting for 72.5% of the variance (see Table SM 5). The first factor reflects the classic approach vs avoidance dimension and is labeled MOVING TOWARD VS WITHDRAWING. The second factor consists of a juxtaposition of no movement vs abrupt movement and is labeled NO VS ABRUPT MOVEMENT. The item “antagonistic movement against people or things” has cross-loadings on both factors. Moving toward is characteristic for compassion and all positive emotions (except pride), whereas withdrawing is particularly pronounced for sadness, shame, guilt, disappointment, and being hurt. While the low arousal emotions like compassion or sadness imply very little movement, abrupt movement is frequent for anger, irritation, hate, contempt, and jealousy. As the body movement category is only sparsely represented, and as the features included are rather similar to some of the features for the Action tendency component, we decided to use only the facial and vocal features of the Expression component in further analyses reported in the present and future chapters.

Mapping the Expression component factors onto the overall structure

To further explore the relationships between the overall factorial structure and the internal structure of the facial and vocal expression domains, we have regressed the respective factors on the four overall factors (after omitting all expression features).

Facial expression. Table 10.3 shows the standardized regression weights and R^2 of the facial expression factors regressed on the four overall factors. The values for R^2 show that VALENCE is exclusively predicted—as suggested by Figure 10.1 above—by the FROWN VS SMILE distinction. The R^2 of 0.95 for this prediction is extremely high, suggesting that observing frowning vs smiling faces is in itself sufficient to estimate the degree of valence of an emotion. In the commentary on Figure 10.2, it was suggested that the EYES CLOSED/TEARS dimension is strongly linked to low power. This suggestion is supported by the fairly good prediction of the overall POWER factor by this facial expression dimension. Finally, the overall NOVELTY dimension is predicted by high JAW DROP/EYEBROWS UP values. The R^2 for this dimension is relatively low,

probably because we have only one emotion word, surprise that carries much of the effect. The arousal dimension is not predicted by facial expression factors.

Table 10.3 Standardized regression weights and R^2 of the facial expression factors regressed on the four overall factors

Overall factors	β FROWN VS SMILE	β JAW DROP/EYEBROWS UP	β EYES CLOSED/TEARS	R^2
VALENCE	0.95***	0.07***	-0.05***	0.90
POWER	-0.06*	0.13***	-0.64***	0.44
AROUSAL	-0.08*	0.38***	-0.02	0.15
NOVELTY	0.06	0.55***	0.02	0.31

Note: * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. The expression features were removed from the four overall factors.

Vocal expression. The equivalent predictions for vocal expression are shown in Table 10.4. The strongest R^2 is found for the prediction of the overall POWER factor by a high degree of VOCAL ENERGY and absence of PERTURBED SPEECH (see comments on Figure 10.3). The overall AROUSAL factor is also well predicted, although with a somewhat lower R^2 , mostly due to high VOCAL ENERGY and strongly PERTURBED SPEECH. Finally, there is a somewhat weaker link between FIRM VS PERTURBED SPEECH and the overall VALENCE factor, with firm voice being characteristic of positive emotions (see comments on Figure 10.3). NOVELTY is not related to the vocal expression factors.

Table 10.4 Standardized regression weights and R^2 of the vocal expression factors regressed on the four overall factors

Overall factors	β VOCAL ENERGY	β FIRM VS PERTURBED SPEECH	R^2
VALENCE	0.07*	-0.59***	0.35
POWER	0.65***	-0.47***	0.64
AROUSAL	0.52***	0.41***	0.44
NOVELTY	0.23***	0.19***	0.09

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The expression features were removed from the four overall factors.

p. 164 These results confirm the conclusion reached by researchers in the area of facial and vocal expression analysis, based on the findings in recognition studies, that facial expression is best suited for communicating emotional valence (for which there does not seem to be many valid cues in vocal expression). Conversely, vocal expression is much better able to convey the affective dimensions of arousal and of power (which are less well signaled by the face; see Bänziger, Grandjean, & Scherer, 2009; Scherer et al., 2011).

Emotion category differentiation based on the Expression component

We now examine, separately for facial and vocal expression, to what extent the respective internal factors allow the discrimination of the 24 emotions, that is, classify them correctly on the basis of the factor scores, in comparison to classification success based on the features for the respective expression modality.

Facial expression. In the case of facial expression (see Table 10.5), the results of the MDA based on factor scores shows that 44.5% of cross-validated grouped cases were correctly classified. In contrast, for the MDA, based on all nine facial features, 62.7% of cross-validated grouped cases were correctly classified. Classification success clearly exceeds chance level ($1/24$; 4.2%) and although accuracy is rather higher for the complete facial feature set, the three internal factors do reasonably well. Table 10.5 also shows the most frequent confusions in the feature-based classification. Except for one case, all confusions occur within emotion families.

Table 10.5 Classification accuracy (in percent) for the 24 emotion words in discriminant analyses based on the facial expression factors and the facial expression features

Emotion words	Classification based on facial expression <i>factors</i>	Classification based on facial expression <i>features</i>	
	Accuracy	Accuracy	Confusion > 15% with
being hurt	50.0	47.1	despair
sadness	79.4	82.4	
shame	20.6	67.6	
guilt	52.9	76.5	
compassion	35.3	47.1	pride
disappointment	35.3	70.6	
love	58.8	73.5	
contentment	41.2	47.1	pleasure
happiness	35.3	41.2	joy
pride	55.9	73.5	
pleasure	20.6	58.8	
joy	52.9	50.0	happiness
interest	88.2	91.2	
surprise	97.1	94.1	
despair	17.6	35.3	disappointment, being hurt
stress	32.4	50.0	
anxiety	17.6	35.3	
fear	76.5	94.1	
jealousy	23.5	55.9	
hate	44.1	55.9	irritation
irritation	20.6	50.0	anger
anger	44.1	61.8	
disgust	17.6	85.3	
contempt	50.0	61.8	
Total	44.5	62.7	

Vocal expression. Table 10.6 reports the MDA data for vocal expression. Results show that for the MDA based on factor scores, 33.1% of cross-validated grouped cases were correctly classified. For the analysis based on the 12 vocal features 53.2% of cross-validated grouped cases were correctly classified. Again, classification success

is better than chance although accuracy is somewhat lower than for facial expression. The last column in Table 10.6 also shows the major confusions, most of which again occur within emotion families.

Table 10.6 Classification accuracy (in percent) for the 24 emotion words in discriminant analyses based on the vocal expression factors and the vocal expression features

Emotion words	Classification based on vocal expression <i>factors</i>	Classification based on vocal expression <i>features</i>	
	Accuracy	Accuracy	Confusion > 15% with
being hurt	14.7	47.1	despair
sadness	41.2	70.6	
shame	52.9	82.4	
guilt	29.4	70.6	
compassion	52.9	76.5	
disappointment	47.1	64.7	being hurt
love	20.6	82.4	
contentment	47.1	44.1	
happiness	14.7	32.4	joy
pride	41.2	64.7	
pleasure	23.5	35.3	happiness
joy	44.1	32.4	happiness, interest
interest	26.5	47.1	contentment
surprise	55.9	67.6	
despair	5.9	29.4	being hurt, disappointment
stress	14.7	55.9	
anxiety	20.6	50.0	stress
fear	70.6	52.9	anxiety
jealousy	23.5	38.2	
hate	32.4	50.0	anger
irritation	17.6	23.5	anger
anger	61.8	64.7	irritation
disgust	5.9	50.0	
contempt	29.4	44.1	
Total	33.1	53.2	

Integration of facial and vocal expression. Having discussed the discrimination and automatic classification of the 24 emotions via MDA separately for facial and vocal expression, we now turn to an integrative assessment of the Expression component. The results of an MDA for the total of five expression factors (facial plus vocal) reveals that the five discriminant functions, explaining 60.3, 22.2, 10.3, 5.3, and 2.0% of the variance, respectively, show correlations with more than one expression factor, making it difficult to label these functions. The only exception is the first discrimination function, which exclusively reflects the facial FROWN vs SMILE factor, which is entered first into the equation and explains most of the variance (60.3%). The classification accuracy for the MDA based on the five factor scores is shown in column 1 of Table 10.7 —57.0% of cross-validated grouped cases were correctly classified. Column 2 of Table 10.7 shows the results of the MDA based on all individual expression features (excluding body movement) and the confusions of which there are only very few in this case (occurring only with very close emotion family members). Here, 73.0% of cross-validated grouped cases were correctly classified. This constitutes a rather impressive hit rate for a single emotion component (expression).

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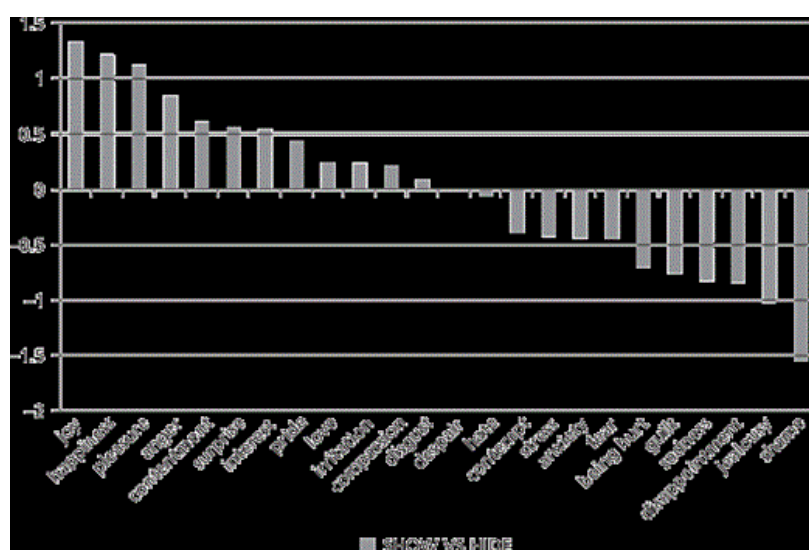
Table 10.7 Classification accuracy (in percent) for the 24 emotion words in discriminant analyses based on both facial and vocal expression factors and both facial and vocal expression features

Emotion words	Classification based on facial and vocal expression <i>factors</i>	Classification based on facial and vocal expression <i>features</i>	
	Accuracy	Accuracy	Confusion > 15% with
being hurt	55.9	64.7	despair
sadness	82.4	79.4	
shame	61.8	82.4	
guilt	67.6	85.3	
compassion	55.9	76.5	
disappointment	70.6	82.4	
love	85.3	91.2	
contentment	52.9	61.8	
happiness	38.2	41.2	joy
pride	58.8	88.2	
pleasure	29.4	67.6	
joy	58.8	50.0	happiness
interest	88.2	91.2	
surprise	100	100	
despair	26.5	41.2	disappointment
stress	64.7	73.5	anxiety
anxiety	47.1	58.8	stress
fear	79.4	88.2	
jealousy	29.4	79.4	
hate	50.0	64.7	
irritation	17.6	47.1	anger
anger	55.9	52.9	irritation
disgust	32.4	82.4	
contempt	58.8	67.6	
Total	57.0	71.6	

Overall, our results show that facial expression features seem to carry somewhat more discriminative cues (yielding 62.7% accuracy) than vocal features (53.2%). When all expression features from all modalities are used in the MDA, a very respectable rate of 73% accuracy is reached. While the classification based on all expression features reaches the highest accuracy rate, as is to be expected, the combination of the three facial and two vocal factors is doing comparatively very well with 57% accuracy. We started this chapter by highlighting the emphasis placed on emotional expression as a faithful mirror of internal feelings. The current data confirm the important role that is generally assigned to the Expression component with respect to differentiating emotional states.

The regulation of emotional expression

In constructing the feature profile for the GRID study, we had decided to include a number of items related to the regulation of emotion and in particular the strategic control of expression. Given the importance of emotion regulation, particularly with respect to its function in interpersonal interaction, there has been a tendency in the literature to consider regulation as an emotion component in its own right. However, if the emotion episode is considered as a dynamic unfolding of changes in different organismic systems driven by appraisal (as in the CPM model described in Chapter 1), regulatory processes, from homeostatic and unconscious to strategic or intentional, are ubiquitous and become part and parcel of the complex recursive processes that constitute the emotion. As much of regulation concerns its manifestation in observable expression, we discuss the data pertaining to the four regulation items listed at the beginning of the chapter as part of the Expression component. A factor analysis of the regulation items across all emotion words and all samples, yields a single factor accounting for 53.6% of the overall variance. The factor loadings, shown in Table SM 7, can be easily interpreted in the sense of a continuum from up-regulation, in the sense of showing more expression than warranted by the feeling, to down-regulation in the sense of hiding the expression (e.g., using a poker face), masking an incipient expression by a smile, or even down-regulating the felt emotion altogether to avoid or decrease expression tendencies. This factor will be referred to as show vs hide. Figure 10.4 shows the sorted estimated marginal means for the emotions (listed in Table SM 8). While joy, happiness, pleasure, and also anger are rarely masked (and there may be even a tendency to express these emotions more strongly than they are felt), being hurt, guilt, sadness, disappointment, jealousy, and particularly shame are strongly censored and often hidden or masked.



It should be noted that the ratings of the type and degree of up- or down-regulation of different emotions by the participants in this study, have to be taken as estimates of modal tendencies to regulate certain emotions. Given the sensitivity of regulation to situational factors that may impose display rules for certain emotions or strategic concerns of individuals in particular interaction situations, there is likely to be an enormous amount of variance in the amount of regulation exercised in a particular emotion episode. Yet, the data reported here are highly consistent with other data sets in the literature in which differences in regulation attempts for different emotions have been reported (Matsumoto, 1990; Scherer & Wallbott, 1994). However, it is difficult to maintain that such differences in modal tendencies to regulate different emotions are actually part of the *constitutive* meaning of an emotion term. Rather, the ratings of our participants might reflect everyday knowledge about such modal tendencies and thus represent ecological correlations. Moreover, as the regulation tendency has only been operationalized by a few items, it was decided to not include the emotion regulation features and factor in further analyses in this book.

10.2 Conclusions

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Overall, these results show that, as expected, the GRID paradigm is useful to extract the mental representation people have about emotional expression, representations that form the basis of emotional communication. Given the difficulty of specifying facial and vocal expressions with words alone, the results for the Expression component are rather remarkable. The factorial structure extracted from the data is very clear and appropriate, and, together with the regressions on the overall factors, confirms the differential capacities of the two modalities suggested in the literature—facial expression being better suited to differentiate emotions on the VALENCE and NOVELTY dimensions and voice being more discriminative on the POWER and AROUSAL dimensions. Given these complementary capacities, it is not surprising that emotional expressions can be best recognized in multimodal presentation (Bänziger et al., 2009). What is more surprising is how clearly this important specialization is reflected in the semantics of the emotion words via their position in four-dimensional space. We have also been surprised by the remarkable power of the combined set of facial and vocal expression features to successfully discriminate the set of 24 emotion categories, even at the level of the factor scores.

Notes

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- 2 All supplementary materials (SM) are available at the GRID website: <http://www.affective-sciences.org/GRID>. See Appendix 1 (“Availability”) for further details.