



Components of Emotional Meaning: A sourcebook

Johnny J. R. Fontaine (ed.) et al.

<https://doi.org/10.1093/acprof:oso/9780199592746.001.0001>

Published: 15 August 2013

Online ISBN: 9780191762765

Print ISBN: 9780199592746

Search in this book

CHAPTER

13 The meaning structure of emotion terms: Integration across components

Klaus R. Scherer, Johnny J. R. Fontaine

<https://doi.org/10.1093/acprof:oso/9780199592746.003.0014> Pages 210–230

Published: August 2013

Abstract

This chapter compares the role of the different components in predicting the overall dimensions. The contribution of the appraisal factors seems to be mediated by the reaction component factors. A stepwise discriminant analysis, introducing the component factors in the theoretically expected order, supports the proposed primacy of appraisal as a differentiating component. The major conclusions from the main data set are: (1) the semantic profiles of major emotion words are shared in a stable fashion within and across different cultures; (2) four factors are needed to span the emotional space; (3) unique dimensional structures for each component, adapted to its specific function in the emotion episode, are identified; (4) the emotion component factors differentially contribute to the overall dimensions without duplicating the overall structure; (5) a combination of only the ten best predictors drawn from several components allows to differentiate the categories with approx. 70% accuracy in a multiple discriminant analysis.

Keywords: [component integration](#), [role of specific components](#), [conclusions](#)

Subject: [Developmental Psychology](#), [Social Psychology](#)

Collection: [Oxford Scholarship Online](#)

Now that we have reported the empirical results for each of the major components of emotion (viz. Appraisal, Action tendencies, Bodily reactions, motor Expression, and Feeling), we will briefly summarize the main results and attempt to integrate findings across the different emotion components. As we used a standard sequential organization of the analyses in each of the preceding chapters, we will maintain this sequence here. First, comparing the internal structure of the different emotion components (reviewing the underlying dimensionality of the component features and discussing the way in which each local structure helps to describe the specificity of the emotion words). Second, using regression to map the local structures into the overall structure of four major, cross-culturally stable factors (VALENCE, POWER, AROUSAL, and NOVELTY). Third, using Multiple Discriminant Analyses (MDA) to evaluate the capacity of the GRID features (and the emotion component factors) to correctly classify the 24 emotion words under study.

Before embarking on this enterprise, a few general comments are in order:

- 1 As outlined in Parts I and II of this book, the GRID study has a rather explicit theoretical background—both the GRID paradigm and the GRID instrument have been based on a specific type of componential emotion theory, the Componential Process Model of emotion (CPM; see Chapter 1 and Scherer, 1984a, b, 2001, 2009c). The CPM is a process model of emotion elicitation and differentiation. The reason why its architecture is germane to addressing issues concerning the meaning of emotion words, is that its architecture invites this type of generalization (see Chapter 1 for details). It is thus unavoidable that, in what follows, we will in several places draw conclusions about the fit between the data reported and theoretical assumptions made by the model. Generally, we claim that the data are compatible with the CPM, that there is *indirect* support for the model or that the *plausibility* of the model is strengthened by particular patterns of results. We want to make it perfectly clear that we do not make any claims concerning causal inferences implied by the CPM model from the data reported here. We have reported a large set of data on reliable judgments of semantic features of emotion terms in many different languages and these data can be interpreted in an inferential sense with respect to what members of a linguistic community believe about the semantic content of emotion terms. Any links to issues of diachronic language development, for example, the lexical sedimentation hypothesis or the degree to which semantic structure and content mirror structures and processes within the phenomenon under study, in this case emotion, remain obviously highly conjectural. The data reported here cannot provide empirical evidence for actual emotion processes and cannot be used for causal inference. However, we believe that such conjectures are useful for the interpretation of data patterns and for the development of more sophisticated hypotheses for future research.
- 2 As explained in more detail in Chapter 5, the analysis techniques used in this volume are for the most part intended to serve descriptive and exploratory purposes. Given that we entered fairly uncharted terrain, requiring highly interdisciplinary approaches, we felt it would be useful to first provide an inventory, to survey the lay of the land, before using the more sophisticated tools available in the statistical tool box (e.g., multilevel analysis, nonlinear techniques, etc.) to test specific hypotheses. For example, we restrict our analysis and discussion of the results largely on main effects of individual features and factors, rather than including the myriad of possible interactions.
- 3 We see this book as the beginning rather than the end of the exploitation of an extremely rich data set. It is precisely the hunches and conjectures presented here that are to serve an incentive to other researchers, as well as to ourselves, to develop more detailed and focused hypotheses that can be tested with the current GRID data set or new data to be collected with the instrument.
- 4 As described at the outset (see Chapter 5, the multicomponent GRID paradigm has been designed to integrate diverse approaches to the study of emotion from many different disciplines. Thus, wherever possible we advocate using this tool as a *tertium comparationis*, a sort of litmus test that can help to impartially discuss the relative merits of differential assumptions about the mechanisms and processes underlying emotion labeling.

13.1 Comparing emotion component structures

How similar are the emotion component factor structures described in Chapters 8 to 12 and what are their respective contributions to the overall structure as reported in Chapter 7? Theoretically, one might expect two diametrically opposite possibilities: 1) the local structures prefigure the overall structure (*duplication model*), or 2) each emotion component structure is unique, depending on its specificity, that is, the function it serves to facilitate adaptive responses or the nature of the organismic subsystem it is based on, and thus providing an independent input to the overall structure (*additive contribution model*). We will show that the answer lies somewhere in the middle between these extreme models. Whereas we have covered the individual components in a didactic order in the preceding chapter, proceeding from the more established (Feeling, Bodily reaction, Expression) to the more recently highlighted emotion components (Action tendencies, Appraisal), we will now reverse the order, following the theoretically proposed causal sequence as described in Figure 1.1 of Chapter 1.

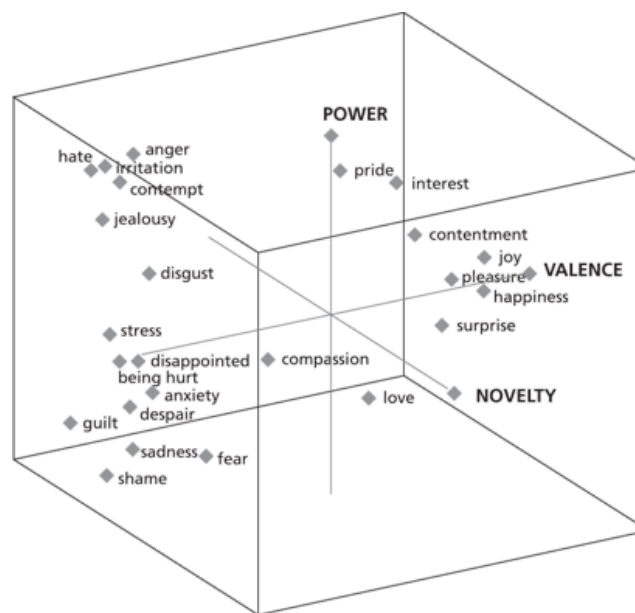


Figure 13.1 Plot of the average factor scores for the 24 emotion words on VALENCE, POWER, and NOVELTY.

Appraisal component. According to appraisal theories, and the CPM in particular, the appraisal process initially triggers the emotion episode and continually drives the changes in the other components in a recursive process (see Chapter 1, for further detail). Thus one might expect the internal structure of these components to correspond to a duplication model. This is partially true at a first level of analysis as a factor analysis of the appraisal features yielded two factors that are very similar to the first and the last factor of the overall structure: GENERAL VALENCE APPRAISAL and NOVELTY APPRAISAL. However, as the detailed analysis in Chapter 12 showed, the VALENCE factor in this analysis is a powerful superfactor that needs to be decomposed to show the underlying structure of the appraisal feature domain. This is consistent with the assumption (described in Chapter 1; see Table 1.1 in the chapter) that almost all of the appraisal criteria are valenced, with different types of VALENCE corresponding to the nature of the appraisal checks. Another, statistical, reason for this initial structure is that most appraisal criteria were operationalized by a single feature. A hierarchical analysis, partialling out the VALENCE superfactor and resubmitting the residual appraisal features to a subsequent factor analysis, revealed that the underlying appraisal structure can be best represented by seven factors, including the VALENCE APPRAISAL factor, to represent the 13 theoretically postulated appraisal criteria shown in Table 12.1 of Chapter 12.

Table 13.1 Summary of the regression analyses of the emotion component factors on the four overall factors

	VALENCE	POWER	AROUSAL	NOVELTY
Appraisal component factors				
VALENCE APPRAISAL	***			
NOVELTY/CHANCE CAUSE			*	*
COPING ABILITY				*
EXPECTED/FAMILIAR			*	
GOAL RELEVANCE				*
NORM VIOLATION				
SELF VS OTHER CAUSE				
R ²	0.91	0.16	0.26	0.36
Action tendency component factors				
DEFENSIVE/APPETITIVE	***	*		
DISENGAGEMENT/INTERVENTION		**	*	
SUBMIT VS ATTACK	*	***		
R ²	0.91	0.73	0.07	0.03
Facial expression component factors				
FROWN VS SMILE	***			
JAW DROP/EYEBROWS UP			**	**
EYES CLOSED/TEARS		***		
R ²	0.90	0.44	0.15	0.31
Vocal expression component factors				
VOCAL ENERGY		***	**	*
FIRM VS PERTURBED SPEECH	**	**	**	
R ²	0.35	0.64	0.44	0.09
Bodily reaction component factors				
DISTRESS SYMPTOMS	*	***	*	*
AUTONOMIC AROUSAL	**	*	***	
BODY TEMPERATURE	***		*	*
R ²	0.70	0.49	0.46	0.11
Feeling component factors				

BAD VS GOOD	***			
WEAK VS STRONG		***		
CALM VS RESTLESS			**	
TIRED		*	**	
R ²	0.91	0.66	0.52	0.01

Note: symbols representing size of beta coefficients: * $\beta > |0.20|$, ** $\beta > |0.40|$, *** $\beta > |0.60|$.

The set of six factors obtained after partialling out VALENCE APPRAISAL showed little in the way of duplication of the overall structure—most importantly, the AROUSAL factor was absent and the factors are strongly focused on the eliciting event. The empirically found structure largely corresponds to the theoretical structure suggested by the CPM in terms of the logical interdependence of the appraisal criteria in the evaluation process. Furthermore, a detailed analysis of the factor loadings suggested that the grouping of features on a factor is likely to be, in part, determined by ecological correlations rather than conceptual overlap. All in all, it seems fair to conclude that the appraisal structure, in terms of one-to-one correspondence of factors, strongly contributes to the overall structure, especially in terms of VALENCE and to a lesser degree to NOVELTY, but does not completely duplicate it.

Action tendency component. Most of the work on this emotion component has been performed by Frijda and his collaborators (Frijda, 1986, 1987) and we have borrowed heavily from his work in selecting the items for this component (see Chapter 11). As Frijda has only provided a very high level structure, distinguishing appetitive from defensive action tendencies (see Chapter 11), our factor analyses were largely exploratory. As in the case of appraisal, we found a very strong superfactor which fits Frijda's proposed distinction rather well. In consequence, this superfactor is labeled DEFENSIVE VS APPETITIVE. Using the same strategy as in the case of the Appraisal component, partialling out the superfactor and running additional factor analyses, we identified two reliable subsidiary factors: DISENGAGEMENT VS INTERVENTION and SUBMIT VS ATTACK. Again, the internal structure of this component does not duplicate the overall structure. While the DEFENSIVE VS APPETITIVE superfactor bears resemblance to the overall VALENCE factor, appetitive tendencies being positive and defensive tendencies negative, it does have a distinctive motivational orientation. SUBMIT VS ATTACK and DISENGAGEMENT VS INTERVENTION both contribute to the overall POWER factor. The factorial solution we found shows interesting similarities to dimensional social interaction and personality models. Thus, Scholl (2013), in a large scale review of dimensional research about the perception of feelings, non-verbal and verbal communication, behavior, and personality, reveals in each domain three very similar dimensions: 1) general positive versus negative evaluation (e.g., happiness–disgust or friendliness–hostility); 2) a strong versus weak characterization (e.g., anger–fear or dominance–submission); and 3) an active versus passive impression (e.g., ecstasy–boredom or high–low arousability). The author suggests that these three dimensions might correspond to an evolutionary need for coordination between individuals.

Expression component. As we had been unable to find prior work on the factorial structure of this domain on a molecular level (individual facial movements and voice/speech qualities), we chose a number of expressions in both modalities that have been repeatedly studied in the expression literature and for which there are common expressions in natural language. The internal structure of these items was determined empirically—separately for facial and vocal expressions as we expected that domain-specific groupings would be masked if both modalities were combined (see Chapter 10). The factor analyses yielded the following factors for each modality: FROWN VS SMILE, JAW DROP/EYEBROWS UP, and EYES CLOSED/TEARS for the facial domain and VOCAL ENERGY and

p. 213 FIRM VS PERTURBED SPEECH for the vocal domain. The organization of these factors is unlikely to be generated by facial or vocal subsystems or mechanisms, as factors are based on elements from different substructures. In fact, it seems that elements of expression are grouped together that consistently co-occur in specific social situations and during certain emotional episodes: smiles during pleasant experiences or friendly contact; jaw drop and eyebrows up when encountering an unexpected object or event; closing the eyes and tears in the situation of loss; and high vocal energy in the case of emphasis or stances of dominance. These local expression factors additively contribute to the overall factors (to VALENCE and NOVELTY in the case of facial expression, and POWER and AROUSAL for vocal expression) and do not directly mirror the overall factors (as a duplication model would predict).

Bodily reaction component. In selecting the features to measure this emotion component we drew on elements of questionnaires used in earlier intercultural studies of emotion experiences. We expected to find a similar factor structure, reflecting some of the classic distinctions in autonomous nervous system (ANS) functioning and their respective signature patterns (see Chapter 9). This is indeed what we found: a three-factorial structure, which we labeled the factors as DISTRESS SYMPTOMS, AUTONOMIC AROUSAL, and BODY TEMPERATURE. The confirmation of the earlier cross-cultural results underlines the stability of the bodily reaction factor structure. The latter is completely different from the overall structure, being mainly determined by differences in the activation of different subsystems of the ANS. Thus, again, the emotion component factors for this emotion component seem to additively contribute to the overall structure (AUTONOMIC AROUSAL to overall AROUSAL, DISTRESS SYMPTOMS to overall POWER, and BODY TEMPERATURE to overall VALENCE), but do not duplicate it.

Feeling component. This component comes closest to a duplication of the overall structure, as the overall VALENCE, POWER, and AROUSAL factors are clearly discernible in the adopted four-factorial feeling structure (see Chapter 8). This is a direct consequence of our selection of features to be included for this component on the basis of the major contributions to the literature (see Chapter 8). There are two exceptions to this overall fit: 1) the overall AROUSAL factor is represented by two separate feeling factors: CALM VS RESTLESS and TIRED. A similar distinction has been proposed and empirically demonstrated by other researchers in the domain of feeling research (e.g., Thayer, 1989). In the GRID data set, it emerges in the Feeling component only; as it is not sufficiently supported by similar distinctions in other components to affect the overall factor structure accordingly. 2) The overall factor NOVELTY does not have an equivalent in the Feeling component ratings. This is entirely due to our not having included items designed to measure this dimension. As described above, we followed the rule of choosing only features firmly established in the literature, which, in the case of affective feelings, has so far recognized only three dimensions. NOVELTY was first proposed as an important overall factor on the basis of our own preliminary work with the GRID instrument (Fontaine et. al., 2007). Apart from these two differences, the internal structure of the Feeling component comes closest among the components to the overall structure. This close correspondence confirms the plausibility of the assumption that the Feeling component consists of an integrated representation of the changes occurring in all other components, and serves monitoring functions.

In conclusion, we note that the internal structures of all components, with the exception of feeling, are inherent in the components' nature and function and do not prefigure or duplicate the overall structure. This suggests that while there is direct correspondence between local component and overall structures in some cases, the bulk of the evidence supports an additive contribution model.

p. 214 For three emotion components, there is a VALENCE superfactor although in each case the VALENCE takes a distinct form: for appraisal, we observe as many types of valences as there are major appraisal criteria, for Action tendencies, VALENCE is represented by APPETITIVE VS DEFENSIVE motivation, and for feeling, VALENCE is captured by the distinction between positive vs negative feeling states.

The Feeling component is special in that it comes closest to the four-dimensional overall structure. This is expected as this component provides a central conscious representation of the other emotion components, which is subsequently categorized and labeled to make meaning out of the experienced emotional episode. Yet there are major differences too and the overall dimensions cannot be considered as simple duplicates or instantiations of the dimensions in the Feeling component. On the contrary, as we saw in Chapter 7, the overall dimensions are firmly and reliably anchored in a wide diversity of synchronized changes pertaining to all five components, not just the emergent feeling, and they provide a much more comprehensive and a much richer reflection of the meaning of the emotion words as lexical encapsulations of emotion episodes.

13.2 How well are the overall factors predicted by emotion component factors?

In this section, we evaluate how well each of the four overall factors are predicted by the emotion component factors. In contrast to the previous section where we focused on emotion components, in this section we focus on the overall factors, discussing each of them in detail. Table 13.1 summarizes the results of the regression analyses reported in the emotion component chapters (Chapters 8 to 12). The table shows the results of regressing *the emotion component factors (shown in rows) separately* on each overall factor computed without including the respective emotion component features for greater independence (shown in columns). If one uses an arbitrary cutoff point of 50% ($R^2 = 0.50$) for the percentage of variance accounted for in the overall factors by the emotion component factors in the respective components, the results can be summarized as follows (excluding the Feeling component as the features were chosen in such a way as to represent the overall factors, as recalled above): 1) the overall VALENCE factor is extremely well predicted by all components except vocal expression (the percentage accounted for generally exceeding 90%). This shows that each of the components reflects valenced reactions. 2) The overall POWER factor is reasonably well predicted (60–70%), mostly by the Action tendency and the vocal part of the Expression component. 3) Neither the overall AROUSAL nor the overall NOVELTY factor is well predicted by any of the emotion component factors (the best prediction being achieved by AUTONOMIC AROUSAL for the overall AROUSAL factor).

To complement the analyses, we computed stepwise regressions of *all emotion component factors together* on each of the four overall factors. The results are shown in Table 13.2. The table lists, separately for each overall factor, which additional emotion component factors (in the order of entry) were automatically entered into the model until the cutoff criterion of R^2 change of at least 0.03 was reached. It should be noted that these regressions do not represent an independent prediction as the overall factor scores here were necessarily based on all 142 items, as well as the emotion component features on which the emotion component factors (used as predictors) were computed. Given the large number of features, this is the only way in which the relative predictive validity of the emotion component factors can be directly compared. While the results are useful for the purpose of illustrative comparison, they cannot be used as exact estimates.

Table 13.2 Summary of the regression analyses of overall factors on emotion component factors

Overall factors	Emotion component factor	ΔR^2	R^2	β
VALENCE	VALENCE APPRAISAL (appraisal)	0.92		0.91
	SUBMIT VS ATTACK (action tendency)	0.04	0.96	-0.20
POWER	EYES CLOSED/TEARS (facial expression)	0.52		-0.22
	SUBMIT VS ATTACK (action tendency)	0.22		0.44
	DISENGAGEMENT VS INTERVENTION (action tendency)	0.11		0.22
	DISTRESS SYMPTOMS (bodily reaction)	0.07		-0.33
	VOCAL ENERGY (vocal expression)	0.03	0.95	0.22
AROUSAL	AUTONOMIC AROUSAL (bodily reaction)	0.57		0.83
	BODY TEMPERATURE (bodily reaction)	0.23		0.47
	DISTRESS SYMPTOMS (bodily reaction)	0.09		0.25
	SUBMIT VS ATTACK (action tendency)	0.05	0.93	-0.23
NOVELTY	NOVELTY/CHANCE CAUSE (appraisal)	0.60		0.54
	JAW DROP/EYEBROWS UP (facial expression)	0.08		0.37
	DISENGAGEMENT VS INTERVENTION (action tendency)	0.11		-0.42
	SELF VS OTHER CAUSATION (appraisal)	0.04		0.18
	EYES CLOSED/TEARS (facial expression)	0.03	0.86	-0.19

Note: predictor factors were entered into the table as long $\Delta R^2 \geq 0.03$.

As shown in the preceding section of this chapter, the overall VALENCE factor is very successfully predicted with factors from all emotion components, with the exception of vocal expression. However, as shown in Table 13.2 the appraisal superfactor VALENCE APPRAISAL *alone* is sufficient to predict the overall VALENCE factor with a level of explained variance of over 90% ($R^2 = 0.92$). Only

one additional factor is added, the action tendency factor SUBMIT VS ATTACK, which adds only 4% to the variance explained. In contrast, it takes five factors from different emotion components to reach a comparable level of explained variance for the POWER factor ($R^2 = 0.95$). All of these predictors make a contribution of approximately comparable size as shown by the beta coefficients (strength of contribution of a predictor in the regression model), which vary between 0.22 and 0.44 in absolute size. The most important contribution is due to the action tendency SUBMIT VS ATTACK, even though it is not the first to enter the model (it follows the facial expression factor EYES CLOSED/TEARS which has a lower beta value once all predictors are in the model). As described above, the overall AROUSAL factor is strongly predicted by the body reaction factor AUTONOMIC AROUSAL accounting for 60% of the variance by itself and maintaining a very high beta coefficient (followed by

the body reaction factor BODY TEMPERATURE). Finally, overall NOVELTY prediction is largely due to the NOVELTY APPRAISAL, which accounts by itself for 60% of the variance, but is closely followed by the facial expression factor JAW DROP/EYEBROWS UP and the action tendency factor DISENGAGEMENT VS INTERVENTION, which reach beta coefficients of similar size. In consequence, except in the case of overall POWER, some components seem to provide a particularly strong contribution to certain overall factors, appraisal to overall VALENCE and overall NOVELTY, and bodily reaction to overall AROUSAL.

p. 217

Given the general assumption in the underlying theory (CPM) that appraisal drives the reaction patterns in the other emotion components one might wonder why the appraisal factors did not show a stronger effect in predicting the overall factors. The main reason is that the effect of appraisal on the overall factors is likely to be mediated by its effects on other components. As shown in Figure 1.1 of Chapter 1, the assumption is that the appraisal process triggers a chain of sequential-cumulative reactions in several other components which are then centrally integrated. It is thus possible that one of the appraisal-caused changes in one of the components is strongly weighted in the integration process and thus obtains a better proximal prediction for an overall factor. Another reason is that, as mentioned in Chapter 12, combination of appraisal check results might produce an efferent effect in a configurational fashion, rather than having a direct linear effect. As our regression analyses only contain the main effects of the appraisal factors and no interactions, such configurational nonlinear effects will not show up in our results. We will return to this issue in the next section.

13.3 Classification of emotion terms through discriminant analysis

In this part of the chapter, we present a series of analyses that are designed to understand how the 24 emotion terms in the GRID study can be differentiated in a way that ensures both high accuracy and reasonable economy with respect to the number of predictors. We first examine the MDA solution for all 22 emotion component factors that have been identified in the preceding chapters as predictors. This is followed by a systematic comparison of the classification hit rates with MDA solutions based on either features or factors as predictors, both separately per emotion component and across emotion components. We then inquire into the possibility of empirically identifying a small set of “best” predictors among the emotion component factors. In this case, we discuss details of the MDA parameters that provide interesting leads on the accurate recognition of specific emotions. In the next step, we examine the stepwise contributions of different emotion components (represented by their emotion component factors) to accurately classify and examine the degree of fit with theoretical explanations. To conclude, we turn to the role of the four overall factors in differentiating the emotions, first showing the positions of the 24 terms in the four-dimensional space and then investigating the role of each overall factor in classification using MDA techniques.

Discrimination based on emotion component factors. The viability of our proposal to measure the semantics of emotion words by profiles of component features can be assessed by the respective success of discriminating the 24 emotion words on the basis of these profiles. As demonstrated in Chapters 8 to 12, the GRID paradigm fares extremely well on this challenge on a component by component basis. After having identified the internal structures of each emotion component and having computed the scores for the emotion component factors, we can now enter *all of the 22 emotion component factors together* into an MDA to determine the degree of classification accuracy that can be obtained on the basis of the emotion component factor predictors. The results in Table 13.3 show a high degree of classification success with an overall accuracy hit rate of 78.8% (cross-validated), which compares extremely favourably with the hit rate based on all 142 features of 82.1%, given that the latter is based on a much larger number of predictors and thus provides much richer information (see Chapter 7). The small number of confusions that do occur represent mainly within-family confusions. These results suggest that the component factors capture most of the information.

Table 13.3 Classification accuracy (in percent) for the 24 emotion words in discriminant analyses based on all 22 and the 10 best predicting emotion component factors

Emotion words	Classification based on 22 emotion component factors	Classification based on the 10 best predicting emotion component factors	
	Accuracy	Accuracy	Confusion > 15% with
being hurt	73.5	52.9	
sadness	97.1	85.3	
shame	88.2	88.2	
guilt	91.2	88.2	
compassion	88.2	91.2	
disappointment	85.3	73.5	
love	97.1	94.1	
contentment	67.6	67.6	
happiness	32.4	41.2	joy
pride	88.2	91.2	
pleasure	61.8	55.9	joy
joy	64.7	67.6	
interest	88.2	91.2	
surprise	100	100	
despair	67.6	67.6	
stress	85.3	79.4	
anxiety	67.6	52.9	stress, fear
fear	91.2	94.1	
jealousy	97.1	91.2	
hate	76.5	85.3	
irritation	50.0	44.1	anger
anger	67.6	64.7	irritation
disgust	85.3	73.5	
contempt	79.4	79.4	
Total	78.8	75.9	

Summary of discriminant analyses. Table 13.4 summarizes the cross-validated accuracy percentages for all discriminant analyses reported in this part of the volume, based on the individual features and on the factors extracted for each of the emotion components and the overall set of features. Surprisingly the feature sets in the individual components (set size ranging from 18 to 40 items) allowed successful classification at a rate of 60–70%, which is quite extraordinary given the chance level of 4.2% (1/24). This hit rate compares also rather favourably with the hit rate of 82.1% obtained by entering the complete set of features across all components, that is, all 142 items, as predictors. These results suggest a high degree of redundancy of the information differentiating emotional meaning across the features in the different components. This seems consistent with our theoretical assumption that modal emotion episodes, labeled with specific words, tend to consist of experiential episodes with a high degree of synchronization among the components driven by appraisal results. For example, if the appraisal results encourage the preparation of an avoidance reaction, the type of ensuing synchronization of the autonomic nervous system and the motor expression system might well express shared aspects of affective meaning.

Table 13.4 Summary of classification accuracy (in percent) in discriminant analyses per emotion component and across emotion components with feature and factor scores

Component features/factors	Number of features	Accuracy based on feature scores	Number of factors	Accuracy based on factor scores
Appraisal	31	70.7	7	56.3
Action tendency	40	67.6	3	46.1
Expression	21	71.6	5	57.0
Bodily reaction	18	62.4	3	45.1
Feeling	19	58.5	4	47.2
All emotion components	129	82.5	22	78.8
All emotion features	142	82.1	4	69.4

Table 13.4 also provides an answer to the question to what extent the emotion component *factors* (ranging from three to seven factors) capture the essential information in the respective emotion component *features* (ranging from 18 to 40 items): on average, the hit rate drops by only 15%. This is quite astounding, given the drastic reduction in the number of predictors from approximately 25 to around 5 +/-2 per component. This again confirms that the emotion component factors capture the essential emotion differentiating information in each of the components. On the level of the complete instrument, the hit rate of 78.8% obtained with the 22 emotion component factors compares to a hit rate of 69.4% obtained by entering the *four overall factors* as predictors. The latter figure is quite remarkable given the reduction in the number of predictors (from 22 to 4). It points again to a fairly high degree of redundancy among the component factors.

Set of best predictors. One would like to know which of the emotion components (and of the factors within these components) make a stronger contribution to accurate classification than others. To this end, we computed a discriminant analysis using stepwise entry of the 22 emotion component factors and deciding on a cutoff point in terms of the additional variance explained with the entry of each new factor into the model. This is only an approximate method to decide on the relative importance of predictors as the sequence of entry may be affected by sampling error and by multi-collinearity in the dataset. Adopting a cutoff criterion of approximately 1% of added variance, either nine or ten emotion component factors could be reasonably chosen

under this criterion (the ambiguity being due to instability at the cutoff point in the stepwise entry procedure with earlier predictors removed and then reentered). We decided that the safest procedure was to choose the solution with ten emotion component factors (which the regression algorithm entered into the model in the following order): VALENCE APPRAISAL (appraisal); SUBMIT VS ATTACK (action tendency); EYES CLOSED/TEARS and JAW DROP/EYEBROWS UP (facial expressions); AUTONOMIC AROUSAL, DISTRESS SYMPTOMS, and TEMPERATURE (bodily reactions); and, SELF VS OTHER CAUSATION, NOVELTY APPRAISAL, and NORM VIOLATION (appraisals).

These ten factors were then used as the “best” predictor set in a new MDA, yielding 75.9% correct classification after cross-validation (the hit rates for the 24 emotions and the most frequent confusions are shown in Table 13.3). This result is remarkable for two reasons: 1) despite a reduction of the predictor factor set from 22 to 10, the hit rate drops by less than 3%, again pointing to a certain amount of redundancy in the information in the different components, and 2) all of the components, except feeling, are represented among this set of best predictors. This shows that despite a certain degree of redundancy, the unique information provided by specific components is required to define the meaning of the emotion terms in sufficient detail for correct classification. Most likely the Feeling component factors (the only component not represented in the set) are not required because of the important point made earlier in this section, namely that the Feeling component is already an integration of changes that occur in the other emotion components and is thus completely determined by the latter (this is also the reason why the internal feeling structure comes closest to a duplication of the overall factors).

We now examine some of the detailed parameters in the MDA with the 10 best predictors in order to better understand the bases for the emotion classification by this predictor set. The structure matrix is shown in Table 13.5. The structure matrix represents the correlations between the discriminant functions (which are linear combinations of the 10 predictors) that maximally differentiate the emotion terms and each of the 10 predictors. Table 13.6 shows, for each of these functions, the mean score per emotion term (also called “centroid” in MDA). This information allows seeing which emotions have similar values on a specific function and are thus grouped together. For example, the first column in Table 13.6 shows a clear separation between positive and negative emotions. Consistently, function 1 can be described as a “VALENCE distinction function,” an inference which is supported by the high correlation of the VALENCE appraisal factor. The correlations in Table 13.5, which were used to interpret the respective functions, are shown in bold.

Table 13.5 Structure matrix in discriminant analysis with the 10 best predicting emotion component factors

Component factors	Functions									
	1	2	3	4	5	6	7	8	9	10
VALENCE APPRAISAL (appraisal)	0.88	-0.06	-0.07	0.05	0.12	-0.32	0.00	0.25	-0.06	0.20
SUBMIT VS ATTACK (action tendencies)	-0.11	0.71	0.02	-0.24	0.34	0.11	-0.34	0.42	-0.01	-0.04
EYES CLOSED/TEARS (facial expression)	-0.08	-0.49	0.07	-0.20	0.47	0.44	-0.16	0.14	-0.46	0.21
NOVELTY APPRAISAL (appraisal)	0.02	0.03	0.18	0.58	0.21	0.44	-0.41	-0.24	0.39	0.15
SELF VS OTHER CAUSATION (appraisal)	0.02	0.19	0.39	-0.04	0.19	0.25	0.82	0.10	0.09	0.14
NORM VIOLATION (appraisal)	0.00	0.14	-0.03	0.12	-0.54	0.23	-0.08	0.72	-0.12	0.28
JAW DROP/EYEBROWS UP (facial expression)	0.04	0.14	0.19	0.52	0.32	0.19	0.00	-0.15	-0.71	-0.03
AUTONOMIC AROUSAL (bodily reaction)	-0.17	0.28	-0.48	0.32	0.19	0.09	0.13	-0.29	-0.14	0.64
DISTRESS SYMPTOMS (bodily reaction)	-0.18	-0.31	-0.04	0.29	0.41	0.00	0.01	0.53	-0.06	-0.58
BODY TEMPERATURE (bodily reaction)	0.32	0.04	-0.44	0.16	0.36	0.43	0.02	0.28	-0.13	-0.52

Note: correlations used to interpret the discriminant function are in bold.

Table 13.6 Emotion word centroids in discriminant analysis with the 10 best predicting emotion component factors

Emotion words	Functions									
	1	2	3	4	5	6	7	8	9	10
being hurt	-3.4	-0.7	1.9	-0.7	0.5	0.7	0.3	0.2	-0.2	0.3
sadness	-3.5	-3.6	3.0	-1.9	0.5	0.2	-0.6	0.0	0.5	-0.1
shame	-2.1	-2.4	-3.1	0.2	-1.2	2.2	-0.4	-0.1	0.2	-0.2
guilt	-2.4	-3.3	-3.1	0.0	-2.3	-0.7	-0.8	0.1	-0.8	0.3
compassion	1.1	-3.6	2.3	-0.7	-1.3	0.2	1.8	-1.0	0.2	0.3
disappointment	-3.0	-0.7	3.5	-0.4	-0.7	0.4	-0.3	0.1	-0.5	-0.1
love	5.3	-2.6	-2.5	-0.5	0.9	0.1	2.6	0.5	-0.3	-0.2
contentment	6.4	-0.4	0.8	-1.7	-0.3	-0.4	-0.9	0.2	0.5	-0.3
happiness	6.9	-0.6	0.3	-0.2	1.0	0.6	-0.4	0.1	-0.3	0.1
pride	4.7	1.6	-0.8	-1.8	0.2	-1.6	-1.4	0.0	-0.2	0.3
pleasure	6.6	-0.3	-0.7	-0.3	0.6	0.8	-0.3	0.8	0.1	-0.3
joy	6.7	0.1	0.3	0.4	1.0	0.5	-0.6	-0.4	0.0	0.5
interest	4.9	1.8	0.7	2.3	-2.8	-1.2	0.1	-0.8	0.2	-0.3
surprise	1.8	2.4	2.3	5.1	0.2	0.8	0.2	0.4	-0.1	0.1
despair	-3.6	-2.1	1.0	-0.4	0.7	-0.5	-0.9	-0.1	-0.4	-0.4
stress	-3.2	-0.5	-2.2	0.7	0.6	-0.9	-0.1	-0.2	1.0	0.2
anxiety	-3.3	-1.5	-1.9	1.9	0.4	-1.0	0.2	0.2	0.3	0.0
fear	-3.7	-2.0	-0.3	2.7	2.0	-1.1	-0.4	0.1	-0.2	-0.1
jealousy	-1.7	3.0	-0.1	-1.5	1.6	-1.1	1.0	-1.3	-0.4	-0.2
hate	-3.1	3.8	-1.1	-1.7	0.2	0.0	0.7	0.8	0.0	0.1
irritation	-2.8	3.1	-1.0	-0.3	0.0	1.4	-0.3	-0.8	0.3	0.0
anger	-2.8	3.7	-1.5	-0.2	0.2	1.5	-0.5	-0.6	-0.2	-0.1
disgust	-3.5	1.1	1.3	0.5	-0.2	-0.3	0.1	0.8	0.1	0.0
contempt	-2.2	3.6	0.8	-1.5	-1.7	-0.6	0.8	1.1	0.1	0.0

Importantly, four of the ten best predictors are appraisal factors. Two of these define functions that are directly related to two of the overall factors, functions 1 and 4. Function 1 represents the strong VALENCE superfactor (separating the positive from the negative emotions; as shown in column 1 of Table 13.5). Function 4 is defined by NOVELTY APPRAISAL (together with the consequent facial expressions JAW DROP/EYEBROWS UP; separating

surprise, fear, anxiety, and interest from the other emotions in column 4). The SELF VS OTHER CAUSATION appraisal factor defines function 3 (together with cold BODY TEMPERATURE and low AUTONOMIC AROUSAL; separating self-reflective emotions from those in which other persons tend to cause the event) and function 7 (separating love and compassion from the other emotions). The NORM VIOLATION appraisal factor defines function 8 (separating contempt, disgust, and hate from the other emotions). Function 10 combines all Bodily reaction component factors, and is obviously related to AROUSAL, but the emotion differentiation is difficult to explain by the patterns in the centroid values. However, the fact that all three body factors entered in the stepwise discrimination suggests that these predictors play an important role, possibly in the fine-grained discrimination within emotion families. Functions 5 and 6 are difficult to interpret in a straightforward fashion.

Function 2 is particularly interesting because it is related to the overall POWER factor as defined here by the action tendency SUBMIT VS ATTACK (together with absence of CLOSED EYES/TEARS; separating emotions with high perceived coping potential from those where the outcome is more uncertain).

Appraisal is not directly involved here (the COPING POTENTIAL factor did not enter the group of the ten best predictors), probably due to the fact, documented in detail in Chapter 12, that the POWER factor is particularly sensitive to interactions between different appraisal checks, requiring configurational interaction analysis (rather than the linear analysis of main effects used here). However, as mentioned in Chapter 12, the definition and computation of variables measuring these configurations in future research may well allow showing the effect of appraisal on the POWER factor. To illustrate this approach for the present case, we attempted to predict the SUBMIT VS ATTACK action tendency with a set of four appraisal factors (i.e., VALENCE, confirmed expectations, norm violation, and self vs other causation). The stepwise regression procedure produced a model with all four of these factors (all yielding significant contributions), with equivalent strength (beta weights around 0.25) and an R^2 of 0.22. This suggests that appraisal is also involved in this potency-related discriminant function, most likely mediated by the emergence of the action tendency of attacking, together with situational context factors. As mentioned in the preamble to this chapter, the detailed analysis of the myriad of interactions between appraisal variables that are possible and meaningful require further hypothesis development, assisted by the current results, and need to be addressed in further work.

Although no direct causal inferences are possible on the basis of our data on the meaning of emotion words, the results obtained with the set of ten best predictors (especially the large number of Appraisal component factors in the set) are highly compatible with our central theoretical proposal—the notion that the appraisal results drive and synchronize the changes in all other components.

Cumulative analysis of emotion component contributions. To further examine the role of appraisal in defining the meaning of emotion terms, we ran a series of cumulative MDAs, adding one emotion component after another based on the theoretical assumptions shown in Figure 1.1 of Chapter 1. The sequence prediction holds that appraisal results first produce specific pattern changes in action tendencies (adaptive reactions to relevant events) and in the Expression and Bodily reaction components. The exact sequence and interactions between these components are not theoretically specified, as they probably consist of a series of recursive adjustments. Finally, the Feeling component should be modified as a result of all preceding modifications because it is expected to integrate the synchronized changes in the other components (and allow access to conscious awareness of an emotion episode). In line with this theoretical prediction, we decided to enter the Appraisal component first, then the Action tendency component, followed by the combined Expression and the Bodily reaction components, as it can be argued that action tendencies lead to physiological preparation and expressive signals (however, it is also possible that bodily symptoms and expressions occur spontaneously and at least partly independently of action tendencies). The Feeling component was entered last.

The results are shown in Table 13.7. In the first step of the successive MDAs, the Appraisal component features alone reached a hit rate of 70.7%. Including action tendencies added 4.7% to the total cross-validated accuracy

p. 223 (effect on individual emotions: the hit rates for being hurt, anger, $\hookrightarrow$ and contempt rise disproportionately). The bodily reactions and the facial and vocal expressions further added 5% (with love, contentment, pleasure, irritation, and disgust benefitting). Finally, including the Feeling component features to the prediction set adds only an additional 2.2% (with anger and sadness profiting) to attain the total of 82.5%.

Table 13.7 Classification accuracy (in percent) and change in classification accuracy in discriminant analyses with a theory-based sequential entry of emotion component features

Emotion words	Accuracy and change in accuracy				
	Only appraisal features	Plus action tendency features	Plus bodily reaction and expression features	Plus feeling features	All emotion component features
being hurt	61.8	14.7	2.9	5.9	85.3
sadness	79.4	-2.9	5.9	14.7	97.1
shame	91.2	0.0	0.0	0.0	91.2
guilt	88.2	3.0	2.9	0.0	94.1
compassion	85.3	5.9	2.9	0.0	94.1
disappointment	67.6	8.9	11.7	0.0	88.2
love	91.2	2.9	3.0	0.0	97.1
contentment	52.9	3.0	17.6	0.0	73.5
happiness	47.1	-11.8	-2.9	2.9	35.3
pride	94.1	0.0	0.0	0.0	94.1
pleasure	52.9	0.0	14.7	0.0	67.6
joy	47.1	-5.9	8.8	-5.9	44.1
interest	88.2	5.9	3.0	0.0	97.1
surprise	94.1	5.9	0.0	0.0	100.0
despair	79.4	3.0	5.8	5.9	94.1
stress	73.5	5.9	5.9	5.9	91.2
anxiety	50.0	8.8	3.0	5.8	67.6
fear	85.3	2.9	5.9	3.0	97.1
jealousy	88.2	0.0	0.0	0.0	88.2
hate	70.6	-3.0	8.9	2.9	79.4
irritation	38.2	8.9	14.7	2.9	64.7
anger	32.4	29.4	-5.9	14.7	70.6
disgust	67.6	8.9	11.7	0.0	88.2
contempt	70.6	17.6	0.0	-5.8	82.4
Total	70.7	4.7	5.0	2.2	82.5

Note: change in accuracy larger than 10% in bold.

Obviously, the exact numbers of the percentage accuracy added with each step must be interpreted with care. Given the redundancy between components that we have demonstrated in this chapter, it automatically follows that whatever component will be entered first will show the highest percentage of classification success, with ever declining percentage amounts for each successive step. If the Feeling component would be entered first and the Appraisal component last, the picture would be quite different. This would indeed be the case for any order chosen. However, testing all possible orders of entry would seem quite meaningless as it is extremely unlikely that, for example, the Feeling component precedes the Appraisal component. While the stepwise procedure reported here cannot be used to empirically establish the relative importance of a component for classification success, it serves to illustrate what the relative contribution of each component might be if the theoretically suggested sequence of effects were correct. This remains to be shown in future experimental work.

Cumulative analysis of overall factor contributions. The three-dimensional plots shown in Figures 13.1 and 13.2 illustrate the distribution of the 24 emotion terms in the four-dimensional space spanned by the overall factors. We have performed a similar series of successive or cumulative MDA analyses with these four overall factor predictors of the 24 emotion terms, to estimate the respective contribution of each of the factors. As reported in Chapter 7, using only those four overall factors to classify the terms results in a cross-validated hit rate of 69.4%, which, quite surprisingly, is only about 10% less than the hit rate obtained with all 142 items.

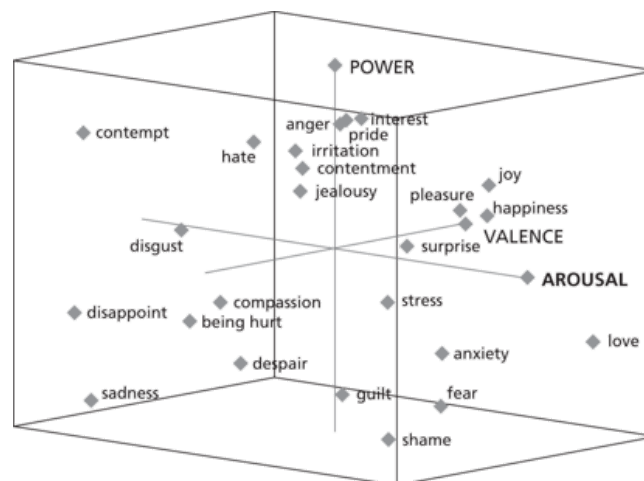


Figure 13.2 Plot of the average factor scores for the 24 emotion words on VALENCE, POWER, and AROUSAL.

The results of the cumulative MDAs are shown in Table 13.8. In the first step, the VALENCE factor alone reached a hit rate of 24%, showing that, while VALENCE is very important, it is not very useful for discrimination of emotion terms. Entering the POWER factor into the model added 20.4% to the total accuracy hit rate; entering the AROUSAL factor further added 15%, and the NOVELTY factor finally added another 10%. As expected, the order of entry and the size of the contribution to the hit rate reflect the proportion of variance accounted for by the respective factors in the original factor analysis (see Chapter 7). Nevertheless, it is instructive to see how important the respective factors are for the correct classification of individual emotions. Most of the 24 emotions rose sizably in their hit rate once the POWER factor was added. The same is true when the AROUSAL factor is added; interestingly, disappointment and contentment had a major increase of hit rate increase at this point. Upon the entry of the NOVELTY factor, there is a particularly strong rise for the emotions of pride and interest. In both of these emotions, the respective factors may help to disambiguate the clouds of positive emotions for which POWER differences do not play a major role. However, there is little further increase in accuracy for surprise—the prediction is already very good after the second step, much before the NOVELTY dimension is entered in the fourth step. Most likely, this can be explained, as in the preceding analysis, by the fact that surprise is located in a mid-position on the VALENCE factor.

Table 13.8 Classification accuracy and change in classification accuracy in discriminant analyses with a sequential entry of the four overall factors

Emotion words	Accuracy and change in accuracy				
	VALENCE	Plus POWER	Plus AROUSAL	Plus NOVELTY	Four overall factors
being hurt	17.6	8.9	8.8	5.9	41.2
sadness	11.8	38.2	26.5	5.9	82.4
shame	35.3	11.8	23.5	8.8	79.4
guilt	67.6	-11.7	20.6	20.6	97.1
compassion	26.5	35.3	20.6	-3	79.4
disappointment	8.8	3	61.7	3	76.5
love	11.8	79.4	0	5.9	97.1
contentment	26.5	-11.8	52.9	0	67.6
happiness	61.8	-3	0	0	58.8
pride	20.6	11.8	0	50	82.4
pleasure	2.9	3	11.7	20.6	38.2
joy	11.8	32.3	17.7	5.8	67.6
interest	55.9	-3	-8.8	35.3	79.4
surprise	47.1	38.2	8.8	5.9	100
despair	8.8	41.2	-11.8	-2.9	35.3
stress	20.6	38.2	11.8	0	70.6
anxiety	17.6	5.9	0	26.5	50
fear	8.8	29.4	29.4	14.8	82.4
jealousy	8.8	58.8	0	5.9	73.5
hate	11.8	0	23.5	32.3	67.6
irritation	58.8	-41.2	3	-8.8	11.8
anger	2.9	58.9	5.8	0	67.6
disgust	11.8	64.7	11.7	5.9	94.1
contempt	20.6	0	44.1	0	64.7
Total	24	20.4	15	10	69.4

Note: change in accuracy larger than 10% in bold.

As a final illustration of the analyses reported in this section, we provide, in Figures 13.3 and 13.4, the profiles on both the 21 component factor scores and the four overall factor scores for the five emotions that are most

frequently studied. These five emotions are generally considered as “basic” emotions, supposed to represent quintessential representatives of a universal emotion system. The graphs allow us to obtain a quick overview of the major similarities and differences between these emotions on the structures we have identified in this section.

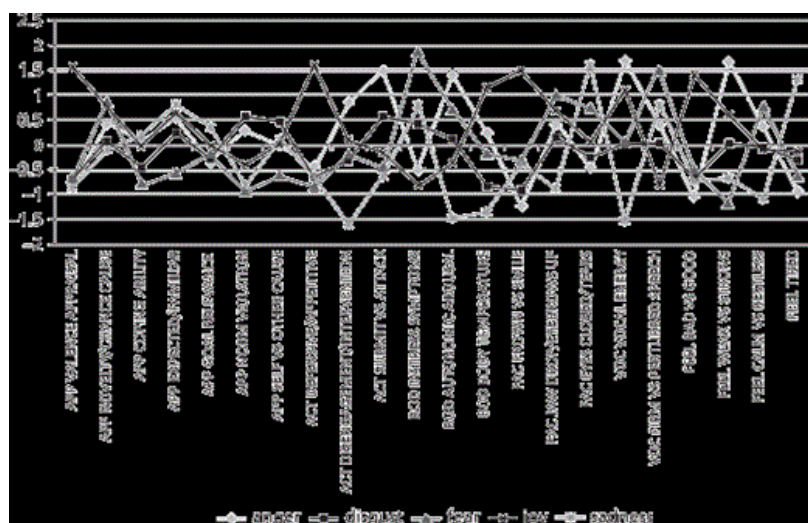


Figure 13.3 Profiles on emotion component factors for five “basic” emotions (APP, appraisal; ACT, action tendencies; BOD, bodily reaction; FAC, facial expression; VOC, vocal expression; FEEL, feeling).

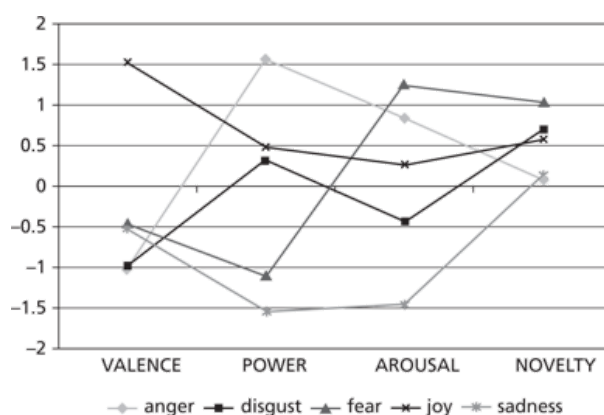


Figure 13.4 Profiles on overall factors for five “basic” emotions.

Overall, expressing all due caveats about the inappropriateness of drawing causal inferences from our data, we suggest that the findings from this series of successive MDAs provide *indirect* support, in the sense of suggesting high plausibility, for the theoretical claim that appraisal checks trigger the elicitation and drive the differentiation of emotional states—and encourage the assumption that this process may be partially mirrored in the semantic profiles of emotion words. By far the greatest amount of variance explained is due to the profile of appraisal results, leaving only little room for independent effects in other components. Not surprisingly, the central causal role of appraisal underlying the differentiation of emotion episodes, and also the labels used to refer to them, as a consequence, is now accepted by the large majority of emotion theorists (including discrete or basic emotion theorists, see Ekman, 2004).

13.4 Conclusions

This concludes the overview of the major empirical findings of the GRID study across all 34 datasets from 27 countries covering a total of 24 different languages and provides a first opportunity to take stock. With respect to the issues discussed and the questions posed in Part I of this volume, the results of the first wave of analysis of the massive data set collected in this study, suggest the following conclusions:

- p. 228
- ↳ the judgments of the 142 GRID features representing the five components of emotion show a high level of agreement between judges in the different language communities and across the different cultures studied. This suggests that semantic profiles of major (translationally equivalent) emotion words are shared in a stable fashion within and across many different cultures
 - the data from 27 countries with 24 different languages clearly replicate a preliminary finding with the GRID instrument in three Western countries (Fontaine et al., 2007) showing that the emotional space, as established on the basis of the similarities between the profile based on all 142 items, spans four dimensions—VALENCE, POWER, AROUSAL, and NOVELTY—in this order of importance
 - separate factor analyses for each component show a unique dimensional structure for each emotion component, adapted to the specific function of the component in the emotion episode
 - regression analyses show that the emotion component factors differentially contribute to, and allow partial prediction of, the overall factors without duplicating or mirroring the overall structure
 - in addition to the specificity of the contribution of each component to the overall structure, there is a certain degree of redundancy of emotion specific information across the components
 - using the semantic profiles based on all 142 semantic features the 24 emotion words can be correctly differentiated (in an automatic classification by MDA) to more than 80%
 - due to the partial redundancy of information available in different components, it is possible to differentiate the 24 emotion categories rather accurately by several emotion component factors in isolation—in particular on the basis of the Appraisal component. A combination of only the ten best predictors drawn from several components allows the differentiation of the categories with approximately 70% accuracy.

These results confirm a fundamental tenet of the GRID paradigm, which is that the semantics of emotion words can be best defined in a domain-specific way—that is by considering many aspects of all the emotion components that emotion episodes consist of. Obviously, definitions are free, and so other scientists may prefer different ways of defining meaning. However, one generally accepted requirement for the meaning of words is that it must be specific to the word in order to allow effective communication. Whatever definition of meaning one chooses, it must be possible to describe the specificities of word meanings with the elements of the architecture proposed by the definition. Consequently, this description must permit the differentiation of the words concerned on the basis of the elements of the definition. In this section, we have been able to demonstrate, in favour of our definition proposal, that feature profiles with representative items for all five major components of emotion do in fact allow a statistical discrimination and classification that exceeds 80% of accuracy in cross-validated MDAs. We believe that this exceptionally high hit rate, which vastly exceeds the chance level of 4.2%, still underestimates the capacity of component feature profiles to encapsulate the meaning of emotion terms and allow discrimination of them, reliably. As explained at the outset of this chapter, in this volume we have reported first descriptive and exploratory analyses of the rich data set constituted by the GRID study results. We feel confident that further theoretical, empirical, and methodological work will allow both us and groups of other researchers to go beyond what has been reported here, particularly with

respect to the relationships between emotion components, the interactions between features, especially in the appraisal domain, and the use of multilevel and nonlinear analysis techniques.

p. 229

In introducing the theoretical basis of the GRID paradigm in Chapter 1, we have pointed out that the three major theoretical traditions in emotion research, apart from differing with respect to the definition of emotion and the presumed nature of the underlying mechanism, disagree on the role assigned to the verbal labels of emotional experience. It has been suggested that basic emotion theories could be said to define the role of emotion terms as “program descriptors,” constructivist theories to see them as “meaning constructors,” and the CPM viewing emotion terms as “modality identifiers,” that is, marking a frequently occurring multicomponent configuration (and synchronization) of appraisals and associated response patterns. As pointed out at the beginning of the chapter, the kind of data collected in the GRID study do not allow the drawing of any causal inferences with respect to the nature of the underlying mechanism, as only judgments on semantic profiles have been collected. However, if one accepts that emotion words are not sheer figments of imagination or culturally shared stereotypes without any kernel of truth, the findings reported here can be interpreted in terms of their compatibility with fundamental theoretical assumptions and their plausibility. Specifically, the following tentative conclusions concerning the disagreements between the three theoretical currents may be drawn from the results reported here:

- the similarity of semantic profiles across languages and cultures seem to point in the direction of a certain grounding of the semantics of emotion words in the underlying phenomena, suggesting that there are certain modal patterns of emotional experience that are relatively universal and that have comparable semantic markers
- the independent contributions of features from different components, confirm the notion that emotions have to be seen as multicomponential processes
- the important role played by the Appraisal component in discriminating the emotions is compatible with the assumption that the synchronization is driven by the pattern of appraisal results.

Thus, apart from empirically confirming the utility and plausibility of the GRID paradigm to define the meaning of emotion terms in natural languages, the results reported in this section also help to advance the debate about some issues concerning the definition and the empirical study of emotion. Most importantly, however, the results reported in this section establish the GRID instrument as a comprehensive (given the findings on internal structures), reliable (given the strong agreement between judges), and valid (given the high accuracy of category differentiation) tool to measure semantic meaning. The remainder of the volume will explore the utility of the instrument as a tool in basic research on emotion processes, as an assessment of interesting differences in the meaning of major emotion words across languages and cultures that illustrate the important variation around the core of widely shared modal organization, and as a valid tool for a variety of applied uses.

13.5 Outlook

p. 230

The focus of this third part of the book was to explore the meaning structure of emotion terms across samples, languages, and cultural groups for each of the emotion components. Therefore the cross-cultural aspect, which is one fundamental aspect of the GRID project, has not received much attention in this part. Cultural similarities and differences only explicitly played a part in the investigation of the stability of the factor structures. Still, the results of the present section do constrain the role of cultural and linguistic factors on the meaning structure of the emotion domain. The current results do not fit an extreme constructionist approach. For each of the components a stable structure emerged across four language groups, of which one is very different in nature from the other three, namely the East-Asian language family. Moreover, it was observed that between 70% and 80% of the terms can be correctly classified based on their profile. We both observed a sizable stability in the meaning of the emotion features and as in the meaning of the emotion terms. This suggests that there is stability in the internal organization of the emotion domain, as well as in the subdomains the emotion terms refer to. These findings are compatible with the lexical sedimentation hypothesis, which states that salient characteristics of our emotional functioning have been encoded in similar ways across languages and cultural groups (see Chapter 1). The stability we found, however, is not incompatible with the existence of important and salient differences in the meaning of emotion terms and of emotion features. With the structures described in this section we have created an empirically validated set of reference points that allow us to look for and interpret cultural and linguistic differences. The chapters in the following parts will provide many examples of the possibilities to use the GRID paradigm to capture fine-grained differences in the meaning of emotion terms between languages and cultural groups.

Notes

- 1 Corresponding author: Klaus R. Scherer. Swiss Center for Affective Sciences—University of Geneva. 7, Rue des Batoirs, CH-1205 Geneva, Switzerland. Klaus.Scherer@unige.ch