COGNITION AND EMOTION, 1997, *11* (2), 113–150

Profiles of Emotion-antecedent Appraisal: Testing Theoretical Predictions across Cultures

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Placed in a context of appraisal theories of emotion-elicitation and differentiation the present study pursues three aims: (1) testing theoretical predictions based on the author's Stimulus Evaluation Check (SEC) model; (2) examining the number and types of appraisal dimensions necessary for emotion differentiation and the relative importance of different dimensions; and (3) determining the similarity of emotion-specific appraisal profiles across cultures. The data reported were gathered in a large-scale intercultural study in which 2921 respondents in 37 countries were asked to recall recent experiences of joy, sadness, fear, anger, disgust, shame, and guilt; and to answer questions concerning their appraisal of the emotion-eliciting event. The results support many but not all of the SEC model's predictions. Multiple discriminant analyses suggest that a relatively small number of appraisal dimensions may be sufficient to classify the major emotion categories with a reasonable degree of accuracy. Cross-cultural comparison shows that emotion-specific appraisal profiles correlate highly across geopolitical culture regions although there are consistent differences for some regions.

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A large number of researchers have conducted the questionnaire study in the respective countries and have contributed important suggestions to the overall design of the research programme. In consequence, they have to be considered as co-authors even though they are too numerous to list in the author line. They are listed in alphabetical order together with the university where the study was conducted: Elisha Babad, Hebrew University of Jerusalem, Israel; Eva Baenninger-Huber, University of Zurich, Switzerland; Cleve Barlow, University of Auckland, New Zealand; Marek Cielecki, University of Warsaw, Poland; Cindy Gallois, University of Queensland, Australia; Jo Kleiven, Oppland Regional College, Norway; Jacques Cosnier, University II of Lyon, and Monique Allès-Jardel, University of the Provence, Aix-en-Provence, France; Britt-Marie Drottz, University of Göteborg, Sweden; Heiner Ellgring, University of Würzburg, Germany; Alfonso Jimenez-Fernandez and Jose Miguel Fernandez-Dols, Autonoma University of Madrid, Spain (J.M. Fernandez-Dols

INTRODUCTION

A central research topic in the psychology of emotion is the study of the processes that underlie the *elicitation* and *differentiation* of emotional responses. The emergence of *appraisal theories* marks a major advance towards this aim. These theories, developed quite independently of each other during the last 15 years, suggest that the nature of an emotional reaction is based on the individual's subjective appraisal or evaluation of an antecedent situation or event (Arnold, 1960; Conway & Bekerian, 1987; Dalkvist & Rollenhagen, 1989; De Rivera, 1977; Frijda, 1986; Lazarus, 1968, 1991; Mees, 1985; Oatley & Johnson-Laird, 1987; Ortony, Clore, & Collins, 1988; Roseman, 1984, 1991; Scherer, 1981, 1982, 1983, 1984a,b, 1986, 1988; Smith & Ellsworth, 1985; Solomon, 1976; Weiner, 1982, 1986). The evaluation is generally considered to rely on cognitive processing (at both cortical and/or subcortical levels; see LeDoux, 1989; Leventhal & Scherer, 1987; Scherer, 1993a) of environmental or proprioceptive stimuli.

There is a high degree of convergence with respect to the nature of the appraisal dimensions postulated by different theories, in spite of widely divergent disciplinary and historical traditions (see Lazarus & Smith, 1988; Manstead & Tetlock, 1989; Reisenzein & Hofmann, 1990, 1993; Roseman, Spindel, & Jose, 1990; Scherer, 1988). In addition to this convergence, which suggests high face validity of the underlying assumptions, a number

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especially for his help in collecting the data in Costa Rica, Honduras, Mexico, Guatemala, Venezuela, Chile, and El Salvador), [within these countries we extend our thanks to: Mirta Gonzalez (Costa Rica), Otto E. Gilbert (Guatemala), Isabel de Villanueva (Honduras), Rolando Diaz-Loving (Mexico), Ignacio Martin (El Salvador), Angelica Gonzalez and Gonzalo Zaror (Chile), and Pedro R. Rodriguez (Venezuela)]; Tsutomu Kudoh, University of Osaka, Japan; Hing-Keung Ma, Chinese University of Hong Kong, Hong Kong; David Matsumoto, University of California, Berkeley, USA; Silvia Maurer-Lane and Silvia Friedman, Catholic University of São Paulo, Brazil; Gerold Mikula, University of Graz, Austria; Alastair Mundy-Castle, University of Lagos, Nigeria; Rauni Myllyniemi, University of Helsinki, Finland; Usha S. Naidu, Tata Institute of Social Sciences, Bombay, India; Vladimir Nesic, University of Nis, Croatia; S. Nyandia-Bundy and R.P. Bundy, University of Zimbabwe, Zimbabwe; Robert F. Norton, American University of Beirut, Lebanon; Dimitra Papadopoulou and D. Markoulis, University of Thessaloniki, Greece; Karl Peltzer, University of Malawi, Malawi; Catherine Peng, University of Oxford, England, who collected the data in the People's Republic of China; Pio Ricci-Bitti and Dino Giovannini, University of Bologna, Italy; Luis Soczka and Constanza Paul, University of Porto, Portugal; Velina Topalova, Bulgarian Academy of Sciences, Bulgaria; Ad Vingerhoets and J. Hendriksen, Catholic University of Nijmegen, The Netherlands; C. Westenholz-Bless, University of Zambia, Zambia.

The author would like to thank Robert Rosenthal, Harald Wallbott, and Ursula Scherer, for helpful comments and suggestions concerning data analysis and manuscript preparation.

of recent empirical studies have provided support for the notion that a limited number of appraisal or evaluation dimensions are sufficient to explain the elicitation and differentiation of emotional states. These studies have used a variety of different paradigms to establish the relationship between particular configurations of appraisal results and the nature of the ensuing emotional reaction (see also Ellsworth, 1991; Lazarus & Smith, 1988; Parkinson & Manstead, 1992; Scherer, 1988): (1) asking subjects to recall specific emotional experiences and questioning them about the outcome of antecedent evaluation processes (Ellsworth & Smith, 1988; Folkman & Lazarus, 1988; Frijda, Kuipers, & ter Schure, 1989; Gehm & Scherer, 1988; Mauro, Sato, & Tucker, 1992; Reisenzein & Hofmann, 1993; Reisenzein & Spielhofer (1994); Roseman et al., 1990; Smith & Ellsworth, 1985; Tesser, 1990); (2) making use of naturally occurring or emotion-producing events such as examinations or inducing emotions experimentally and obtaining judgements on appraisal processes (Folkman & Lazarus, 1985; Smith, 1989; Smith & Ellsworth, 1987); (3) having emotion words judged as to the appraisal implications of the underlying concepts (Conway & Bekerian, 1987; Frijda, 1987; Parkinson & Lea, 1991; Smolenaars & Schutzelaars, 1986/87); and (4) using vignettes or scenarios that have been systematically manipulated with respect to appraisal-relevant dimensions and asking subjects to indicate the emotional reactions that they—or a fictitious other—might experience in this situation (McGraw, 1987; Roseman, 1984; Russel & McAuley, 1986; Smith & Lazarus, 1993; Stipek, Weiner, & Li, 1989; Weiner, Amirkhan, Folkes, & Verette, 1987; Weiner, Graham, & Chandler, 1982; Weiner, Russell, & Lerman, 1979). On the whole, these studies provided substantial support for many of the theoretical claims of appraisal theorists.

Three concerns seem of paramount importance for the future development of this research area: (1) development of tight theoretical predictions and empirical testing of concrete hypotheses; (2) parsimony with respect to the number of appraisal dimensions postulated and an assessment of their relative importance; and (3) systematic study of individual, group, and cultural differences in the operation of emotion-antecedent appraisal processes.

Theoretical prediction. Roseman (1991, p. 167) has pointed out that only relatively few appraisal theorists have proposed detailed and concrete theoretical predictions as to which emotional state ought to occur as a consequence of a particular configuration of appraisal results. In the interest of cumulative research, it seems desirable to elaborate a detailed set of hypotheses, based on a theoretically derived set of appraisal dimensions, that can be empirically tested. The results of such hypothesis-testing studies can give rise to further theoretical refinement in general, and to

regular revision of predictions (e.g. see Roseman et al., 1990; Scherer, 1993b).

Parsimony and relative importance of appraisal dimensions. One can identify three major approaches with respect to the set of appraisal dimensions suggested to explain emotion-elicitation and differentiation:

(1) a *reductionist* approach, reducing the number of dimensions to a minimum, often based on the assumption of fundamental motive constellations or prototypic themes (Lazarus, 1991; Oatley & Johnson-Laird, 1987; Stein & Trabasso, 1992);
(2) an *eclectic* approach, attempting to enumerate as many appraisal dimensions as considered useful to maximise the differentiation between the ensuing emotional states (Frijda, 1986, 1987); and
(3) a *principled* approach (e.g. Roseman, 1991; Scherer, 1984a, 1986, 1993b; Smith & Ellsworth, 1985), postulating a restricted number of abstract (in the sense of being devoid of specific content such as type of underlying goal or specific theme) appraisal dimensions which are considered to be sufficient to account for the differences among the major emotion categories. The principles underlying the selection and definition of the appraisal criteria vary across theories; in the case of the author's model they are determined by stimulus features, personal relevance, coping potential, and normative context (see Scherer, 1984b, for an account of the development of the theory).

Obviously, a larger set of nonredundant appraisal dimensions is likely to explain a larger proportion of the variance in a given set of emotion categories. Yet, in the spirit of Occam's razor, it would seem preferable to be able to predict the general nature of the emotional reaction on the basis of a relatively small set of appraisal dimensions (to discriminate an agreed-upon set of major emotion categories). It is suggested, therefore, that one should set a desired level of accuracy for the classification of outcome emotions on the basis of a set of appraisal dimensions and to determine empirically how many and which dimensions are required to attain this level.

Reisenzein and Hofmann (1993) have attempted to establish such a criterion accuracy. They report data that specifies the maximum level of discrimination that human judges can achieve on the basis of a *full* description of an emotional event by the individual who experienced the situation. The information provided to the judges included not only abstract appraisal dimensions as suggested by appraisal theorists but also content cues, such as descriptions of prototypic situations. Subjects asked to recognise the respective emotions on the basis of scenarios consisting of such exhaustive descriptions of antecedent events reach an accuracy per-

centage of 65–70%, averaged over different emotions. Consequently, it would be surprising if one of the appraisal theories, using only a smaller set of abstract appraisal dimensions, were to be able to discriminate the outcome emotions correctly in about 65–70% of the emotion situations studied.

A lower recognition rate has indeed been found in studies where only relatively abstract appraisal dimensions are available to judges or to discriminant analysis algorithms. For example, Smith and Ellsworth (1985) correctly classified 42% of 15 emotions, using 6 predictors (factor scores); Frijda et al. (1989) reported 32% (study 1, 32 emotions, 19 appraisal variables) and 43% (study 2, 32 emotions, 23 appraisal variables); Reisenzein and Spielhofer (1994) found 43% (chance corrected) for 30 emotions, 58% for 22 emotions (using 22 appraisal variables in both cases). Reisenzein and Hofmann (1993) argue that inclusion of further appraisal dimensions may augment recognition or classification accuracy although they do acknowledge the problems of including variables that are not *bona fide* appraisal dimensions (e.g. action tendencies). Clearly, inclusion of variables other than appraisal dimensions no longer allows one to view a discrimination study as a simulation of emotion-*antecedent* appraisal processes in the sense of most appraisal theories.

It becomes an issue of empirical study, then, to determine how many appraisal dimensions (and which particular set of them) are needed to get as close as possible to a criterion value, taking into consideration how much discriminatory power is added by each additional predictor. As this optimal number depends in part on the number of different emotions to be classified one needs to adopt a standard set of emotions to compare the predictive power of different appraisal theories. A modest beginning might be to select the major emotion categories found in many theoreticians' lists (e.g. anger, fear, joy, sadness, disgust, shame, and guilt).

Apart from *number*, a major issue of interest is the *relative importance* of particular criteria (i.e. their contribution to classification success). Several of the empirical studies cited earlier show (based on correlational or regression analyses) that the different appraisal dimensions vary widely in importance with respect to their contribution. For example, the studies by Smith and Ellsworth (1985, 1987), Folkman and Lazarus (1988), Mauro et al. (1992), and Roseman et al. (1990) all indicate that the criterion of agency or causation is one of the strongest prediction criteria (as one might have predicted from Weiner's work, 1982, 1986). Thus, it seems an important task for further studies in this area to determine systematically the relative weight of the various dimensions proposed in predicting the quality and intensity of emotional reactions.

Cross-cultural differences. Scholars of emotion are currently engaged in a lively debate opposing a universalist position, which assumes a phylo-

genetically based biopsychological emotion mechanism, to a cultural relativist position, which assumes that emotions are necessarily part of cultural meaning structures (see Scherer & Wallbott, 1994). Although much of the debate centres on the use of emotion vocabulary (Mesquita & Frijda, 1992; Russell, 1991) or the universality of expressive behaviour (Ekman, 1994; Mesquita & Frijda, 1992; Russell, 1994), the universality or cultural-specificity of appraisal mechanisms is also of major importance. Even if emotion were to be considered a relatively universal biopsychological mechanism, one could assume that the nature of the eliciting events and the type and intensity of emotional reactions to similar events would be highly different across different cultures (see Mesquita, Frijda, & Scherer, 1997).

There is evidence that differences in the actuarial frequency of particular events (e.g. crime, see Scherer, Wallbott, Matsumoto, & Kudoh, 1988), in the relative importance of particular aspects of social life such as the family (see Mesquita, in press), in the definition of self-identity (Markus & Kitayama, 1991), or in the nature of cultural value systems (see Shweder, 1993) all play an important role in the elicitation and differentiation of emotional reactions.

It is conceivable, however, that such differences are limited to the surface structure of the emotion-eliciting events, such as type of situation or type of cultural value involved, and that the differences might disappear once an analysis of the appraisal process is conducted on the basis of relatively abstract appraisal dimensions (see earlier). in other words, the nature of the appraisal process and the set of evaluative criteria used in it might well be part of the universal biopsychological mechanism. For example, although specific goals are likely to be strongly determined by cultural values, the abstract appraisal of the goal conduciveness of an event might not be.

There are, to date, very few empirical data sets relevant to this intriguing issue. Mauro et al. (1992) studied the differentiation of 14 emotions by a set of 10 appraisal dimensions (based on the models suggested by Roseman, Scherer, and Smith and Ellsworth, and operationalised by 28 questions/variables) in a comparative study with students in the United States, Japan, the People's Republic of China, and Hong Kong. They concluded that few differences between cultures are observed for the more "primitive" dimensions such as pleasantness, attentional activity, certainty, coping potential, and goal/need conduciveness. With respect to more complex appraisal processes, they reported few differences for legitimacy and norm-self-compatibility but more substantial differences for control, responsibility, and anticipated effort.

Work in this area needs to establish whether the appraisal processes that have been postulated by researchers from Western civilisations, mostly

using English, German, and Dutch, can be demonstrated to operate in widely different culture regions and language groups. It would be a modest beginning to examine whether emotion-specific appraisal profiles are strongly correlated across countries with different climates, languages, socioeconomic conditions, lifestyles, and existential philosophies.

The present paper addresses the three issues outlined earlier in the context of a large-scale intercultural study of emotional experience (see also Gehm & Scherer, 1988; Wallbott & Scherer, 1986/1988, for preliminary, partial reports on this long-term project). Using a specially developed questionnaire, we asked respondents in 37 countries to recall recent experiences of seven emotions (joy, anger, fear, sadness, disgust, shame, guilt), and to describe the patterns of their appraisal of the situation or event and their reactions in different response domains. Whereas an earlier article presented the results concerning the emotional reaction patterns (Scherer & Wallbott, 1994), the present paper reports the data relevant to the emotion-antecedent appraisal processes.

With respect to the first issue, *theoretical prediction*, this paper presents a partial test of the author's predictions on emotion differentiation. These predictions were generated within the framework of a psychobiologically oriented *component process model of emotion* (Scherer, 1981, 1984a,b, 1986, 1993a,b). This model defines emotions as episodes in which an internal or external stimulus or event of major relevance to an organism's needs and goals produces a synchronisation of all of the major organismic systems. The theory postulates that the elicitation, and the consequent differentiation, of the emotion episode is determined by an appraisal process in the form of a series of *stimulus evaluation checks* (SECs): novelty/suddenness, intrinsic pleasantness, goal-conduciveness, coping potential, and compatibility with standards. These SECs can and do occur at different levels of central nervous system (CNS) functioning (Leventhal & Scherer, 1987) which turns the issue of whether appraisal is necessarily cognitive into a moot question (see LeDoux, 1989; Scherer, 1993a).

Since the first formulation of the model (Scherer, 1981) the author has attempted to elaborate a relatively exhaustive set of concrete predictions as to which particular SEC result configurations ought to produce particular emotional states. This set of detailed predictions has been constantly revised on the basis of theoretical refinement, suggestions by other appraisal theorists, and empirical evidence. The latest and most complete version of the predictions was published in Scherer (1988). Although a detailed description of the theoretical background cannot be provided in the context of this paper (see Scherer, 1984a,b, 1986, 1988, 1993a,b for further details), it is necessary to specify the predictions pertinent to the empirical work reported here. This is a rather difficult enterprise for several reasons.

Because this long-term cross-cultural study was designed in 1984, the appraisal-related questions in the questionnaire used in this study were based on the state of the theoretical framework at that time (Scherer, 1984a). Furthermore, as will be shown in the Method section, given the practical constraints of a study involving collaborators in 37 countries, only a subset of the SECs could be studied, and only in a somewhat rudimentary manner (because the questionnaire format and the nature of the administration permitted neither a very subtle characterisation of the SECs in lengthy, elaborately worded questions nor a large number of such questions). In consequence, the 8 questions used to assess SECs in the present study cannot do justice to the profile of 16 subchecks included in the more recent published predictions. In one case, however, there is *more* differentiation: Perceived fairness or justice had been postulated as a separate check in earlier versions of the theory (i.e. Scherer, 1984a) and was therefore included as a separate question. In the more recent versions, this dimension has been subsumed under the SEC *Compatibility with external standards*.

Another problem concerns the nature of the emotion categories. In this study, only basic emotion categories are used which are not as differentiated in terms of families as suggested in Scherer (1986) which forms the basis for more recent SEC predictions. For example, whereas earlier predictions (and this study) use the category "anger", Scherer (1986, 1988) provides different SEC profiles for "irritation/cold anger" versus "rage/hot anger".

Table 1 shows an attempt to "distil" the spirit of the more recent appraisal (SEC) pattern predictions for the seven emotion categories studied and for the variable labels to be used in this study (which reflect the concrete question asked and the direction of the coding). This attempt is based on condensing and adapting the predictions shown in table 2 in Scherer (1986) and table 5 in Scherer (1988). In this process it was often necessary to combine two or more subchecks from more recent predictions (e.g. control, power, and adjustment for coping potential) into one single prediction for an SEC variable in this study (e.g. coping ability). Similarly, partially different predictions for members of an emotion family (e.g. sadness/dejection vs. despair) had to be combined to provide one prediction for the overall emotion category, or family name (e.g. sadness). In cases of doubt or uncertainty, a conservative decision was taken by avoiding a clear prediction and entering "open" (i.e. different SEC results are considered compatible with the respective emotion) into Table 1. An ANOVA approach, using 1 degree of freedom contrasts will be used to test the theoretical predictions in this table with respect to the ordering of the emotions on a particular appraisal dimension.

TABLE 1
Predictions on Emotion Differentiation based on Stimulus Evaluation Checks

	Joy	*Fear*	*Anger*	*Sadness*	*Disgust*	*Shame*	*Guilt*
Novelty/Expectancy							
Expectedness	Open	Low	Open	Open	Open	Open	Open
Intrinsic Pleasantness							
Unpleasantness	Low	High	Open	Open	Very high	Open	Open
Goal/Need-conduciveness							
Goal hindrance	Very low	High	High	High	Open	Open	Low
Coping Potential							
External causation	Open	External	External	Open	External	Internal	Internal
Coping ability	Medium	Very low	High	Low	Open	Open	Open
Compatibility with standards							
Immorality	Open	Open	High	Open	Open	Open	Very high
Self-consistency	Open	Open	Low	Open	Open	Very low	Very low

Note: This table is based on table 2 in Scherer (1986) and table 5 in Scherer (1988). Open = different evaluation results are compatible with the respective emotion and/or further detail (on subtype of emotion and/or subchecks) needed for predictions.

With respect to the *parsimony* issue, the SEC model belongs to the *principled* approach to appraisal (see earlier). The question to be investigated in this paper is how close one can get to an accuracy criterion (such as the 65–70% suggested by Reisenzein & Hoffmann, 1993, see earlier) on the basis of only eight criteria or fewer. Instead of recognition accuracy by human judges, the percentage of hits and misses obtained via discriminant analysis will be used as an accuracy criterion in the present study. Although the scope of the present study does not allow one to settle the issue, the data can provide a first glimpse at some of the issues to be tackled in further research. Appraisal profiles will be presented to illustrate the distinctiveness of the SEC pattern for each emotion and the relative importance of the different SECs. Furthermore, an attempt will be made to use the discriminant functions to evaluate the relative importance of the appraisal dimensions studied quantitatively.

The *generalisability across cultures* of emotion-antecedent appraisal processes has rarely been studied. Although the component process model developed by the author considers emotion to be a universal psychobiological mechanism, the eliciting factors, the nature of goals and norms entering the appraisal process, as well as control and regulation processes, are thought to be culturally determined. To assess the extent of cultural influences on appraisal, it seems necessary to study a large number of *diverse* cultures. The similarity of the appraisal profiles in the data from the large-scale cross-cultural study on which this paper is based will be examined on the basis of profile correlations between major geopolitical culture regions.

METHOD

Background

A detailed description of the methodology used in this extensive cross-cultural study (conducted from 1984 to 1992) is provided in Scherer and Wallbott (1994). In that paper issues such as the development of the precoded questionnaire (based on the results for free-format questionnaires used in earlier studies, Scherer, Wallbott, Matsumoto, & Kudoh, 1988; Scherer, Wallbott, & Summerfield, 1986), the choice of emotions to be studied, the choice of emotion components investigated, the choice of countries included in the sample, translation and back-translation of the research materials, and subject characteristics are presented in great detail. In an effort to save space, only the factual information on methodological details of the research procedure are provided here.

Questionnaire Design

The questionnaire consisted of a one-page general instruction and seven two-page sections, one for each of the seven emotions studied (joy, anger, fear, sadness, disgust, shame, guilt). The instruction asked the respondent to recall a situation in which he/she had recently experienced a strong emotion of the kind indicated and for which they vividly remembered the circumstances and their reactions. They were assured of total anonymity and asked to reply to each of the questions with respect to the situation and the emotional experience generated by the latter. Finally, an example was provided for the circling of the response alternatives.

The two-page questionnaire section for each of the seven emotions consisted of four parts: (1) *Situation description; (2) Subjective feeling state*; (3) *Physiological symptoms and expressive reactions* (see Scherer & Wallbott, 1994, for further details on (1)–(3), and Scherer, 1988, for a reproduction of the complete questionnaire); (4) *Appraisal*. Nine questions on novelty/expectation, pleasantness, goal-conduciveness, fairness, responsibility/causation, coping ability, morality, and relationship to self-concept (see Scherer, 1984a) were posed (with precoded answer alternatives appropriate to the question concerned). The choice and the formulation of these questions were a compromise between: (a) attempting to represent as many checks and subchecks of the SEC model as possible; and (b) having to keep the questionnaire relatively short and to express the SECs in a simple, straightforward manner. As mentioned in the Introduction, the constraints of question formulation in this study do not in all cases allow one to capture the core meaning of the SECs. Possible difficulties of interpretation stemming from these problems will be discussed case by case in the presentation of the results.

The detailed wording of the questions and the answer alternatives (in the form in which they were coded for statistical analysis) are listed later in the order in which they appeared in the questionnaire (the SECs or subchecks which were operationalised by each question are given in square brackets before the text of question; the variable names used throughout the paper—which indicate the direction of the answer categories in their formulation—are in *italics* following the text of the question):

Now please think back to the situation or event that caused your emotion.

[Novelty/Expectation]—Did you *expect* this situation to occur? (1 not at all, 2 a little, 3 very much) *Expectedness*

[Intrinsic Pleasantness]—Did you find the event itself *pleasant* or *unpleasant*? (1 pleasant, 2 neutral, 3 unpleasant) *Unpleasantness*

[Goal-conduciveness]—How *important* was the event for your *goals, needs, or desires at the time it happened*? Did it *help* or *hinder* you to follow your plans or achieve your aims? (1 it helped, 2 it didn't matter, 3 it hindered) *Goal hindrance*

[Compatibility with external standards—Fairness]—Would you say that the situation or event that caused your emotion was *unjust* or *unfair*? (1 not at all, 2 a little, 3 very much) *Unfairness*

[Coping potential—Agent]—Who do you think was *responsible* for the event in the first place? Check one, the most important of the following: (a list of 10 categories of possible agents, recoded as: 1 self, 2 close persons, 3 other persons, 4 impersonal agency) *External causation*

[Coping potential—Control/Power/Adjustment]—How did you evaluate your *ability to act on or to cope with the event and its consequences* when you were first confronted with this situation? Check one, the most appropriate, of the following: (a list of 5 categories, reordered on a continuum of having or needing less power to deal with an event to being able to positively influence an event: 1 powerless, 2 escape possible, 3 pretend nothing happened, 4 no action necessary, 5 could positively influence event and change consequences) *Coping ability*

[Compatibility with external standards—Norms]—If the event was caused by your own or someone else's behaviour, would this behaviour itself be judged as *improper* or *immoral* by your acquaintances? (1 not at all, 2 a little, 3 very much) *Immorality*

[Compatibility with internal standards—Self-ideal]—How did this event affect your *feelings about yourself*, such as your *self-esteem* or your *self-confidence*? (1 negatively, 2 not at all, 3 positively) *Self-consistency*

The *italicised* parts of the questions were underlined in the questionnaire. in addition to the answer alternatives listed, respondents could check the category "not applicable" for each of the questions. This answer alternative was included to respond to appraisal questions that they considered to be irrelevant to the situation concerned. However, the possibility that respondents also checked this alternative for other reasons (e.g. in the sense of *Don't know* or *Don't remember*) cannot be ruled out.

The sequence of the seven target emotions was randomised over respondents to control for order effects. At the end of the booklet, respondents were asked to complete a personal background questionnaire containing questions concerning gender, age, field of study, religion, language, country of origin, and parents' education and occupation. Because these background variables had little effect on most of the variables in the study, no results for these variables will be reported.

Sampling of Countries

The aim was to study a sufficiently large number of rather diverse countries to obtain a representative sampling of culture differences. Because this research was conducted essentially without any external funds, a convenience sample of countries was obtained by contacting colleagues in different countries who were interested and able to participate in the study without funding.

Translation of the Questionnaire

The "pragmatic" type of translation (Brislin, 1980) was used, emphasising the accuracy of the information intended to be conveyed in the source language form (in this case English). The emotion question was translated into the language spoken in each of the participating countries by the local collaborator and his or her associates. Collaborators received the original English version as a model, together with detailed instructions on the translation process, particularly the procedures to follow for back-translation. The principal investigators checked a large number of these translations and back-translations but were obviously unable to verify the accuracy in all cases, particularly in the case of the more "exotic" languages. There can be little doubt that the translations, especially of the emotion labels, do not ensure complete overlap with respect to denotative and particularly connotative meaning in all the languages studied. To the extent that there are differences this would increase error variance. However, a systematic check of the concrete situation descriptions (which were translated into English and returned to the investigators with the quantitative data from most countries) showed that no major translation problems were encountered.

Sampling of Subjects

Given the large number of cultures studied, we decided for reasons of comparability and of practicability that groups of students in major city universities were to be used in each country. As a consequence, the generalisability of the data to be reported is limited to "modern mass societies". The choice of respondent populations also implies a fairly high degree of "Westernisation" in many of the countries studied, which may well reduce the chances of finding cultural differences (see Scherer & Wallbott, 1994, for a more detailed discussion of this important point).

The collaborators in each of the sites were asked to recruit about 100 students, about 50% male and 50% female. In addition, they were to

obtain, whenever possible, about 50% psychology students and 50% non-psychology students. Foreign students were to be excluded as far as possible and age range constraints (18–35 years) were to be observed. These criteria were also used in the final data analysis to exclude all cases that did not fit these constraints. In total, 2921 respondents were retained in the data set, 55% women, 45% men, with a mean age of 21.8 years. Of the respondents 43% were psychology students, whereas the rest were studying a variety of other disciplines (see Scherer & Wallbott, 1994, for a detailed breakdown of subject characteristics by country).

Administration, Coding, and Analysis of the Questionnaire

The questionnaire was administered to groups of students in class, under conditions that would guarantee complete anonymity to each respondent. The collaborators and their associates in each of the participating countries transferred the data from the questionnaires to data coding sheets and translated the text of the situation descriptions into English. Central data-processing and analysis were performed at the University of Giessen and the University of Geneva.

RESULTS

Analysis of the "Not Applicable" Responses

As described earlier, respondents could reply with "not applicable" to the appraisal questions in order not to force them to apply the suggested criteria to the situation in question. Overall, this special answer category was selected for 16.3% of all responses, approximately evenly distributed over the seven emotions. However, there were systematic differences for the SECs. The number of "not applicable" responses was below average for Expectedness (6.3%), Unpleasantness (5.5%), and Coping ability (3.9%). They were above average for Goal hindrance (22.8%), Unfairness (28.1%), and Immorality (30.1%), except in the case of anger. These responses were particularly frequent for Immorality in the case of fear (41.7%) and sadness (45.3%)

Although these results are interesting in their own right, the "not applicable" answer category poses problems with respect to the analysis of the main data set. Because this category cannot be integrated into the interval scale format that is used for the responses on the different dimensions, it has necessarily to be treated as missing observation. This has little effect on univariate analyses (because, as shown earlier, only a relatively

small percentage of such responses is found for any one variable). However, in the case of multivariate analyses, which by definition involve listwise exclusion of cases with missing observations, it does result in a serious reduction of the *N*. As the probability that a respondent is excluded if he/she used the "not applicable" category is multiplied by 7 (the number of emotions studied) and because the incidence of the use of this category is uniformly distributed over respondents and emotions, very small numbers of such answers can lead to a serious reduction of analysable cases in multivariate analyses using listwise exclusion of missing values. To avoid this problem for the multivariate analyses reported later, the "not applicable" answers were declared as missing observations which were then replaced by the respective class mean for that variable (following the most appropriate, conservative strategy for the replacement of missing values, see Tabachnik & Fidell, 1989).

Testing the SEC Predictions in the Component Process Model

This analysis consisted of an examination of whether, for each SEC variable separately, the means for the emotions studied could be rank-ordered according to the predicted pattern (shown in Table 1). Matrices for planned comparisons in the form of orthogonal contrasts (7×7) were constructed for use with the special contrast option of the SPSS MANOVA program. As an example for the approach used, Table 2 shows the matrix of contrasts and the repeated-measure ANOVA results for one of the SECs, in this case *Unpleasantness*. The rows marked by *pp* (published prediction) show the contrast effects that were generated by publishing theoretical predictions based on the author's component process model (see Table 1). The remaining rows of the contrast matrix were constructed *ad hoc* to satisfy the criterion of orthogonality of the contrasts (weights across rows and cross-row products must sum to zero). These *ad hoc* contrasts (shown as *ah*) were constructed in such a way as to allow subsequent interpretation on theoretical or common sense grounds.

The repeated-measure ANOVAs, using a 7-level (emotion) within-subjects factor and the special contrasts chosen, yield, in addition to the overall *F* for the emotion factor, univariate *F*-tests for each of the 6 contrasts in the matrix (the first row always corresponds to the grand mean). In the example in Table 2, these *F*-values, together with the respective effect size estimate η (eta), are shown in the last two columns. For the sake of brevity only these two values are reported in the following results. In interpreting the results, the reader should be mindful of the problems of operationalising the SECs by the brief and relatively undifferentiated questions imposed by the cross-cultural questionnaire design.

TABLE 2

Example for the Use of Orthogonal Contrasts in Testing Predicted Differences between Emotions (SEC Variable: *Unpleasantness*)

Contrast	*Joy*	*Fear*	*Anger*	*Sadness*	*Disgust*	*Shame*	*Guilt*	*Source*	*F*	(η) *Eta*
0	1	1	1	1	1	1	1			
1	−6	1	1	1	1	1	1	*pp*	50810.2	.979
2	0	−1	−1	−1	5	−1	−1	*pp*	50.1	.159
3	0	4	−1	−1	0	−1	−1	*pp*	n.s.	.028
4	0	0	−1	3	0	−1	−1	*ah*	n.s.	.065
5	0	0	1	0	0	1	−2	*ah*	13.4	.078
6	0	0	1	0	0	−1	0	*ah*	75.0	.183

Note: Contrasts: *pp*, published prediction; *ah*, *ad hoc* prediction. Only significant results with $P < .001$ are reported, $df = 1/2171$).

Post hoc comparisons of differences among emotions. Because the a priori predictions covered only part of the observed differences among emotions (as indicated by a relatively large number of the *ad hoc* comparisons that reached significance in the analysis of the orthogonal contrasts), *post-hoc comparisons* between the emotion means, using the Student-Newman-Keuls procedure, were also computed in addition. This was done on the basis of two assumptions: (1) the mean value of an SEC variable for a specific emotion and for a specific country represents a rather stable estimate of the response tendency concerned in that country; (2) even though the answers of each *individual* subject for the seven emotions are probably not independent of each other, the *means across all subjects* in a country are likely to be independent *for the different emotions* (because one may assume that subjects experience and perceive the relationships between emotions somewhat differently, it is to be expected that the dependencies cancel each other out in the process of averaging). A one-way ANOVA, with emotion as a 7-level factor and with the 37 country means per variable as observations, was computed. This procedure results in conservative Student-Newman-Keuls estimates of significant differences between means and in homogeneous subgroups among the levels of the emotion factor.

The rank ordering of the emotions as suggested by this analysis is given later for each SEC variable. Each group of emotions joined by an equal sign (=) represents a homogeneous subgroup with respect to the particular variable (i.e. the means are not significantly different from each other). The smaller than signs (<) indicate boundaries between homogeneous subgroups (i.e. each emotion mean on the right of the sign is significantly different from the ones to the left). Overlap of two homogeneous subgroups is marked by < = (i.e. the two adjacent means linked by < = are not significantly different from each other but there is a significant difference with the mean once removed in the direction of the < sign).

The results of the planned and the *post hoc* comparisons will now be discussed for each of the SEC variables separately (see also the discussion of the questions in the Method section).

Expectedness. The novelty/expectation SEC was assessed by asking whether the situation had been expected or not. A large difference between fear and all other emotions was predicted, based on the assumption that fear events often occur in a particularly sudden and abrupt fashion. Although this contrast is significant ($F = 29.8$, $df = 1/2094$, $\eta = .12$), the effect is not very strong and the means suggest that events that elicit anger, disgust, and shame are about as unexpected as those that provoke fear. One might speculate that the absence of a stronger effect of higher novelty or suddenness in fear situations might be due to the fact that some of the

situations reported in response to the fear label could be labelled *anxiety situations* for which low suddenness would be expected. This result again underlines the necessity of distinguishing between subtypes of major emotion categories such as anxiety versus panic fear or hot versus cold anger (see Scherer, 1986).

Joy-eliciting situations seem to be a case apart; they are much more expected than any other emotion. *Post hoc* comparison of the means suggests the following ordering with respect to the suddenness/expectedness of the eliciting event (from *unexpected* to *expected*): anger = disgust < = shame < = fear < = guilt < = sadness < joy.

Unpleasantness. The intrinsic pleasantness SEC was assessed by simply asking for the "pleasantness" of the event *itself* as we decided that the notion of "intrinsic" might be too subtle to be used in this context (see Scherer, 1988, pp. 96–98, for a more detailed discussion of the distinction between a rudimentary "intrinsic pleasantness check" and the perceived pleasantness of an emotional episode or experience). As predicted, the events producing the only positive emotion in the list, joy, are judged as immensely more pleasant than all other events (F = 50810.2, df = 1/2171, η = .98).

The prediction, based on Darwin, that disgust is a special response to intrinsically very unpleasant stimuli is borne out by a significant effect contrasting disgust with all other negative emotions (F = 50.1, df = 1/2171, η = .16). The prediction that fear-producing stimuli or situations are perceived as more intrinsically unpleasant than those eliciting anger, sadness, shame, and guilt (where the evaluation might depend more on a transaction with the individual's goals, needs, or standards) was not supported. The order suggested by the *post hoc* comparison (from *pleasant* to *unpleasant*): joy < shame = guilt < fear < = sadness < disgust = anger.

Goal Hindrance. The goal/need conduciveness check was assessed by asking whether the event had helped or hindered in reaching goals or satisfying needs. Again, as predicted, events causing the only positive emotion, joy, had helped, whereas events causing negative emotions had been more likely to hinder (F = 3253.8, df = 1/950, η = .88). More interesting is the second predicted contrast (F = 45.5, df = 1/950, η = .21): Events causing disgust, shame, and guilt were significantly less of a block or hindrance to goal achievement or need satisfaction than were fear, anger, and sadness. (However, although the second predicted contrast was significant overall, the z-score for fear was not different from disgust, guilt, or shame; see later.) It is possible that disgust is often provoked by a goal-irrelevant stimulus and that actions leading to shame or guilt are often undertaken to satisfy a need. The following ranking of the means is

assessed in an indirect fashion by a question about whether the event had positive or negative effects on the respondent's self esteem.

Immorality. Two contrasts were based on prior predictions. As expected, events leading to guilt and anger were perceived as more immoral than those eliciting the other emotions (F = 161.8, df = 1/640, η = .10). Contrary to expectation, however, guilt-producing events are not seen as more immoral than anger-producing events (F, n.s.). The prediction had been based on the assumption that guilt should always imply the violation of a social norm or expectation, whereas this should not necessarily be the case for anger. Interestingly, and unexpectedly, disgust-producing events were also seen as highly immoral. The *post hoc* comparison of the means yields the following ranking of the emotions relative to the perceived immorality of eliciting event (from *low* to *high*): joy < sadness < fear < shame = guilt < anger = disgust.

Unfairness. Although perceived immorality of an action clearly implies that external, social standards have been violated, the issue of fairness is more complicated. Perceived unfairness is obviously a powerful determinant of emotion but it is not clear to what extent fairness is defined by social standards. It is possible to argue that there is a very fundamental, almost phylogenetically continuous notion of "deservedness" that is at the basis of fairness (see Scherer, 1992b, pp. 4–7). Because the feeling of deserving a particular outcome is related partly to internal standards and causal attributions, fairness judgements might present a complicated mix of attribution of responsibility and checks of compatibility with external and internal standards. Future theoretical and empirical work will have to elucidate these issues. No specific predictions were tested because fairness had been subsumed under the norm compatibility check. *Post hoc* comparisons of the means in this study suggest the following ranking on unfairness of the eliciting event (from *low* to *high*): joy < shame = guilt < fear < sadness < disgust < anger.

Self-consistency. The internal standards compatibility SEC found to be exceedingly difficult to assess in a simple question was approximated by asking whether the event had had a positive or negative effect on self-esteem. Three prior predictions were tested by planned contrasts. As might be expected, the prediction that situations inducing shame and guilt, the two negative self-reflective emotions, would produce a negative effect on self-esteem (as the person's behaviour violated internal self-esteem standards) was very strongly supported (F = 999.5, df = 1/1053, η = .70). The prediction that this negative effect should be particularly strong for guilt (assuming that the respective norm violations are more closely related to

morality and thus more centrally important to the core self-image) was not borne out (F, n.s.). The prediction that anger-inducing events should also have a somewhat more negative effect on self-esteem (as some anger experiences might be brought about by one's own actions or reflect negatively on one's ability to deal with a problem) was supported ($F = 97.8$, $df = 1/1053$, $\eta = .29$). However, inspection of the means shows that, if anything, the difference is marginal and that sadness, contrary to expectations, had an even stronger negative effect on self-esteem. A very powerful, but nonpredicted, effect was found for joy-eliciting situations which seem to boost strongly self-esteem. This might be due to the fact that quite a few of the joy situations were due to achievement and might have had a strong pride component. The *post hoc* comparison reveals the following ranking on consistency with self-esteem (from *low* to *high*): guilt = shame < sadness < fear = anger = disgust < joy.

Discrimination Capacity and Relative Importance of Appraisal Dimensions

Multiple Discriminant Analyses. For two reasons it was decided not to include the Unpleasantness variable in the predictor set. (1) It was felt that the question "Did you find the event itself pleasant or unpleasant?" (see Method section) did not succeed in measuring the *intrinsic* pleasantness of an object or event as defined for the second SEC in the sequence suggested by the author (see Scherer, 1988, pp. 96–98, for a detailed discussion of the complexity of this point). Instead, this question probably elicited a response in terms of the overall pleasantness or positivity of the emotional *reaction* experienced by the respondents—i.e. the *feeling pleasant* at the time rather than *the event itself being intrinsically pleasant to most people most of the time.* (2) Whereas the SECs are generally not highly intercorrelated in these data, Unpleasantness is strongly correlated with Goal hindrance ($r = .59$), low self-consistency ($r = -.55$), and Unfairness ($r = .45$). A stepwise regression of these variables on Unpleasantness shows that 45% of the variance can be predicted on the basis of these three SEC variables, making it appear rather likely that the variable Unpleasantness in this study represents a response rather than an appraisal variable.

The seven remaining predictor variables were used in a discriminant analysis. Of the 20,497 cases, 12,280 were randomly selected for the analysis, the remainder being set aside for cross-validation. The first discrimination function (explaining 70.1% of the variance) is determined by Goal hindrance, and Self-consistency. External causation marks the second function (which explains 20.4%), mainly differentiating the self-reflective emotions, shame and guilt, from the others. Unfairness and

Coping ability load highly on the third function which, however, accounts for only a rather small percentage (7.9%) of the variance explained. The mean percentage of correct classifications in the cross-validation amounts to 39.2%.

The confusion matrix presented in Table 3 shows that the hits and misses are distributed quite unevenly over the seven emotions. Joy shows a very high percentage of hits, and fear, disgust, and shame a rather low percentage. Anger, sadness, and guilt occupy an intermediate position. The matrix shows some consistent patterns of confusion. As one might expect, shame and guilt are frequently confused, and disgust is often misclassified as anger. Is it less obvious why anger and sadness are relatively often confused? The fear prediction is the least successful, with misses being distributed quite evenly over the other negative emotions.

Given the high prediction accuracy for joy and the sizeable errors for the other—negative—emotions, one might suspect that the overall hit rate is mostly due to the success of distinguishing between positive and negative emotions. In order to determine the extent to which this is the case, the discriminant analysis was rerun, this time exluding joy as a category for analysis and classification (in other words, determining the discriminant functions for the negative emotions only). The overall classification accuracy is 32.8% as compared to 39.2 for the discrimination including the

TABLE 3
Confusion Matrix resulting from Discriminant Analysis

Actual Emotion	*Predicted Emotion*						
	Joy	*Fear*	*Anger*	*Sadness*	*Disgust*	*Shame*	*Guilt*
Joy	**86.0**	2.9	0.5	4.5	2.7	2.1	1.3
Fear	8.6	**14.3**	15.2	26.6	10.0	13.5	11.8
	17.4		*14.9*	*28.6*	*10.2*	*13.6*	*15.2*
Anger	4.8	8.5	**46.9**	14.3	10.6	8.0	6.8
	9.8	*46.7*		*14.7*	*13.2*	*8.3*	*7.4*
Sadness	6.8	10.3	16.0	**40.6**	7.3	9.1	9.9
	12.7	*15.9*	*42.4*		*8.4*	*9.4*	*11.2*
Disgust	4.6	15.6	29.5	17.4	**22.4**	7.7	6.6
	15.6	*28.4*	*16.7*	*24.3*		*7.7*	*7.3*
Shame	5.8	9.0	13.5	11.3	5.4	**22.6**	32.5
	10.7	*13.3*	*12.4*	*5.9*	*22.7*		*35.0*
Guilt	4.7	5.6	15.1	7.9	4.6	18.6	**43.4**
	6.8	*14.7*	*8.7*	*4.6*	*19.0*	*46.2*	

Note: Numbers in standard type, discriminant analysis categorisation of all emotions; numbers in *italics*, discriminant analysis categorisation of 6 negative emotions only. Values in confusion matrix, percentages; mean accuracy percentage, 39.2% (negative emotions only 32.8%).

positive emotion. The fact that the classification accuracy falls only by about 6% shows that the discriminatory power of the SEC variables is not limited to distinguishing positive from negative emotions. The discriminant functions allow one to determine the relative importance of the different SEC variables for the negative emotion discrimination. The first function, determined by External causation, explains 66% of the variance and differentiates the self-reflexive emotions, shame and guilt, from the other emotions. The second function, characterised by high correlations with Unfairness, Immorality, and Coping ability (discriminating anger and disgust from sadness and fear), adds 27%. The third function, with a high loading of Goal hindrance, adds only 5% (with a tendency to discriminate fear and disgust from anger and sadness).

The discriminant analyses described earlier show that External causation, Unfairness, Immorality, and Coping ability have the most discriminatory power of the SEC variables measured in this study. A further analysis was run in which only these four variables were used to classify the emotions. The overall classification accuracy for all 7 emotions reached 32.2%, a loss of 7% as compared to the initial analysis with 7 variables. Each of the variables loaded on a separate discriminant function. The first function, with a high loading for Unfairness (and a somewhat lower one for Immorality), explains 58% of the variance and discriminates anger and disgust from the other emotions. The second function, characterised by External causation, adds 32% of the variance and separates the self-reflexive emotions from the others. The third function, with a high correlation for Coping ability, adds 7% and discriminates joy, anger, and disgust from the other emotions. The fourth function, determined by Immorality (and to a lesser extent by Unfairness), adds only 2% and discriminates disgust from the others.

Emotion-specific Appraisal Profiles. In order to render the patterning comparable across the SECs, all variables were converted to *z*-scores (the deviation of a value for a specific emotion from the mean over all seven emotions) for each respondent. Then, the mean of these *z*-scores across respondents for each of the seven emotions studied was computed. The *z*-score values are listed in the first column of Table 4. The use of *z*-scores clearly highlights any differences between the emotions. This can be justified by two arguments. First, the questionnaire method which requires the recall of specific emotional experiences does not allow one to obtain comparable data for a "neutral" state. Thus, because we do not have any metric for comparing appraisal patterns to a hypothetical neutral baseline or across emotions, our only point of reference for a quantitative comparison is the average value across different emotional states. Second, given the discrepancy of scale levels used across SEC variables in this study (and

across different studies in this area), the use of z-scores is the only way of transforming of the data on to a common scale that allows direct comparison.

Although there is a unique pattern for each emotion, there are some similarities between patterns. Thus, shame and guilt on the one hand, and disgust and anger on the other, show some overall similarity in their respective SEC patterns. This might explain why these pairs are often found close to each other in dimensional studies of the emotions (Plutchik, 1980; Russell, 1980) and why they showed high confusion rates in the present study. The joy evaluation pattern, as one might expect, is very different from all of the negative emotions. The data also show the important role of causal attribution, separating emotions caused mainly by external agency (sadness, fear, disgust) from guilt and shame, where one is likely to be responsible for the eliciting event. Similarly, the Unfairness and Immorality dimensions separate out disgust and anger, where the eliciting behaviour or event are often seen as unfair and/or immoral. It may be noted that in the case of guilt and shame, fairness and morality do not go together. It is possible to describe one's own behaviour (causal attribution being mainly internal for these two emotions) as immoral but not as unfair. Interestingly, an opposite split between fairness and morality, although of smaller magnitude, is found for sadness. Sadness-eliciting events are not seen as less immoral than the average emotion-eliciting event but they are seen as more unfair (reminding us of the well-known phenomenon of deploring one's fate as unjust). Joy-eliciting events are seen as eminently fair.

These data also allow a first assessment of the relative discriminant power of the different SECs. Whenever the z-scores for an SEC variable deviate strongly from zero, the variable discriminates the emotion concerned from the mean of all seven emotions. Thus, the *absolute* values of the z-scores for the different SEC variables added up across all emotions allow one to comment on relative discriminating power. The Unpleasantness variable shows the highest absolute mean z-score, in large part because of the strong difference between joy and the negative emotions. The lowest values are found for Coping ability and Expectedness. These qualitative impressions are confirmed by the more quantitative assessment of the contribution of the different SEC variables to the discriminant functions, dicussed earlier. It is not entirely clear why coping ability does not contribute as much to discrimination as had been theoretically expected. Part of the problem may be a less than optimal operationalisation of this SEC by a single question. Expectedness, on the other hand, may well be somewhat less important than the other appraisal variables in differentiating qualitatively different emotions (with the possible exception of surprise). However, this appraisal dimension might affect the intensity or other aspects of the emotional reaction.

Cross-cultural Generalisability of Emotion-antecedent Appraisal

Because there is no agreed-upon "culture grid" for cross-cultural comparison (see Mesquita et al., 1997) it is difficult to translate country differences into culture differences. A comparison between 37 individual countries being somewhat unwieldy, it was decided to form groups based on geopolitical regions. The categories chosen were: (1) countries in northern and central Europe; (2) countries around the Mediterranean Basin; (3) Anglo-American New World countries; (4) Latin American countries; (5) Asian countries; and (6) African countries. This grouping is mostly based on geographical vicinity, although an attempt was made to consider political and historical factors related to the regional spread of Western influence. Although this classification is based on *ad hoc* criteria, it is felt that it is preferable to a grouping on the basis of continents.

Table 4 presents the emotion-specific appraisal profiles, as based on *z*-scores, for each of these culture regions. Visual inspection of the data shows that there is generally a rather high similarity between the region profiles for a given emotion. In order to quantify the similarity, profile correlations were computed between the profiles for the regions within the individual emotions. For reasons of space, rather than presenting the large number of coefficients in tabular form, the major results will be discussed in the text. Across all emotions, profiles were intercorrelated with $r = .80$. However, there were some sizeable differences between the individual emotions. On average, profiles correlated as follows: joy .99, anger .87, fear, sadness, and guilt .80, shame .71, and disgust .61. These differences may be partly due to the extent to which a clearly distinct and pronounced profile exists for a given emotion—the more the *z*-scores for the SECs in the profiles deviate from zero, the more marked is the profile and the less likely are local reversals in ranking which reduce the correlation. As Table 4 shows, the *z*-scores for disgust are generally close to zero, whereas there are high absolute values for joy. However, the possibility that part of the differences between emotions might also be due to culture-specific appraisal tendencies for specific emotions (e.g. in the case of shame, cannot be ruled out).

Averaging the profile intercorrelations for regions across all emotions reveals some systematic differences between geopolitical regions: Whereas North/Central Europe, the Mediterranean Basin, the New World, and Asia, respectively, show average intercorrelations of $r = .85$ with all other regions, this drops to $r = .71$ for Latin America and Africa. In other words, the appraisal profiles in these two regions show a greater distance from the overall profile for the total sample, as compared to the other regions.

TABLE 4
Z-score Profiles for Emotion-specific Appraisals for 6 Geopolitical Culture Regions and the Total Sample

	Total Sample	*North/ Central Europe*	*Mediter- ranean Basin*	*New World*	*Latin America*	*Asia*	*Africa*
Joy							
Expectedness	0.64	0.42	0.81	0.55	0.80	0.41	0.82
Unpleasantness	−2.00	−1.98	−2.02	−2.04	−1.96	−2.00	−2.01
Goal hindrance	−1.18	−1.11	−1.15	−1.18	−1.23	−1.19	−1.28
Unfairness	−0.72	−0.61	−0.68	−0.61	−0.85	−0.77	−0.76
External causation	−0.13	−0.06	−0.22	−0.23	−0.19	−0.11	0.00
Coping ability	0.44	0.49	0.46	0.48	0.49	0.52	0.21
Immorality	−0.63	−0.53	−0.62	−0.64	−0.76	−0.66	−0.62
Self-consistency	1.18	1.13	1.11	1.28	1.22	1.19	1.24
Fear							
Expectedness	−0.12	0.01	−0.07	−0.10	−0.29	−0.05	−0.29
Unpleasantness	0.34	0.36	0.37	0.40	0.35	0.21	0.35
Goal hindrance	0.12	0.11	0.08	0.06	0.19	0.09	0.15
Unfairness	0.00	−0.01	0.00	0.05	−0.10	−0.11	0.19
External causation	0.23	0.15	0.22	0.18	0.22	0.12	0.51
Coping ability	−0.29	−0.27	−0.38	−0.35	−0.17	−0.25	−0.34
Immorality	−0.05	−0.05	−0.04	−0.02	−0.33	−0.12	0.34
Self-consistency	−0.06	−0.08	0.01	−0.22	0.07	−0.11	−0.15
Anger							
Expectedness	−0.21	−0.06	−0.10	−0.13	−0.33	−0.16	−0.57
Unpleasantness	0.41	0.40	0.41	0.42	0.41	0.43	0.43
Goal hindrance	0.37	0.38	0.29	0.40	0.35	0.40	0.42
Unfairness	0.58	0.44	0.59	0.62	0.51	0.62	0.79
External causation	0.12	0.07	0.14	0.06	0.13	0.10	0.23
Coping ability	0.07	0.09	−0.03	−0.07	0.04	0.26	0.13
Immorality	0.29	0.21	0.23	0.38	−0.01	0.41	0.71
Self-consistency	−0.09	0.00	0.05	−0.32	0.00	−0.27	−0.18
Sadness							
Expectedness	0.03	0.28	0.12	0.10	−0.09	0.10	−0.42
Unpleasantness	0.36	0.34	0.34	0.32	0.39	0.29	0.45
Goal hindrance	0.30	0.24	0.30	0.17	0.26	0.32	0.51
Unfairness	0.11	−0.01	0.01	−0.03	0.02	0.11	0.61
External causation	0.47	0.43	0.45	0.40	0.44	0.31	0.79
Coping ability	−0.35	−0.35	−0.41	−0.35	−0.20	−0.34	−0.49
Immorality	−0.12	−0.15	−0.18	−0.13	−0.42	−0.16	0.42
Self-consistency	−0.17	−0.12	−0.11	−0.19	−0.02	−0.33	−0.30

(Continued)

Table 4 (Continued)

	Total Sample	*North/ Central Europe*	*Mediter- ranean Basin*	*New World*	*Latin America*	*Asia*	*Africa*
Disgust							
Expectedness	−0.19	−0.12	−0.21	−0.14	−0.27	0.07	−0.44
Unpleasantness	0.40	0.41	0.44	0.33	0.42	0.37	0.39
Goal hindrance	0.13	0.05	−0.03	0.14	0.23	0.18	0.26
Unfairness	0.27	0.13	0.21	0.43	0.29	0.23	0.52
External causation	0.27	0.32	0.42	0.20	0.12	0.16	0.30
Coping ability	0.02	−0.15	−0.01	−0.10	0.24	0.15	0.02
Immorality	0.29	0.28	0.26	0.63	−0.10	0.27	0.69
Self-consistency	−0.02	0.03	0.11	−0.02	0.06	−0.18	−0.23
Shame							
Expectedness	−0.13	−0.06	0.05	−0.10	−0.24	−0.10	−0.42
Unpleasantness	0.24	0.31	0.23	0.12	0.23	0.11	0.34
Goal hindrance	0.13	0.17	0.10	0.17	0.02	0.11	0.26
Unfairness	−0.13	−0.15	−0.15	−0.18	−0.23	−0.29	0.19
External causation	−0.41	−0.48	−0.47	−0.56	−0.38	−0.42	−0.14
Coping ability	0.02	−0.02	−0.01	−0.12	0.07	0.09	0.04
Immorality	0.05	0.14	0.00	0.23	−0.19	−0.21	0.43
Self-consistency	−0.41	−0.45	−0.39	−0.73	−0.07	−0.46	−0.59
Guilt							
Expectedness	−0.01	0.11	−0.05	0.12	−0.18	0.19	−0.22
Unpleasantness	0.25	0.23	0.36	0.05	0.36	0.12	0.22
Goal hindrance	0.14	0.18	0.13	0.08	0.15	0.09	0.16
Unfairness	−0.11	−0.17	−0.05	−0.24	−0.11	−0.25	0.12
External causation	−0.55	−0.56	−0.63	−0.66	−0.55	−0.65	−0.27
Coping ability	0.08	0.05	0.07	0.02	0.11	0.17	0.06
Immorality	0.16	0.14	0.14	0.05	−0.10	0.22	0.54
Self-consistency	−0.43	−0.45	−0.46	−0.58	−0.24	−0.46	−0.46

DISCUSSION

The cognitive processes underlying emotion elicitation and differentiation are likely to occur in a rapid, automatic, and largely unconscious fashion. It is extremely difficult, therefore, to study these processes empirically by attempting to obtain verbal self-reports of such underlying emotion-antecedent processing. Thus, one cannot rule out the possibility that the answers the respondents gave to the appraisal variable questions may partially reflect their social representations as to what antecedent situation appraisals seem appropriate for particular emotion labels. However, even if only social representations were assessed, these are likely to contain more than a kernel of truth (see Scherer, 1992a, for a more detailed discussion of this issue). In spite of the limitations of this type of data, this approach to

the study of naturally occurring emotions seems the only one, in our present state of knowledge, that allows for the systematic statistical analysis of a number of emotion-antecedent appraisal dimensions. Consequently, the results reported in this paper, based on verbal reports of emotional events recalled from memory as prompted by discrete emotion labels, justify a number of conclusions relevant to the three major questions outlined in the Introduction.

Theoretical Prediction. The long-term intercultural study reported here was initiated during the early phase of the author's theoretical work on emotion-antecedent appraisal. Since the design of the appraisal part of the study reported here, the theoretical predictions have been extended and refined (Scherer, 1986, 1988) as well as partially tested with a Swiss sample (Scherer, 1993b). Furthermore, other researchers have empirically compared Scherer's stimulus evaluation check predictions with other models (e.g. Mauro et al., 1992; Roseman et al., 1990). However, the present study provides the first data set that tests the author's model directly and systematically, albeit in a version which is limited to the so-called "basic emotion" concepts (as they are used in most other appraisal theories). Furthermore, rather than being limited to subjects drawn from a single culture, typically North America, the present data set is based on a very diverse set of countries representing widely different cultures. The results reported here demonstrate that many of the predictions are empirically supported and suggest that both the existence of an emotion-antecedent appraisal process and the nature of the emotion-differentiating evaluation criteria or checks are widely shared if not universal. More importantly, the cases in which the empirical data have contradicted the predictions provide important input into the continuing process of theory development.

Later, the lessons to be drawn from the data for the predictions shown in Table 1 will be summarised for each of the seven emotions studied. For those appraisal dimensions for which quantitative predictions have been made—which can be considered as the core predictions, or necessary conditions for the occurrence of a specific emotion—it will be determined whether the predicted attribute (very low to very high) corresponds to the empirically found position of the emotion in question in the overall ranking, for that dimension, of all the emotions studied (see Results section). As in the case of the *z*-score approach advocated earlier, this procedure uses a relative assessment of quantity, because it is not feasible, at present, to use absolute scale values. In the case of the "open" predictions, it will be determined whether a relatively extreme *z*-score in Table 4 ($z > .5$, half a standard deviation) suggests that a particular value of the dimension in question does have predictable value for an emotion (this is based on the notion that the *z*-score should average out to a value around

zero if many different values of the dimension are compatible with an emotion). The intrinsic pleasantness dimension will not be used in this assessment because there is reason to believe that this question was responded to in the sense of pleasantness of the experience.

As expected, joy is induced by events that are conducive to one's needs and goals. However, a modification of the prediction concerning coping potential is suggested by the data: High rather than medium coping potential evaluation seems to be required. Furthermore, it had been theoretically expected that there would be no systematic, distinctive evaluation results for the other dimensions. However, the *z*-scores in Table 4 suggest some persistent tendencies: Events that give rise to joy are evaluated as highly expected, as well as highly compatible with external and internal standards. If future work confirms these results, and if it can be ruled out that a general positive halo effect is responsible for them, the predictions for joy need to be revised.

The fear predictions are the least well supported of all the emotions studied. It had been expected that fear-inducing situations would be elicited by suddenly occurring events, caused by other people or impersonal agency, that are obstructive to major needs (like survival and bodily integrity) and where one feels rather powerless. Although the patterns of results do not contradict these predictions—all values point in the predicted direction—the *z*-scores are relatively close to zero, suggesting a lack of distinctiveness of the appraisal profile (a result which is confirmed by the very low hit rate for fear shown in Table 3). Clearly, in this case one or more essential appraisal dimensions seem to be missing. In addition, many respondents may not construe survival or bodily integrity as an essential need or goal and may not have responded correctly to the goal-conduciveness question (i.e. checking "not applicable" rather than "hindered reaching my goals" in the case of danger).

Anger was predicted to be provoked by a goal-obstructive event, seen as somewhat immoral, that one has sufficient power or coping potential to deal with. This is generally confirmed although some of the *z*-scores (e.g. for coping ability) are not as distinctive as one might have expected. Also, although anger-inducing events are seen as somewhat immoral, the more powerful dimension seems to be perceived fairness—anger-producing events are seen as very unfair indeed. It had also been expected that anger-producing events might be seen as somewhat inconsistent with internal standards, at least in those cases where one gets angry with oneself. However, the data do not support this prediction. This could be due to a tendency on the part of the respondents to primarily report anger directed towards others. In order to allow differentiation of the emotions it might be necessary to distinguish between self-anger and other-anger in the future.

Sadness events had been expected to be characterised by low goal-conduciveness and low coping potential, a pattern that is supported by the data. A high *z*-score for the causality check indicates that the large majority of sadness-inducing events were attributed to other persons or impersonal agency. In consequence, it may be necessary to add a prediction to this effect.

Disgust was predicted to result from an intrinsic unpleasantness evaluation and an attribution of responsibility to others. Although the latter prediction was not unequivocally supported (apparently disgust can be felt towards things for which one is responsible), the role of the pleasantness dimension cannot be assessed because its operationalisation may not sufficiently reflect the necessary "intrinsicness" (see earlier). High *z*-scores point to strong immorality and unfairness evaluations in the case of disgust, which had not been predicted. This might be the reason for the frequent confusion with anger in the discriminant analysis. Because a morality/fairness evaluation contradicts the classic definition of disgust, one may need to study this phenomenon more intensively before changing the predictions. One possibility is that at least some respondents reported situations that might have been closer to *contempt* (which seems to have a stronger moral component) than disgust. However, it remains an open question whether it is not also possible to feel "disgust" about somebody (e.g. as a result of what he/she has done), which is also associated with morality and fairness appraisals.

Both shame and guilt had been expected to be characterised by a self-attribution of the responsibility for an action and a high inconsistency of this action with one's internal standards such as ego ideals or self-esteem. This is strongly supported. Furthermore, guilt was expected to differ from shame in terms of a stronger perceived discrepancy between the emotion-eliciting behaviour and external standards such as social norms. Although there is indeed a high discrepancy with external standards for guilt, the *z*-score in question is lower than those for anger and disgust, and not dramatically different from shame. This fact might be one of the reasons for the frequent confusions between shame and guilt in the discriminant analyses. As one might have expected from the literature, the difference between guilt and shame remains elusive and the present data set does not greatly contribute to a better disambiguation of these two emotions.

Together with other successful tests of the predictions of appraisal theorists in the literature (see Introduction), the present data underline the promise of attempting to predict emotion elicitation and differentiation on the basis of a limited number of appraisal dimensions. The present data suggest that each emotion may indeed have a unique pattern of event appraisal profiles, as theoretically predicted.

Parsimony and Relative Weight of Appraisal Dimensions. The author has argued in favour of a parsimonious approach which limits the number of appraisal dimensions considered necessary to differentiate the major emotion categories. It is an empirical issue to determine how close one can get to the 65–70% that may represent the upper limit of accurate recognition given the complexity and changeability of emotion episodes (see Scherer & Tannenbaum, 1986), particularly in view of the massive individual differences. In the present study, using the tough criterion of classification success in a cross-validation sample, around 40% accuracy was achieved with only 7 dimensions and 32% with only 4 dimensions. A comparison of these results with the earlier studies using discriminant analysis referred to earlier is difficult. Clearly, the accuracy percentage needs to be evaluated in the context of the number of predictors in relation to the number of categories discriminated. Furthermore, in some of the earlier studies factor scores based on a larger number of appraisal questions are used (e.g. Smith & Ellsworth, 1985) and it is not always clear whether the accuracy percentage is reported on the basis of the analysis sample or of a cross-validation sample. Although in the present study only 7, rather than 20 or more emotions were discriminated, the number of predictors is much smaller than in earlier studies. In addition, a large cross-cultural sample was used which strongly increases the variance due to the heterogeneity of respondents, research contexts, the large number of investigators, and many other factors. Furthermore, the appraisal dimensions, due to the nature of the study, were operationalised in a very rudimentary way, again increasing the error variance. On the basis of these considerations, the discrimination success achieved in a cross-validation sample compares favourably with what was obtained in earlier work.

The confusion matrix in Table 3 points to specific problems in the operationalisation of the SECs: The substandard performance for fear and the confusions between anger and sadness can be attributed to the unsatisfactory operationalisation of the coping potential check (as shown by the low contribution to the variance in the discriminative functions). Similarly, the operationalisation of *intrinsic* pleasantness was not successful. This is probably the reason that disgust was frequently confused with anger. Furthermore, there is evidence that the internal standards (self ideal) compatibility SEC was not appropriately measured by the question about the extent to which the event affected self-esteem or self-confidence (see earlier). The unsatisfactory operationalisation of the internal standard compatibility check may well be responsible for the frequent confusions between shame and guilt. In consequence, the statistical classification using a limited set of appraisal variables is likely to improve appreciably once better measures of the theoretically postulated SECs are used.

In a recently published study (Scherer, 1993b), the author has demonstrated that a computer-based expert system can achieve high accuracy in the *post hoc* diagnosis of 14 emotions which are specified by respondents' answers on 15 appraisal questions. These questions operationalise the theoretically postulated checks and subchecks in the SEC model in a more representative fashion than the questions that had to be used in the present study. The overall accuracy percentage of the computerised expert system (as based on the SEC model) amounted to 78%. This is probably an inflated estimate as some emotions were not well represented in terms of frequency of occurrence (i.e. rarely reported). Furthermore, the high mean accuracy figure hides some dismal failures. As in the present study, fear was very poorly recognised by the system (14.3% for anxiety/worry, 26.7% for fear/terror). This consistency in the results of the two studies seems to indicate that the SEC model lacks an appraisal dimension that is central to fear differentiation. One candidate could be *certainty of outcome*, a dimension which has been suggested by several other appraisal theorists (Frijda, 1987; Roseman, 1984; Smith & Ellsworth, 1985) and that seems to be implicated in fear-antecedent appraisals. It is possible that this dimension also plays a role in the distinction between fear and anxiety (with certainty of outcome possible more relevant for the latter).

Obviously, the present data are not sufficient to settle the issue of the number and type of appraisal dimensions that are minimally necessary to achieve a satisfactory level of discrimination success. However, the results of the discriminant analyses do provide a number of useful suggestions about how to proceed in further work. Given the relatively high probability that a revised set of SEC variables (and sufficiently refined operationalisations of these dimensions in the form of questions or rating variables) will produce a classification result approaching the 65–70% criterion proposed by Reisenzein and Hoffman, it is suggested that one should pursue the *principled* approach to appraisal as defined in the Introduction. One can use the discriminant analysis approach exemplified in the present study to evaluate systematically the large set of appraisal dimensions suggested by the different theorists in terms of: (1) their *global* contribution in augmenting recognition accuracy and variance explained; and (2) their *local* contribution to disambiguating particular confusion patterns in the confusion matrix.

Because the operationalisation of the SEC variables by the brief questions in the cross-cultural questionnaire was not equally successful in all cases, it is difficult to evaluate the evidence with respect to the relative importance of the different appraisal variables for emotion differentiation. As shown in the Results section, this was particularly the case for Unpleasantness and Coping ability. For the remaining variables, it was shown that External causation, followed by Unfairness and Immorality, are the most

important predictors. The data reported here clearly show that the fairness dimension (sometimes called *legitimacy* by other authors) contributes to emotion differentiation independently of the external standards compatibility check (the variable Immorality in this paper). In consequence, this check, which has been subsumed under the external standards compatibility check in more recent versions of the SEC model (Scherer, 1986, 1988), needs to be reintroduced as a separate dimension. Expectedness clearly plays a somewhat less important role for emotion discrimination than the other checks, although it may well serve to change the nature and intensity of the ensuing emotional state.

A final point concerns the nature of the data analysis. In the interest of greater cumulativeness of empirical research and of creating ways of directly comparing different theories on the basis of empirical data sets, it is suggested that one should consistently use *z*-scores over a similar set of emotions to establish the differences in appraisal profiles for specific emotions. This would also help to assess the implications of results from studies like this one for various appraisal theories proposed in the literature.

The preceding discussion could be attacked on the ground that it does not make sense to settle theoretical issues on the basis of actuarial evidence and that one might prefer theoretically elegant and convincing theories to empirically streamlined and optimised predictor sets. An extreme consequence of this point of view would be to advise abandonment of the optimising approach. As is often the case, the most reasonable position would seem to be somewhere in the middle. It is most likely that a predictor set that does very well in a particular research setting but that does not confirm well to theoretical expectations will fail miserably in another research setting. Thus, it would be very short-sighted indeed to trust optimisation based exclusively on actuarial data, even if they have been obtained with a massive group of participants in many different countries. It would be equally short-sighted, however, not to use the information provided by the statistical evidence on the prediction of actuarial data for further theory development. Theory needs to be constantly confronted with empirical data and although one should not abandon theoretically promising positions simply for statistical reasons only, empirical findings often help to refine or modify theory without abandoning the conviction that one ought to insist on the underpinning of theoretical understanding rather than be driven by data. It is in this spirit that the second objective in this study, examining the issues of parsimony and relative importance is addressed.

Cross-cultural Generalisability. The profile correlations reported earlier show that there seems to be a sizeable degree of generalisability of emotion-specific appraisal profiles. It seems to be difficult to argue on the

basis of the present results that appraisal theories developed in Western scientific traditions do not hold in other cultural contexts. Yet the data do suggest that there may well be culture-specific modulations of appraisal patterns, variations around a universal theme. This conclusion echoes a convergent note in this area—emotions may well be *both* universal psychobiological phenomena *and* show a fairly strong degree of cultural relativity (see Ellsworth, 1994; Frijda & Mesquita, 1994; Mesquita et al., 1997; Scherer & Wallbott, 1994).

A complete analysis of the cross-cultural differences in appraisal and the nature of the underlying determinants is beyond the scope of the present paper. Such an analysis, drawing on culture variables such as climate, socioeconomic indices, and value structure is presented elsewhere (Scherer, in press). In that analysis, ANOVA results suggest that both emotion and country differences contribute to the variance (with emotion differences being the stronger determinant), and that they interact. In particular, the results show that the appraisals of External causation, Immorality, and Unfairness of an emotion-eliciting situation are more strongly affected by country differences than are other SEC variables. The cultural differences found generally replicate the earlier findings of Mauro et al. (1992) on cross-cultural differences for the attribution of causality and, to a lesser extent, for the legitimacy or fairness dimension.

A number of country characteristics, in particular Urbanism, Affluence, Individualism, Frequent rain, and Cinema visits, seem related to the antecedent appraisal for some of the emotions studied, particularly for External causation, Unfairness, and Immorality. A subanalysis for Immorality suggests a role for religion as a potential factor in the explanation of cross-cultural differences in emotion-antecedent appraisal (see Scherer, in press, for further details).

In conclusion, the results of this study advance theory-building and provide suggestions for the design of empirical studies on emotion elicitation and differentiation. Even though one might be reluctant to accept data based on verbal report as reliably reflecting patterns of naturally occurring emotion processes, it seems more fruitful to investigate the hypotheses generated by the data reported in this paper than to proceed in an atheoretical fashion. However, in spite of the utility of retrospective questionnaire data on recalled appraisal processes, experimental studies attempting to manipulate systematically appraisal processes are urgently needed to test the predictions of the various appraisal theories in a more direct fashion.

Manuscript received 12 June 1995
Revised manuscript received 9 July 1996

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