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Article

1983

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How to cite

SCHERER, Klaus R., SUMMERFIELD, Angela B., WALLBOTT, Harald G. Cross-national research on antecedents and components of emotion: A progress report. In: Social Science Information, 1983, vol. 22, n° 3, p. 355–385. doi: 10.1177/053901883022003002

This publication URL: <https://archive-ouverte.unige.ch/unige:101864>

Publication DOI: [10.1177/053901883022003002](https://doi.org/10.1177/053901883022003002)



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Cross-national research on antecedents and components of emotion: A progress report

Introduction

As indicated elsewhere (Scherer, 1981c, 1983), research into emotion in the social and behavioural sciences has been consistently neglected in recent decades. This has serious consequences for advances in the understanding of human behaviour in social interaction, both in theory formation and in the accumulation of empirical research findings. The research programme described in this paper examines some of the existing problems in the field of emotion research that are especially pertinent to social psychology. The most central questions concern the *antecedents*, the *expression* and the *regulation* of emotion in social interaction. The present research project, which is being carried out in five European countries, seeks some preliminary answers to the following questions:

This is a progress report on a collaborative international study between several European laboratories. The co-investigators in the study were: P. Ricci-Bitti, D. Giovannini and G. Brighetti, University of Bologna; K. R. Scherer and H.G. Wallbott, Justus-Liebig University, Giessen; A.B. Summerfield, E. Green and R. Edelmann, University of London; B. Rimé, University of Louvain; J. Cosnier and G. Bénéjam, University of Lyon; J.H. Ellgring, Max-Planck-Institut für Psychiatrie, Munich; V. Aebischer, Laboratoire Européen de Psychologie Sociale (LEPS), Paris and E. Huber, University of Zurich. The study was supported by a grant from the DGRST, France, and contributions from the participating universities and institutions. The authors thank P. Lopez, H. Clasen, P. Müller, and U. Schönwetter for their engagement in preparing the manuscript, and T. Forgas for helpful comments and suggestions.

Social Science Information (SAGE, London, Beverly Hills and New Delhi),
22, 3 (1983), pp. 355-385

1. What are the central elements of social situations which trigger specific emotions? Is it possible to work out a reliable taxonomy for such central elements that can be applied to the analysis of situations antecedent to emotional reactions? How often do specific central elements play a part in the evocation of individual emotions? Are there intercultural differences in the emotion-triggering effects of such situational elements?
2. How are emotions experienced subjectively and how is emotional arousal remembered? Of which psychological symptoms and of which verbal and non-verbal behaviours are the interactors aware? In which situations and with what intensity are attempts at regulation undertaken, either to control or strengthen the emotional experience and expression?
3. What individual differences are there in subjective experience, and in verbal, non-verbal and physiological reactions? Are these differences associated with age, sex, social background and personality characteristics? How greatly do individuals differ in their attempts to regulate emotional arousal and how do such control attempts differ between cultures?

As will be made clear in the following section, even preliminary answers to these questions would provide an important impetus for theory and research in the field of psychology of emotion. Besides being significant for basic research, this approach is relevant to a multitude of situations in which the regulation of emotion in social interaction plays an important role; for the study of interpersonal influence such as negotiations and discussions, for group-dynamic processes and leadership behaviour, and last but not least also for therapeutic intervention in cases of affective and behavioural disturbances.

Present state of research

Emotion as a psychological construct

One of the reasons for the neglect of emotion in psychology is the fact that the construct "emotion" has been, for a long time, inadequately defined. What appears to stand out in the literature is a tendency to see emotion as being a conglomerate (or syndrome) of

several components: (1) precognitive and cognitive evaluation, (2) physiological reactions, (3) motivational components and components of preparation for interaction, (4) motor expression, and (5) subjective emotional state (see Scherer, 1979a, 1981c, 1982, 1983). As is to be expected from daily experience, most theorists of emotion work on the assumption that the components of emotion influence each other. In order to be able to trace the process of emotion it is therefore necessary to examine more closely the characteristics of these individual components and their distinctiveness in different emotions. This is especially important for the central question of whether, as the existence of linguistic labels suggests, there is a set of discrete emotions (cf. Izard, 1977; Plutchik, 1980). One possible approach to this research problem is offered by the examination of the necessary antecedent conditions for the appearance of states, commonly denoted by an emotional concept for which there is a linguistic term.

Antecedents of emotion

The concept of discrete emotions, as represented in particular by Tomkins (1963), Izard (1977) and Ekman (1972), is based on an evolutionary approach that goes back to Darwin. It is argued that the discrete emotions represent adaptive reaction patterns that are momentarily evoked by specific stimulus configurations. While such an association of emotion reactions to certain stimulus configurations in the environment seems likely for many animal species, in view of the limited behaviour repertoire, this is extraordinarily difficult to conceive of in humans because of the variety of possible emotion-triggering situations. It is therefore not too surprising that the discussion of antecedent conditions for discrete emotions has so far been predominantly a question of anecdotes or statements derived from everyday understanding.

Admittedly, there are abstract hypotheses about how the organism evaluates environmental stimuli and what effect this has on the resulting emotional reactions (Arnold, 1960; Lazarus, Averill and Opton, 1970). Recently Scherer (1981c, 1982) has tried to delineate the dimensions along which such evaluations occur and has posited a rather abstract hierarchical model of stimulus evaluation checks (SECs). In trying to predict which types of situations will lead to which emotional reactions it is, however, necessary to

look more concretely at the central elements of situations that lead to certain reactions. To date there are scarcely any empirical investigations on this topic. Averill (1980), Boucher (1979), and Schwartz and Weinberger (1980) have recently attempted to collect situations that evoke similar emotions in different people. Boucher is also especially interested in the cross-national consistency of the situational elements. There has, however, been no attempt to reduce the description of situations received from respondents, as antecedents of emotion, to a smaller number of typical situational elements or characteristics, and thereby to arrive at a classification of factors that exhaustively describes the determinants of emotions.

Since 1979 the present investigators have gathered together descriptions of situations which according to the information given by respondents lead to specific discrete emotions. Here too one of the difficulties of the investigation lies in the question of cross-national comparability of antecedent conditions necessary for emotional reactions. However, unlike the approach of Boucher or Schwartz and his co-workers, the difficulty for the present approach lies in the subsequent analysis of the situational descriptions thus gathered. The aim is to create a categorized coding scheme with the help of which the central elements of emotion-triggering situations, for example, the non-occurrence of an expectation in the case of anger, the loss of a loved one in the case of sorrow, can be classed. With the help of this procedure it should be possible to establish whether emotional reactions can be traced back to a relatively limited number of constant situational elements. It is possible that the taxonomy of situational elements thus discovered will allow the properties and boundaries of the discrete emotions to be better defined than before, as well as placing deliberations about their function and development within an evolutionary framework.

Emotional expression

The expression of emotions is one of the most frequently investigated aspects of emotional reactions. After several early works on emotional expression and recognition there has in recent years been particular interest in the work of Ekman (1982) and Izard (1977) concerning the question of the universality of emotional expression. The vocal communication of emotion is also arousing increasing interest. For a detailed discussion of this field of research

the reader is referred to Scherer (1979b, 1980a, b) and Wallbott (1979). Most researchers have concerned themselves with the expression of simulated emotions by actors, or with the ability to recognize such emotions when acted out. Two important aspects with regard to the expression of emotions have therefore so far remained largely unexplored. One is the investigation of spontaneous expressive behaviour in relatively realistic social interactions including the investigation of possible attempts at regulation. The other is the subjective perception and memory for such non-verbal expressions.

In this study, the subjective perception and recall of non-verbal behaviour associated with specific emotional reactions was investigated by questionnaire. In addition to this, the subjective perception and report of physiological symptoms was examined. Apart from the question of whether individual and intercultural differences exist in the reported physiological symptoms and non-verbal behaviour, the question of whether the recalled non-verbal and physiological reactions corresponded to the patterns of reaction for the individual discrete emotions reported in the literature was to be clarified. The investigation of the subjectively reported experience of physiological symptoms and non-verbal behaviours is an important prerequisite for the study of the regulation of emotions in social interaction. This is because the attempts at control or regulation that are intentionally directed depend primarily upon the perception of a specific piece of expressive behaviour that is to be controlled or regulated within the framework of the strategic interaction and on the basis of rules of performance that are determined by cultural norms.

Regulation of emotion in social interaction

Social psychologists who have concerned themselves with the phenomenon of emotion (e.g. Leventhal, 1979; Schachter, 1970; Zajonc, 1980) have done this for the most part from the point of view of a theory of emotion developed earlier in general psychology, and have only seldom occupied themselves with the aspect of the role of emotion in social interaction and the regulation of emotion. This has rather been studied in recent times by a number of sociologists, who see the phenomenon of emotion as a central factor in social interaction and social organization (cf.

Kemper, 1978; Hochschild, 1979). The role of emotion in social interaction is in many respects of interest to social psychologists. For one thing, it is known from a variety of separate findings in the social psychology literature that the emotional state of an interaction partner has important effects on both the behaviour of the participants and the course of the interaction. In many cases such effects are, however, not seen as problems of emotion and regulation of emotion, but rather from the point of view of cognitive processing, which represents only one part of the emotional process. Thus it is, for example, that in the field of the social psychology of aggression and conflict it is often stressed that a lack of regulation of the emotion appearing in the course of an interaction can very easily lead to aggressive behaviour and to the stirring up of conflicts (cf. Scherer, Abeles and Fischer, 1975).

Looked at theoretically from an evolutionary point of view, it can be shown (cf. Scherer 1979a, 1981c, 1982) that emotion plays a central role in the development of forms of social interaction and organization. Many authors assume that the regulation of emotion is of central significance for the understanding of social behaviour and of social organization. Thus Donald Hebb (1949) very early on pointed out that it is man's capacity for emotional regulation that in his opinion represents the basis for human social organization and which gives the appearance of rationality in human nature. In a similar way the sociologist Norbert Elias (1977) sees the history of human civilization essentially as the history of the control of affect.

Control should not, however, be seen exclusively as the suppression or redirection (weakening) of emotions. Even Aristotle (Aristotle, 1941, p. 996) has stated that it is very important to show appropriate emotions in an appropriate fashion in appropriate situations, if one does not want to be treated as a fool and as socially unskilled. The regulation of emotion therefore requires a very complex procedure in which both the repression and if possible the subjective experience of emotion are made to conform with the demands of the situation where interpersonal interaction is taking place and with social and cultural norms. The problem of the regulation of emotion is highly complex, since intraorganismic, interpersonal and social factors are tightly interwoven.

Cross-national comparative approaches are of particular significance for the study of the regulation of emotion since socio-cultural factors play an important role, as is stressed by many writers in psychology, sociology and anthropology. There seem to

TABLE 1
Sample sizes and sample characteristics

	Samples					
	Giessen	Zürich	London	Paris	Lyon*	Bologna**
<i>N</i> of subjects	77	50	154	105	100	150
% male subjects	49	48	39	38	9	35
% female subjects	51	52	61	62	91	65
$\bar{X}_{age}$ (in years)	23	27	20	24	28	20
s_{age} (in years)	3.0	4.0	3.4	6.6	8.1	2.0
<i>Field of study (in %)</i> ***						
Psychology	39.0	60.0	49.4	47.6	100.0	—
Social sciences	22.1	14.0	11.0	1.0	—	—
Philosophy/Law/ Literature	5.2	2.0	17.5	3.8	—	33.3
Fine arts/ Architecture	—	2.0	1.3	—	—	33.3
Natural sciences	18.2	6.0	3.3	47.6	—	—
Medical studies	3.9	2.0	4.6	—	—	33.3

* Lyon sample is difficult to compare to the other samples because of the large proportion of female subjects and because all subjects are psychology students.

** Bologna sample differs from the other samples because no psychology students are included.

*** Percentages in some cases do not add up to 100 because of missing observations.

be relatively clear cultural expectations as to how appropriate particular emotions and particular intensities of emotion are in particular situations, which type of emotional expression seems to be legitimate and which methods of managing emotion are to be preferred at any one time.

Clearly these questions are much too complex to be adequately assessed by questionnaire. However, given the enormous difficulties about studying emotion in natural settings, it seemed appropriate to gather some preliminary information in the subjectively perceived aspects of *antecedents*, *expression* and *regulation* of emotion in different nations. Although the study is still in progress, the following stages have now been completed and serve as a progress report.

Method

Subjects

All subjects were university students who had lived since childhood in the country concerned, namely France, West Germany, Italy, Switzerland or the United Kingdom, and who were native speakers of the language in question. Participants whose origins appeared doubtful on the basis of a personal information questionnaire were rejected from the study. Although national differences in university admissions must necessarily have influenced the sampling, subjects were selected with as much regard as possible to control fully for socio-economic status because of national differences in the availability of public funding for students from poor families. Details of the sample are given in Table 1.

The questionnaire

Equivalent forms of the questionnaire were developed in English, French, German and Italian. The emotions studied were described in the English version by the labels joy/happiness/pleasure; sadness/sorrow/grief; anger/bad temper/rage and fear/fright/terror. Each set of terms was accompanied by the outline of a face expressing the emotion in question and derived from the work of Ekman (1982). The exact instructions in the English version were as follows:

The present study is concerned with the investigation of events and situations that provoke emotional arousal. We will ask you to describe situations or events that have led to emotional arousal on your part. On the following pages you will find four different emotions illustrated with different words and one picture each. Please describe for each emotion one event or situation which, in the last four weeks, has resulted in your experiencing the respective emotion more or less intensely. Please use the scales to indicate the intensity or degree to which you have been aroused in each case.

We ask you to give the following specific types of information for each event: *What happened?* Please describe the nature, cause and development of the event.

Who was present? Please indicate all persons present during the event: friends, relatives, strangers, etc.

Where did it happen? Please describe the place in which the event occurred.

Did it happen in your living room, in a restaurant, in a public place, etc?

How did you react? Please note what expression or action you engaged in, in terms of bodily sensations, and verbal and non-verbal actions.

You should not try to specify only extreme reactions, in which your emotional arousal was very obvious. It is equally important to recall those events in which you were emotionally aroused without anybody noticing it.

Perhaps you will have difficulty in recalling one event for each emotion, right on the spot. Try, then, to recollect in your mind the events that have happened during the last four weeks. Should you be unable to do so, please think of a situation typical for a student of your age and describe it.

Subjects were instructed to write in specific answers in relation to each emotion. The main questionnaire was followed by a personal information sheet eliciting information about the subject's national, linguistic and academic background.

Procedure

Subjects, who were not paid, completed the questionnaire under the supervision of the investigators in the locations concerned. They were unaware that the study was cross-national. The questionnaire was not timed. Subjects were encouraged to give as full a description of each event as possible. During the subsequent debriefing the aims and cross-national nature of the study were explained.

Development of coding schemes and coding procedure

Since most of the questionnaire consisted of free-response items, it was necessary to develop coding schemes for the systematic analysis of the responses. In a series of meetings of the co-investigators several coding schemes were developed to deal with the open-response items. The most difficult of these was the scheme to code the antecedents of the emotions, i.e. the relevant features, elements, or characteristics of the antecedent situations described by the subjects, since no model for such a scheme existed in the literature. It was decided to develop a rather descriptive coding scheme in terms of factors or antecedents close to everyday experience and understanding ("antecedent code"). The categories used in this code are shown in Table 2. (This code has since been further refined and a more abstract "general component code" has been developed in addition; cf. Scherer, 1983.)

A "modality code" was developed to categorize the free

responses to the questions concerning additional aspects of the situation and the emotional response (i.e. who was involved, where did it happen, amount of verbalization, duration of emotion, etc.). Additional codes for the verbal and non-verbal behaviour (expression code), subjective sensations or feelings (sensation code), and physiological symptoms (symptom code) were based on variable or parameter lists suggested in the literature and refined in the course of several pilot studies.

The coding of the questionnaires was performed in each of the locations by coders trained by the co-investigators. Several attempts were made to check on the comparability of the coding procedure in each of the participating laboratories.

Coding reliability

In order to determine the reliability or inter-coder agreement in each of the participating countries, two trained coders coded twenty questionnaires selected at random from each sample. This coding was done independently by the two coders. Based on these data, percentage agreement was computed for the antecedent code and the modality code. For the expression and symptom codes simple percentage agreement could not be computed, because double coding was possible. In order to determine reliability here the coefficient V2 as used in content analyses (Asendorpf and Wallbott, 1979) was employed. This coefficient compares the number of codings both coders agreed upon with the total number of codings made by coder 1 and coder 2.

In general the reliability data proved that the codes developed were quite sufficient. For the antecedent code the reliabilities for the different samples are about 70 to 75 percent, which is high for a complex code like the one used and the substantial degree of inference called for on the side of the coders. Even higher is the reliability for the modality codes, which is not surprising because these codes needed much less inference and the descriptions of the subjects in the questionnaires usually allowed straightforward coding of these categories. Though very complex and with hundreds of categories, the expression and symptom codes also proved to be very reliable. Here reliability coefficients of more than 70 percent were usually reached. If one combines these codes according to some criterion such as body part involved (i.e. symptoms of

stomach, heart, temperature, face, body movement, etc.) even higher reliability data are obtained.

Results and discussion

Throughout this section we will discuss results based on self-report data. Thus all differences between emotions and nations reflect self-reports based on memory rather than actual, objectively measured differences, which might well be at variance with the subjects' reports. For the sake of simplicity in presenting these data, however, we will generally refer to differences in antecedents and reactions. It should be understood that these are always based on self-report.

Because of the large amount of data gathered and limited space this paper will concentrate on the most important categories studied, which are:

- the antecedents of the four emotions (joy, sadness, fear, anger)
- the physiological symptoms and non-verbal reactions described by the subjects
- the reported intensity of the emotions
- the duration of the emotions
- the amount of control reported by the subjects
- the amount of verbalization described by the subjects (i.e. saying nothing, affect vocalization, exclamation, utterance, discussion)

Antecedents of the four emotions

Table 2 gives the percentages of descriptions of the antecedent categories for all six samples and the four emotions. These descriptive data show on the one hand that for each emotion certain codes appear more often than others, and on the other hand that obviously cross-national differences in the descriptions of the emotional situations exist.

Joy

For joy, for instance, the most predominant categories are "Relationships with friends" (02) with more than 20 percent of occurrence in all samples and "Success experiences" (08) with more than 10 percent of occurrence in all samples. Typical situations for 02 were for example:

I accidentally met a very good friend in my home town, where I had not been for a long time. We had a walk together and spent the evening in a pub talking.

For the first time I let my young cat run free outside the house. The cat ran away, but a few days later it came back to the house, which made me very happy.

Typical situations in the category "Success experiences" (08) were especially experiences of passing examinations. This is not very surprising, since all the samples consisted of university students for whom passing an examination is likely to be an important event. A typical situation is:

I learned that I had passed a very important examination of which I had been very afraid, because everybody before had said that examinations conducted by that certain professor would be very difficult.

Other success experiences also centre around important events in students' lives, for instance:

I was informed that I was accepted as an exchange student which means that I will spend one year in the United States. I am very much looking forward to this experience.

Besides this general result for joy in all countries, some interesting national differences may be mentioned. English (London) subjects, for instance, reported many more joy situations concerning the fulfilment of basic pleasures (eating, drinking, sex) than the other samples. "Relationships with relatives" seemed to be important for the students in Lyon, but much less important for all other samples.

Sadness

For the emotion sadness, too, some categories seemed to be more important than others across all samples. These are "Death of close organism", "Problems with relationships" (the equivalent category to "Relationships with friends" in joy), "Failure/frustration" (i.e. like "Success" in joy also achievement-related situations), and finally "Depression/alienation", i.e. general sadness or depression without a very specific reason.

"Death of close organism" (02) was coded for situations such as:

My grandfather, who I loved very much, has died suddenly and unexpectedly,

or the death of animals and plants, such as:

I bought two little water turtles. Though I tried my best to feed and take care of them, one of the turtles became ill and died after some days.

“Relationships with friends” concerned situations where friends or lovers separate or where friendship and emotional feelings are not adequately returned by a partner, for instance:

When sitting together and talking, a friend suddenly mentioned: “Do you know that xxx is now engaged to Maria?” Because I like Maria very much and would be glad to be her friend, I was very disappointed and sad.

Or:

We had spent a nice afternoon together and then had to separate because my friend studies in another city. I knew that we would not see each other for a long time now.

As in the case of joy, failure and frustration situations concern situations such as examinations (e.g. “failing an examination”) and other important events in a student’s life. An interesting aspect is the occurrence of unspecified depression/alienation situations, which seem to be a problem for students (though not very often mentioned in Giessen and Paris), such as:

I just felt tired, depressed, lethargic. I don’t know the reason for that — maybe my body needs some rest.

Or:

When I got up, I felt heavy and tired. All my movements were slower than usual and a deep sadness just rose inside me, and I had the feeling of being paralysed. I started crying.

Fear

Predominant fear situations described are especially dangerous situations in traffic (03), though this category is not at all important in Italy, fear of supernatural forces and horror films (09), which often means that the subjects had seen a horror film in cinema or TV producing fear that even continues after the film has ended,

TABLE 2
Main antecedents of emotional situations
 (percentage of situation descriptions coded in the respective category)

Emotion	Code- No.	Category	Samples					Bologna
			Giessen	Zürich	London	Paris	Lyon	
Joy	01	Good world news	8	—	6	1	2	4
	02	Relationships with friends	48	32	22	25	36	53
	03	Relationships with relatives	—	4	5	6	13	1
	04	Group experiences	12	8	2	5	5	5
	05	Aesthetic experiences	5	6	7	11	6	7
	06	Basic pleasures	6	12	32	1	1	1
	07	New experiences, adventures, challenges	1	2	—	10	4	8
	08	Success experiences	16	18	15	23	11	15
	09	Rituals	—	—	1	3	5	—
	10	“Schadenfreude”	—	2	—	1	3	—
	11	Receiving gifts	4	2	5	7	7	3
	12	General joy of life	—	10	5	4	6	2
	13	Acquiring new family members	—	4	—	4	—	1
Sadness	01	Bad world news	7	—	10	3	8	5
	02	Death of close organism	21	20	12	15	11	9
	03	Depression/alienation	3	14	11	6	16	14
	04	Sickness of others	1	4	5	9	18	10
	05	Departure of loved ones	13	4	8	7	2	2
	06	Separation from loved ones	8	10	6	3	12	10
	07	End of pleasurable experience	6	—	1	10	7	1
	08	Problems with relationships	21	18	20	27	14	24
	09	Failure/frustration	10	22	19	7	8	17

11	Object loss	1	—	4	—	1	3
12	Unexpected solitude	8	4	—	3	1	2
13	Personal physical tissue damage	—	2	3	10	1	2
<i>Fear</i>							
01	Risk taking	7	4	4	5	10	26
02	Natural forces/causes	—	10	6	2	2	1
03	Traffic	30	20	18	39	27	2
04	Sexual assault, robbery, hooliganism	24	8	23	7	18	1
07	Medical interventions	8	6	4	3	6	5
08	Unspecified fear	—	4	4	1	—	3
09	Supernatural forces, horror films	1	4	14	10	7	11
10	General anxiety	—	—	6	—	3	6
11	Separation and loss	—	4	1	2	4	6
12	Failure in achievement situations	12	10	5	3	2	10
13	Loss of self-esteem	—	8	5	2	1	1
14	Money/object loss	—	6	1	1	3	1
16	Unknown new situations, objects, and persons	3	6	3	17	8	16
17	Phobic fears	1	4	5	1	5	5
18	Loss of control	6	4	1	3	3	3
<i>Anger</i>							
01	Bad world news	8	—	1	1	4	—
02	Personal relationships	14	32	20	22	23	44
03	Interpersonal problems like negligence	48	20	7	21	26	20
05	Damage of personal property	—	2	3	8	11	6
06	Damage of social property	11	18	50	18	12	12
07	Tissue damage/well-being	4	2	1	2	—	1
08	Reaching goals	4	8	4	12	6	11
12	Unnecessary inconvenience	12	18	12	16	12	5
13	Anger for no specific reasons	—	—	2	2	3	1

fear of failure in achievement situations (12), and finally situations that entail the possibility of sexual assault, robbery, or hooliganism (04).

Typical fear situation descriptions for 03 are:

I drove with a friend at night on the motorway. The friend was a little drunk and drove quite carelessly. The street was wet, because it had rained and it was quite foggy.

On the other side of the road a car turned out in order to overtake another car. But the driver lost control and the car came directly towards us. Only in the last moment did it swerve back to the right side of the street.

Fear of assaults, robbery or hooliganism is especially important in the German, English, and French (Lyon) samples. Subjects described situations such as:

I was present at a shoot-out of criminals and was in severe danger.

Or:

I realized that a man partly hidden behind a tree was watching our house. When he realized that I saw him, he turned and went away.

Anger

The situations described for anger can be neatly assigned to four major categories. The most important one is anger in personal relationships (02), followed by social property damage and socially unreasonable behaviour (06), unnecessary inconvenience (12) and interpersonal problems/negligence by other people (03). Unreasonable behaviour (06) seems to be especially important for English subjects and situations described here include the damage of social property like destroying public telephones and other vandalism, or "seeing a mother beating a child in public without apparent reason". Personal relationships often concern events at home such as being angry at a partner, because he did not do things he was supposed to do, or being angry at other students in a students' hall of residence. Typical situations for "Interpersonal problems" (03) are:

I had an appointment with a friend. But the friend was very late. I had to wait for her, and when she finally arrived she did not even try to apologize for being late.

Or:

I was having a pleasant discussion with some friends, when another friend showed up. He soon tried to centre the interaction on himself and disturbed our discussion.

“Unnecessary inconvenience” (12) was coded for situations such as the following:

I waited in a queue to buy a ticket for a concert. Some people pushed in front of me and when I finally reached the man selling the tickets, no more tickets were available.

I went to the library to collect a book I had ordered. The library had informed me by postcard that day that the book was there for me. However, when I got there, the book was not available any more. They had given it away.

Comparisons between emotions

In order to allow manageable comparisons between emotions, the number of coding categories was reduced by combining them into the following seven more general categories:

News categories (good or bad) (joy category 01, sadness category 01, fear no category, anger category 01).

Relationship categories (i.e. events in which other people and their relationships to the actor play a predominant role as antecedents of the resulting emotion) (joy categories 02, 03, 04, 10, 13, sadness categories 02, 04, 05, 06, 08, 12, fear categories 11, 18, anger categories 02, 03).

Success/self-esteem categories related to achievement situations, which are successfully mastered or are not mastered (joy category 08, sadness category 09, fear categories 12, 13, anger categories 08, 12).

Experiences categories concerned with basic pleasures, aesthetic and novel experiences, etc. (joy categories 05, 06, 07, 09, sadness category 07, fear categories 01, 02, 09, 16, anger no category).

Events relevant to gain or loss of *material objects* (joy category 11, sadness category 11, fear category 14, anger categories, 05, 06).

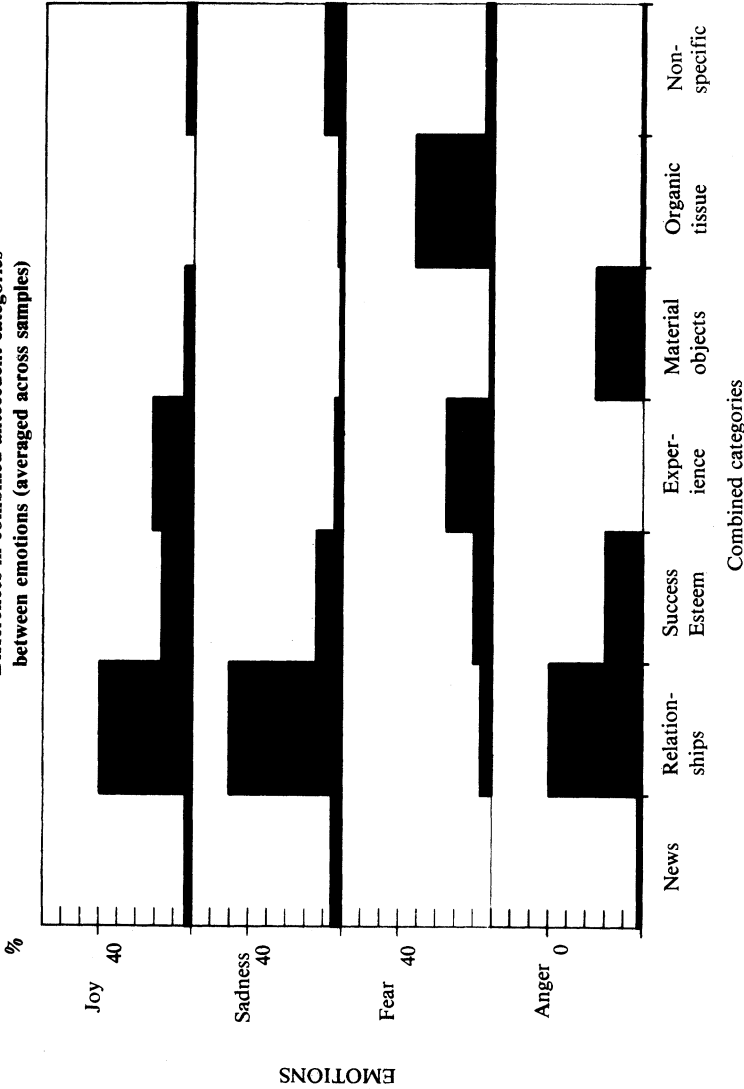
Events relevant to well-being or damage of *organic tissue* (joy no category, sadness category 13, fear categories 03, 04, 07, anger category 07).

Events with *non-specific* or *unspecified* features or emotions without apparent reasons (joy category 12, sadness category 03, fear categories 08, 10, anger category 13).

Figure 1 presents these data which are obtained by averaging the percentages of occurrence across countries and across the categories in each combined category. Chi²-tests were performed for each of the seven general categories, comparing the observed percentages across emotions with expected percentages under the assumption of equal distribution of percentages of occurrence across emotions. Compared to the expected Chi²-value with three degrees of freedom, the differences for all general categories reached significance ($p < 0.001$ in all cases), except “unspecified” ($p < 0.01$) and “news” and “success/self-esteem”, which failed to reach statistical significance. This indicates highly significant differences between the four emotions, thus showing quite distinct patterns for the antecedents of the respective emotions.

The “news” category is not very central for any of the emotions and it does not distinguish between emotions. The “relationship” category distinguishes very clearly between fear, in which relationship aspects do not play an important role, and the other three emotions. Success/self-esteem events are important for all four emotions. Experiences — be it nature, sex or food — are very important in determining either joy *or* fear, but not at all important for sadness and anger. Events involving “material objects” distinguish anger, where they are predominant, from fear, joy and sadness. “Well-being and damage to organic tissue” (including “traffic” situations) are predominant in fear situations, while not at all important for the other emotions. Non-specific emotional situations, though altogether not very frequent, are mentioned especially in connection with sadness (“general depression”) and less often in connection with fear and joy, whereas “anger for no reason” is very rare. These data indicate that it is possible to distinguish emotions by the antecedents mentioned by subjects. The frequency of occurrence of “relationship” antecedents as well as “damage to organic tissue” antecedents distinguishes fear from the other emotions; “experience” antecedents distinguish joy and fear from sadness and anger; “material objects” related

FIGURE 1
Differences in combined antecedent categories
between emotions (averaged across samples)



antecedents distinguish anger from fear, joy, and sadness; and finally “non-specific” antecedents distinguish sadness from the other emotions.

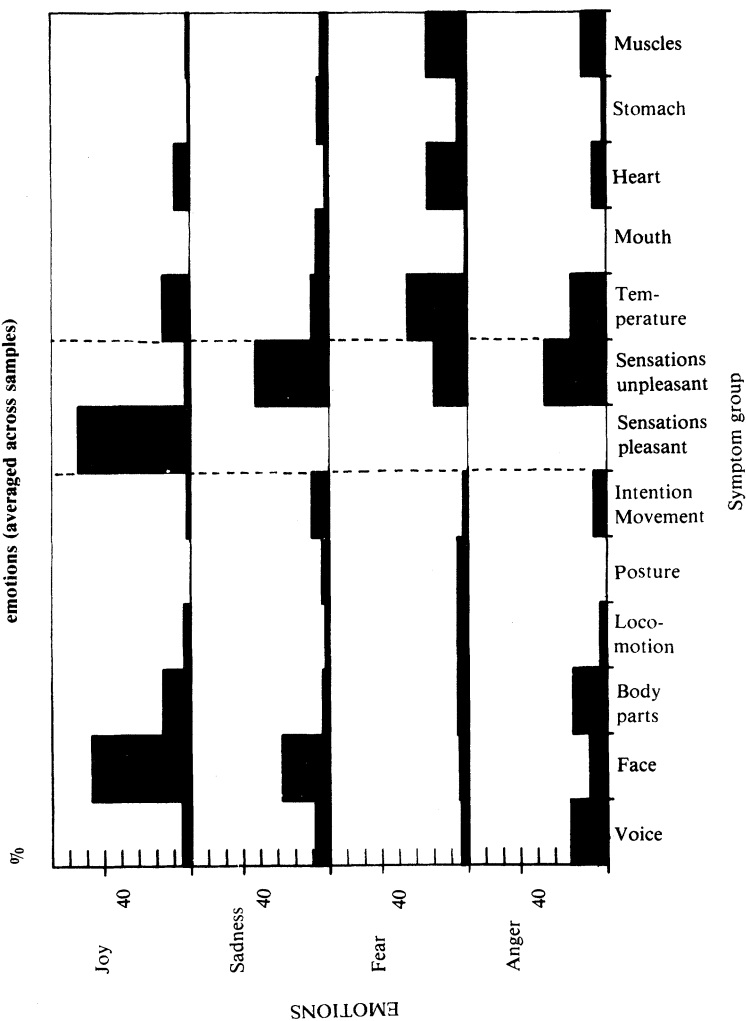
Physiological symptoms and non-verbal behaviour

As the symptom and the expression codes were very elaborate with hundreds of symptoms and reactions, the frequencies with which many categories were reported were quite small across samples. Thus it was decided to combine categories according to the body part mentioned for non-verbal reactions, i.e. voice, face, body part movements (gestures, head movements, etc.), gross motor behaviour (locomotion), posture, motor tendencies (tendency or intention to do something) and the physiological systems (temperature, mouth, heart, stomach, muscles), respectively. In addition, the sensation code contained categories to capture body sensations which are not further specified. This was necessary because subjects often noted such global states as “feeling down” or “excited”, without reporting more precise symptoms. These codes were combined into “pleasant sensations” and “unpleasant sensations”, respectively.

Figure 2 depicts the frequencies of these reaction groups, averaged across the six samples (national specificities in symptom descriptions are not presented because of space limitations). Chi²-tests for each of the thirteen reaction groups taken separately (comparison of observed percentages across emotions with expected frequencies under the assumption of equal distributions, compared to theoretical Chi²-value with three degrees of freedom) again indicate very significant differences between the four emotions. For all reaction groups differences reached high statistical significance ($p < 0.001$) except “body part movements”, “posture”, “intention to move” ($p < 0.05$), and no significant differences between emotions for “locomotion” and “stomach” symptoms.

Reactions rarely mentioned and thus either not important for the emotions studied or not in the centre of attention of the subjects when describing their reactions were “locomotion”, “posture”, “intention to move” (if motor tendencies are mentioned it is usually with sadness — “tendency to cry” — or with anger — “tendency to hit, beat somebody else”), “mouth” symptoms

FIGURE 2
Differences in reaction categories between
emotions (averaged across samples)



(these are usually only mentioned in connection with sadness: "dry mouth", "lump in one's throat") and "stomach" symptoms (related to sadness and fear).

The most striking discrimination between emotions is possible with the general categories "pleasant and unpleasant sensations". Joy generally goes with pleasant sensations; sadness, anger and to some extent fear on the other hand are accompanied by unpleasant sensations. This may seem rather trivial, indicating only that positive emotions (joy) may be distinguished from negative emotions (sadness, fear, anger) by means of the subjective sensations reported. However, the strength of this relationship may explain the strong preponderance of the evaluative positive/negative factor found in virtually all dimensional analyses of emotion. However, in addition to these general sensations, physiological symptoms and non-verbal reactions are also able to distinguish between emotions. Voice reactions for instance (such as loud voice, speech disturbances, high voice, etc.) appear more often in anger situations than in relation to the other emotions. Face reactions (facial expression, eye contact) distinguish joy and sadness, where they are often mentioned, from fear and anger. Body part movements (i.e. gestures, self-manipulations, etc.) are predominant in anger and joy situations, but not in sadness or fear situations. Persons seem to be more active in the motor system when experiencing joy and anger, compared with the more "passive" emotions, sadness and fear.

Physiological symptoms are generally mentioned less frequently than subjective sensations and non-verbal behaviours, but they also distinguish between emotions. Temperature symptoms (feeling hot or cold, face turning red, shivering, etc.) are important in fear situations, less in anger and joy situations, and least in sadness experiences. Heart symptoms (rising blood pressure, rising pulse, heart beats faster, etc.) are important symptoms of fear, but not of the other emotions, and muscle symptoms (muscle cramps, tense muscles, etc.) distinguish fear and anger, where they are often mentioned, from joy and sadness, where they do not play a role. Thus the emotions studied here seem to differ not only in terms of the major characteristics of the antecedent situations that evoke them but also in terms of the resulting physiological and behavioural reaction patterns.

Another way to look at the reaction data is to check which reactions appear in most of the samples with a certain frequency. In

TABLE 3
Most important bodily reactions accompanying emotions*

Non-specific emotional reactions

Code	Description	Emotions			
		Joy	Sadness	Fear	Anger
011	Coldness, to be pale	—	+	+	—
013	Rush of blood, head hot, blushing	+	—	—	+
035	Heart beats faster	+	—	+	+
061	Trembling	—	—	+	+
062	Tension of muscles	—	—	+	+
940	Unpleasant, unspecified arousal	—	+	—	+
941	Unpleasant arousal, tense, restless	—	+	+	+

Specific emotional reactions

Joy	017	General warmth
	311	Laughing
	312	Smiling
	511	To hug, to clasp
	915	Relaxed body
	917	To feel well
	920	Pleasant, unspecified arousal
	923	Pleasant arousal of the whole body
Sadness	023	A lump in one's throat
	315	To cry
	822	Tendency to cry, feeling like crying
	930	Unpleasant, unspecified rest
	935	Laxity, slackness
Fear	014	Perspiration, sweaty palms
	621	To walk faster
	711	Freezing body posture
Anger	012	Feeling hot, rising of temperature
	211	Very loud voice, yelling, screaming
	353	Aroused facial expression
	561	Instrumental actions (throwing objects etc.)
	816	Tendency to hit or beat somebody
	943	General feeling of being nervous

+ = important reactions for the respective emotion

— = reactions not mentioned for the respective emotion

* Those mentioned in at least four of the six samples by at least 5 percent of subjects or in at least two samples by at least 10 percent of subjects.

Table 3 this is reported by separating non-specific emotional reactions, which are typical for more than one emotion, that is, separating two or three emotions from the others, and specific emotional reactions, which characterize one and only one emotion. These data indicate that seven of the reactions (five of them physiological symptoms and two subjective sensations) distinguish between groups of emotions. "Trembling" and "tension of muscles" distinguish fear and anger on the one hand as "tense muscles" emotions from joy and sadness on the other hand as "lax muscles" emotions. "Coldness, to be pale" is characteristic of sadness and fear, while "rush of blood, head hot, blushing" is typical of joy and anger, thus characterizing the latter as "hot" emotions and the former as "cold" emotions. "Unpleasant arousal, tense and restless feeling" characterizes all negative emotions in contrast to joy. These negative emotions can be further distinguished by "unpleasant, non-specific arousal" typical of sadness and anger, but not of fear. "Faster heartbeat" on the other hand distinguishes sadness from fear and anger. While fear and anger (and also joy, as "active" emotions) lead to faster heartbeat, sadness as a "passive" emotion does not.

Furthermore each of the four emotions is characterized by a set of reactions specific to that emotion. Joy, for instance, results in reported symptoms such as "warmth", "relaxed body", "feeling well", "pleasant arousal" and the non-verbal behaviours of "laughing", "smiling" and "hugging/clasping", in agreement with joy as an "active, hot" emotion, which is of course positively experienced. Sadness is accompanied by "lump in throat", "laxity", "unpleasant rest feelings" and the non-verbal behaviour of "crying" or the "tendency to cry", thus presenting the picture of a negative, passive emotion. Fear is characterized by "sweating" and the non-verbal reactions of "freezing" or "walking faster", obviously two techniques for coping with a dangerous event by either running away or "playing possum". Anger, finally, is accompanied by "rising of temperature", the general feeling of "being nervous" and the non-verbal reactions "very loud voice", "aroused facial expression", "instrumental actions" and "tendency to hit somebody". Anger thus seems to be a negative, but compared to sadness and fear, a "hot" and active emotion, characterized by non-verbal activity and the tendency to do something to change the situation.

*Intensity and duration of emotions, amount of control
and amount of verbalization*

Finally, it is possible to distinguish between emotions using some additional information gathered in the questionnaires on the basis of the intensity of the emotions reported, the amount of control or coping used, the duration of the emotions, and the amount of verbalization. In the questionnaires these data were obtained either by rating scales directly (for "intensity" from 1 = very weak to 5 = very strong; for "amount of control" from 1 = very little to 5 = very strong) or by coding of open-ended answers, which could be translated into a semi-interval scale (for "duration" from 1 = under five minutes to 4 = several days or longer; for "verbalization" from 1 = saying nothing to 5 = discussion; compare Table 4). Thus it was possible to use an analysis of variance approach to these data, to compare the two factors "sample" (Giessen, Zürich, London, Paris, Lyon, Bologna) and "emotion" (joy, sadness, fear, anger). For each variable a two-way analysis of variance with two group factors (fixed effects; BMDP programme 2V) was computed. The results of these analyses together with the means for all samples and all emotions are presented in Table 4.

Intensity of emotion showed interesting cultural differences (significance for "sample", main effect $p < 0.000$). English subjects reported emotions of less significance than the other samples (again evidence for the stereotype of the English as being "cold and unemotional"?). A significant main effect is also found for "emotion" in general; anger is reported as less intense than the other emotions.

For *amount of control* there is a significant main effect for "emotion" reflecting a tendency of joy to be much less subject to control than the three negative emotions. Of major interest is the highly significant interaction between "sample" and "emotion". While English subjects reported controlling their positive emotions (joy) more than the other samples, "South Europeans" (Paris, Lyon and Bologna) reported controlling their negative emotions (fear, sadness, anger) less than the other more "Northern European" samples. This again is strongly reminiscent of cultural stereotypes of French and Italian people being free and uncontrolled in their expression of negative emotions.

For the *duration* of the emotions there is a significant main effect

TABLE 4
Comparison of intensity, control, amount of verbalization and intensity
between the four emotions and the six samples

	Emotion	Giessen	Zürich	Sample – means		Lyon	Bologna	Analysis of variance (sample × emotion) effects (ps)
				London	Paris			
Intensity of emotion ^a	Joy	3.9	3.8	3.2	3.8	3.8	3.6	sample = 0.000
	Sadness	3.8	3.9	3.2	3.8	3.6	3.7	emotion = 0.000
	Fear	3.7	3.7	3.1	3.8	3.7	3.5	sample × emotion = 0.086
	Anger	3.8	3.9	3.1	3.7	3.0	3.6	
Amount of control of reactions ^b	Joy	1.5	1.3	1.8	1.5	1.5	1.7	sample = n.s.
	Sadness	2.6	3.0	3.0	2.6	2.4	2.3	emotion = 0.000
	Fear	2.9	3.1	3.0	2.6	2.5	2.2	sample × emotion = 0.001
	Anger	2.8	3.1	2.9	2.4	2.3	2.4	
Duration of emotion ^c	Joy	3.1	3.7	3.3	3.6	2.8	3.5	sample = 0.000
	Sadness	3.2	4.2	4.1	4.1	3.5	4.1	emotion = 0.000
	Fear	2.3	3.0	2.4	2.5	2.0	2.8	sample × emotion = n.s.
	Anger	2.4	2.8	3.0	3.0	2.5	3.4	
Amount of verbaliza- tion ^d	Joy	3.6	2.9	3.3	3.1	3.3	3.4	sample = 0.000
	Sadness	2.7	3.0	3.0	2.6	2.8	2.8	emotion = 0.000
	Fear	2.3	2.9	2.2	2.4	2.3	2.4	sample × emotion = 0.029
	Anger	3.2	3.6	3.0	3.3	3.4	3.5	

a = scale from 1 (= very weak) to 5 (= very strong) c = 1 - under 5 minutes, 2 - up to one hour, 3 - up to one day, 4 - several days or longer

b = scale from 1 (= very little) to 5 (= very strong) d = 1 - saying nothing, 2 - affect vocalization, 3 - exclamation, 4 - utterance, 5 - discussion

of "emotion". While sadness seems to be the longest lasting emotion in all samples, fear and anger reported are usually of shorter duration with joy being between sadness as a "long-lasting" emotion and fear and anger as "short-term" emotions. The significant main effect for "sample" is not easy to interpret. German and French (Lyon) subjects reported emotions of shorter duration than the other samples. This is true both for joy as a positive emotion as well as for the three negative emotions. The only characteristic of these two cities, that is Giessen and Lyon, compared to London, Paris, Zürich and Bologna might be that both are comparatively "provincial" compared to the other urban centres, though this also does not offer an explanation of why "provincial" subjects should report emotions of shorter duration than other subjects.

The *amount of verbalization*, that is, how much people say when experiencing an emotion, is significantly different for the four emotions. Joy and anger are characterized by significantly more verbalization than sadness and especially fear. This may be due to the fact that fear and sadness are often caused by situations where the person is alone or at least not interacting with another person, while joy and anger are very often caused by other people who are part of the situation (see antecedents, p. 365f.). Thus talking seems to be an integral part of joy (chatting with friends, etc.) and anger (arguing, discussing, yelling). While sadness and fear seem to be more solitary emotions with "affect vocalizations" or "vocal emblems" (Scherer, 1977) being the major type of vocalization.

The significant main effect of "sample" is probably less easy to explain. This effect is due to Swiss and Italian subjects reporting more talk when experiencing emotional situations. While the latter is in accordance with the stereotype that Italians tend to "palaver" when aroused, the finding that Swiss people also talk more is quite contrary to current stereotypes about the Swiss ("calm, stodgy"). This becomes even more interesting if the significant interaction between "sample" and "emotion" is considered. The data show that Swiss subjects verbalize least of all samples when experiencing joy, but *most* of all samples when experiencing negative emotions. On the contrary, German subjects verbalize most of all samples during joy, but least of all samples during negative emotions. Thus it seems that Swiss subjects "externalize" negative emotions in verbalizations, while "internalizing" positive emotions, especially compared to the German sample, who reported the complete reverse. While many of these cross-national differences are not easy

to explain, they do suggest a number of interesting hypotheses that could be profitably explored in further research.

In conclusion, the results so far indicate not only that there are systematic differences in subjects' recall of experiencing different emotions with respect to antecedents, expression and regulation, but also that significant cross-national differences exist. Ongoing work of this research group is concerned with a refinement of the methodology, a replication of the findings reported here, and a more systematic evaluation of the data in relation to concepts of culture rather than simply of national boundaries. The data obtained so far from the three German-speaking samples and the two French-speaking samples prompt a more elaborate analysis in relation to language-groups and their associated norms and traditions.

In addition, this research group has now moved into a second phase of the long-term cross-national project in which subjects in the different nations are asked to indicate their most likely reactions to a number of typical antecedent situations (the selection of which was based on the results of the first phase of the study). Finally, the group plans to add a third phase, a series of field studies, in which actual behaviour in a number of emotion-eliciting situations is to be systematically compared across nations.

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