

The Determinants of Subjective Emotional Intensity

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What determines the subjective intensity of emotions? Four major groups of determinants are hypothesised: concerns (strength and relevance), appraisal, regulation, and individual differences. During six weeks subjects reported an emotion every week and answered questions on a computer. It appears that all four groups of supposed determinants are correlated with emotional intensity, the concern variables show the highest correlations. The importance of the determinants is not always the same, there are differences between the emotions and between the dimensions of emotional intensity. The relation between regulation and emotional intensity is complex: Causal relations are expected in both directions. On the one hand, a more intense emotion requires more regulation (positive causal effect), and on the other, regulation will decrease the intensity (negative causal effect). Indications of the existence of both relations are found. Regulation and intensity are positively correlated. The canonical correlation of overall felt intensity and the regulation effort with the determinants is higher than the multiple correlation of only the overall felt intensity with the determinants.

INTRODUCTION

Despite the fact that intensity is one of the most salient aspects of an emotion, comparatively little research has focused on the topic. There are at least two important aspects that require examination: the structure of emotional intensity, and the determinants of variation in intensity. As to the first, the question is whether intensity is a unitary or multidimensional concept; the notion of emotional intensity may in fact refer to the intensities of a set of loosely connected aspects. As to the second: the question is what determines the intensity of an emotion, or the intensities of its various aspects. The first question has been discussed by Frijda, Ortony, Sonnemans, and Clore (1992), by Sonnemans and Frijda (1994), and by Ortony, Clore,

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and Collins (1988). The second question has been touched on by Ortony et al. (1988), and forms the substance of the present paper.

The data in the previous paper on the structure of emotional intensity (Sonnemans & Frijda, 1994) and those in the present paper come from the same investigation. Subjects were asked to recall several emotion incidents, and, for each incident, to answer a large number of questions regarding possible aspects of intensity as well as of possible determinants. Analysis of the intensity questions, as reported in the previous paper, showed the presence of several intensity aspects that are only weakly correlated, if at all. Factor analysis of the responses to a number of self-report questions on intensity variables yielded the following five factors that were virtually independent of one another: (1) duration of the emotion and delay of its onset and peak; (2) the magnitude of perceived bodily changes; (3) frequency of recollection and re-experience of the emotion; (4) strength and severity of action tendency, and drasticness of actual behaviour; (5) magnitude of belief changes and influence on long-term behaviour. These five factors all correlated moderately with a sixth one that was called "overall felt intensity", measured by the question: "On the whole, how intense was your emotion?" Overall felt intensity, as rated by the subjects, appeared to be a joint product of the five aspects mentioned, and to be fairly closely related to the intensity of emotion at its peak, as reported. The relation between the five specific intensity dimensions and overall felt intensity appeared to differ among emotions (Sonnemans & Frijda, 1994). Presumably, the self-report variables, including overall felt intensity, only correlate weakly with objective intensity measures such as behaviour amplitude or physiological measures (Frijda, 1986; Frijda et al., 1992; Lang, 1977).

In addition to answering questions, subjects had to draw a diagram of the intensity of their emotion over time. The diagrams showed that the recalled incidents usually refer to episodes with extended durations—up to several hours or more (Frijda, Mesquita, Sonnemans, & Van Goozen, 1991; Sonnemans, 1991). During those episodes, several different emotions might occur, even if the subjects labelled the episode as an instance of a particular emotion like anger or joy. The intensity ratings pertain to the episodes as a whole, that is (according to the correlations), overall felt intensity, strength of action tendency, and the like reflect both the average level of the entire episode and its peak amplitude.

The present paper reports data on the determinants of self-reported intensity obtained in the same study that investigated the structure of subjective intensity. In that study, a large number of questions regarding possible determinants were also put to the subjects. The data considered in the present paper concern the determinants of subjective emotional intensity.

What determines emotional intensity, or the various intensity aspects? Hypotheses concerning the determinants of emotional intensity can be derived from the analyses in Frijda et al. (1992) and Ortony et al. (1988) and, in particular, from the model of emotion by Frijda (1986). It is proposed that emotional intensity is a function of four classes of variables: concerns, appraisal, regulation, and individual propensities, or:

$$I = f(\text{concerns, appraisal, regulation, individual propensities}),$$

because these classes of variables appear in this model as independent elements in the generation of emotion. According to the model, emotions are elicited when events occur that are appraised as relevant to one or more of the subject's concerns. Actual emotional arousal, as well as the nature of the aroused emotion, depend on the appraisal of further aspects of the event, i.e. of the context with respect to possibilities for coping. One may view relevance appraisal and context appraisal as the first two steps in the emotion process. A third step then is the generation of emotional response, i.e. of a change in action readiness, physiological response, and conscious feeling, on the basis of the preceding appraisal. Finally, overt behaviour may follow, including expressive behaviour. Regulation processes tend to attenuate or to amplify each of the steps in the process: stimulus intake, appraisal, action readiness generation, and behaviour. Variables in the concerns and the appraisal and regulation processes then would determine response intensity, that is, the intensity of action readiness, physiological response, and feeling. However, intensity might also vary as a function of individual propensities (e.g. preferences, thresholds) in these latter regards.

Presumably, different variables within the four classes of determinants account for variations in the different aspects of intensity. The present analysis is primarily focused on overall felt intensity. However, some data are obtained on determinants of specific intensity aspects.

Brief comments on the four classes of determinant variables are in order.

Concerns. Emotions arise only if an event is appraised as relevant for at least one concern. *Concern* is the term used to denote motives, goals, both acute and latent, and preferences or aversions for particular classes of stimuli. Concerns may be assumed to vary in how important they are to the subject; concerns vary in what we call their "concern strength". It is likely that emotional intensity is positively correlated with the relevant concern strength. It is also likely that intensity is positively correlated with the magnitude of the event's value: The more an event is deemed relevant for the individual's concerns, the more intense the resulting emotion will be (Frijda et al., 1992). The difference between concern strength and the magnitude of concern relevance of the event can be illustrated by an

example. Winning a prize in a lottery is relevant for the concern for material well-being. The intensity of the resulting emotion is likely to be influenced by the strength of the desire for money and by the magnitude of the prize. Logically, concern strength and event magnitude should be considered separate factors; in actual practice, they appear hard to separate.

Most emotions involve more than one concern. Emotional intensity can be expected to depend on some combination of the relevance for the individual concerns. Various models for that combination can be proposed and tested; for instance, intensity might depend on the sum of the individual strengths, or on the strength of the strongest concern.

Appraisal. Appraisal enters emotional intensity not only by way of primary or relevance appraisal, just discussed, but also by secondary or context appraisal (Frijda, 1986; Lazarus, 1991). Context appraisal refers to the assessment of variables relevant to the subject's need and means to deal with the event. Certain variables, referred to by Ortony et al. (1988) as "global" variables, are considered to account for the emergence and intensity of emotion *per se*. One of these is how real the event is felt to be, i.e. whether or not it actually occurred, or whether or not it actually does have the implications it might seem to have. If it is not felt to be real, no or a weaker emotion will arise (Frijda, 1988; Ortony et al., 1988). But the process may be complex, because important events that happen unexpectedly often may first defensively generate a sense of unreality; a very intense emotion may arise when that defensive sense of unreality begins to lift (Sonnemans, 1991), or the emotion may appear intense in other regards than that of conscious feeling.

Other variables are considered to be determinants of which emotion is aroused. According to the literature (Frijda, Kuipers, & ter Schure, 1989; Smith & Ellsworth, 1985; Tesser, 1990), certain combinations of appraisal variables are the determinants of particular emotions. These variables then function as "local" intensity variables, determining the intensity of only certain subclasses of emotions; the influence of appraisal variables on the intensity of the emotion may thus, in part, be different for different emotions. We also expect that certain appraisal variables mainly influence certain intensity variables. For example, we expect a correlation between anticipated effort and the strength of action tendencies, and between not having experienced a similar situation before and the frequency of spontaneous recollection and re-experience.

Regulation. The intensity of emotional response, in addition to being determined by the preceding appraisals and concerns, and by individual response propensities, can be expected to be influenced by regulation, i.e. by control activities based on the anticipation of adverse response

consequences (retaliation, failure, discomfort, exhaustion). Regulation may proceed directly, by suppressing feeling or action readiness, or indirectly by affecting preceding appraisal (Frijda, 1986, 1988).

Individual Response Propensities. Individuals differ in their tendency to experience specific emotions, for instance, positive and negative emotions generally (Watson & Clark, 1984), anxiety (Spielberger, 1975), or anger (Spielberger, Jacobs, Russell, & Crane, 1983). There also is evidence for individual differences in emotional frequency and emotional intensity in general (Diener, Larsen, Levine, & Emmons, 1985; Larsen & Diener 1987; Larsen, Diener, & Emmons 1986). One way to conceive of these individual propensities is in terms of propensity for particular appraisals, in which case adding them as an intensity determinant would be logically redundant. However, another way to conceive of them is as thresholds and preferences for particular modes of action readiness, or for change in action readiness generally, and in any case it is not certain that the relevant differences are captured by the appraisal measurements. The present study undertakes a test of the general hypothesis that emotional intensity is determined jointly by variables from the four classes indicated, and of the more specific expectations discussed in the preceding paragraphs.

METHOD

Subjects

Thirty-seven subjects (10 men and 27 women, mean age 22 years), all psychology students, participated in this study. The students received course credits for their participation.

Procedure

The aim of the experiment was to have the subjects report on recalled emotion instances. The experiment involved seven sessions, spread over seven weeks. In the first session, prior to any emotion recall, two general questionnaires were administered, one on concern strength and the other on emotional control. Also, the operation of the Macintosh computer to be used in the subsequent sessions was explained, and the subject practised drawing diagrams on it (a more detailed account is given in Sonnemans & Frijda, 1994).

In each of the subsequent sessions, sessions 2 through 7, the subjects first wrote a brief description of an emotion incident on paper; they were asked to report what had happened, and their subjective experience. After

that, they answered a series of questions presented by the computer by typing in their responses on that computer. In sessions 2 to 3, and 5 to 7, they were asked to recall an emotion incident that had taken place in the previous week; in session 4 they were asked to recall their most intense emotion of the past year. At the end of the sessions 3 through 7, questions were also put about the recall and re-experience of the emotions reported in the earlier sessions.

Computer program. All subjects had a private floppy disk with a system file and the program. The program started automatically when the subject inserted the disk in the Macintosh computer. During the session, the data were saved on the disk. The computer screen showed a window with the question at the top. After a (built-in) delay of 2–4 seconds (depending on the length of the question), the answer dialogue box was displayed beneath the question. Only after selecting an answer with the mouse could the subjects continue to the next question. It was possible to return to (a limited number of) previous questions, to correct an answer. The program did not require knowledge of or experience with a computer.

Overview of the Variables and Measures

The following variables were investigated as presumed independent determinant variables, in addition to the various dependent measures of emotional intensity:

Concern Strength and Concern Relevance. As indicated later, when recalling emotion incidents in sessions 2 through 7, subjects had to indicate the relevance of the 37 concerns on a concern list. Concern strength was determined by two methods. The first (“individual method”) consisted of the ratings of the 37 items on a list in the Concern Strength Questionnaire, administered during the first session. The other measure (“group measure”), starts from the assumption that the stronger a concern, the more often it will be involved in an emotional incident. Average strength of concerns was determined for our subjects as a group, by counting the number of times each concern had been marked as relevant, in the concern relevance question, by all subjects over all recalled emotion instances. We assumed that the relative concern strengths would be rather similar for all subjects in our study.

Appraisal. Appraisal of the emotional events was determined by a questionnaire of the type usual in studies of emotional appraisal. The items in the questionnaire ask for a number of aspects of the emotional event; the nature of these items can be derived from the item names in Table 4, first column (e.g. “Did the event enhance or decrease your

self-esteem?" decrease much/decrease/neither decrease nor enhance/enhance/enhance much).

Regulation. Regulation was studied through regulation awareness, by asking the subjects explicitly, for each recalled emotion incident, to what extent they had tried to dampen their emotional feelings, behaviour, and expression.

Individual Propensities. In the present study, individual propensities (apart from concerns) were investigated only with regard to propensities for emotion control. In addition, we obtained some indices of individual propensities by computing for each individual the means of his/her scores on each of the intensity questions (the dependent variables), over all emotion instances reported (in fact, over the five instances other than the one the mean was to be correlated with).

Questionnaires and Tasks

During session 1, before emotion recall, subjects filled out a concern strength and an emotional control questionnaire.

Concern strength questionnaire. Subjects were presented with a list of 37 concerns. This list is reproduced in the appendix. The list was constructed on the basis of the list of values used by Andrews and Withey (1976), and on data from a preliminary study where a short 20-item list was tried out, to which the subjects could add items. Subjects were asked to rate the strength of each concern on the list on a 5-point scale. The instruction was:

Some aspects of our life are important to us; we call these "concerns". Concerns play a role in the arousal of emotions. In general, when things are going well for our concerns we feel happy and satisfied, and when things are going badly for our concerns, we feel unhappy and dissatisfied.

Not all our concerns are equally important to us. Below is a list of concerns that may play a role in arousing your emotions. How important are these aspects of your life to you?

Emotion control questionnaire. A questionnaire on propensity for emotion control was administered. Roger and Nesselhoefer (1987) and Roger and Najarian (1989) constructed a questionnaire to measure individual differences in emotion regulation and in rehearsal tendency (ECQ and ECQ2: emotion control questionnaire). The ECQ2 (Roger & Najarian, 1989) contains 56 true/false items, distributed over four scales (rehearsal,

emotional inhibition, benign control, and aggressive control). As far as we know, the ECQs have only been validated by examining correlations with other personality questionnaires, and not yet by comparing the emotions of subjects scoring low or high on the scales. In the present study a questionnaire which included a part of the ECQ2 and some new items, concerning positive emotions and sadness, was administered. The questionnaire as adapted contained 36 items that the subjects rated on a 5-point scale (from "not at all" to "very strongly").

Emotion Questionnaires

In sessions 2 through 7, the following sets of questions and tasks were presented by the computer.

Emotion labelling. The subjects were asked to select the emotion word or words that might characterise the emotion or emotions aroused in the reported incident. They could choose from a list of 18 emotion words, or type in an emotion word of their own choice. If more than one emotion word was selected, they should indicate the one that best characterised their experience. The 18 emotions in the list are: fear, joy, sadness, anger, love, happiness, disgust, jealousy, hatred, shame, pride, disappointment, embarrassment, guilt feeling, remorse, pity, hope, and despair.

Emotion intensity questionnaire. The intensity questionnaire consisted of 29, 5-point scale items. Most items concerned specific intensity aspects, namely: strength of felt action tendency, strength of felt bodily arousal, frequency of spontaneous recall and re-experience of the emotion, latency of onset and peak of the emotional response, emotion duration, intensity of the long-term aspects of belief-change, and behaviour change. Other items asked about the following general aspects of intensity of feeling: intensity at the emotion's peak, average intensity, and "overall felt intensity", measured by the question "On the whole, how intense was the emotion?"

Emotion regulation questions. Questions probed, for each recalled incident, the extent to which the subject tried to dampen the strength of his or her feeling, or that of his or her emotional expression or other behaviour.

Drawing a diagram. Subjects were asked to draw on the computer screen, with the help of the mouse, a diagram of the course of their emotion over time. The computer program identified important moments in the diagram like the beginning and the end, the total duration from beginning to end, peaks and valleys, asked the subject questions on these points, that he or she then had to answer, and computed parameters such as average intensity and the time of the peaks and valleys.

Concern relevance questions. For every emotion reported, subjects had to indicate the relevance of the 37 concerns on the list of the concern strength questionnaire, by the following instruction:

The causes of an emotion are very often difficult to establish. Therefore we created a list of things that can have something to do with what causes an emotion. For each statement, indicate the degree to which it influenced the arousal of your emotion.

Answers had to be given on a 5-point scale.

Appraisal questionnaire. The questionnaire consisted of 15 items consisting of 7-point bipolar scales. Most of the questions were taken from the questionnaire used by Frijda et al. (1989). Some questions were added, notably those on the felt reality of the situation at its first moment, and on whether the situation was caused by oneself or someone else, and whether his or her action was praise- or blameworthy. The content of the questions is indicated in Table 4, first column. Not included in the table, for reasons that will become clear, are the items "Was it a pleasant or an unpleasant situation?", "Was the situation easy or hard to bear?", and "Was the situation important for you?"

RESULTS

Because each of the 37 subjects described 6 emotion incidents, the dataset consists of 222 recalled emotion instances. These instances consisted of very unequal numbers of instances of the different emotions. Twenty-five of the instances were labelled by the subjects as (predominantly) instances of fear, 19 of sadness, 41 of anger, 17 of disappointment, 84 of positive emotions,¹ and 36 of other negative emotions (e.g. shame, pity, jealousy, and despair). The small number of instances of specific emotions (e.g. disappointment) demands that conclusions about the specific emotions be interpreted with caution. No differences in overall felt intensity between these emotions were found. Sadness was a little more intense and disappointment a little less intense than the others, but none of the differences is statistically significant.

Significance of correlations, too, should be interpreted with caution, as they will be based on 222 observations, although these cases are not independent because only 37 subjects provided them.

¹ All positive emotions are analysed together because the major difference between the positive emotions appear to be their intensity (love was most intense, followed by hope, happiness, joy, and pride), see Sonnemans (1991).

Comparing the Two Measures of Concern Strength

The correlation between the two measures is only $R = 0.46$ ($P < 0.01$); they evidently do not measure entirely the same thing. The most noticeable outliers were the concerns "my need for a regular and quiet life", "maintaining my property", "my need for prestige and respect from others", "my need to influence others". All these the subjects considered of little importance, but they were often marked as having been relevant in the emotion incidents.

The Relation between Concern Strength, Concern Relevance, and Emotional Intensity. Almost always, more than one concern was considered relevant for a given emotion incident, according to the subjects' ratings (in only 4% of the episodes only one concern was checked; in 74% five or more concerns were checked). Therefore two kinds of composite variables were constructed and used concurrently: the sum of the strengths of the concerns (indicated as "sum" in the tables), and the strength of the concern with maximal strength (indicated as "maximum" in the tables); this was done for both concern strength measures. Concern relevance of a given emotion incident was determined by summing the relevances for each relevant concern ("sum") or the relevance of the concern with the maximum relevance ("maximum"). Furthermore, it is plausible to suppose that a product of concern relevance and concern strength will be a better predictor of emotional intensity than either of these variables alone. These products were therefore computed for all concerns, and composite variables were constructed using both the "sum" and the "maximum" variants of both strength measures.

Table 1 presents the correlations of the variables described with overall felt intensity. The correlation of the number of concerns checked as relevant with overall felt intensity was also computed (it was 0.42). The "sum" variables, with one exception, correlate more strongly with intensity than do the "maximum" variables. Also, the product variables, with one exception (sum, individual measure), correlate appreciably more strongly with intensity than the variables involving only strength. Summed relevance correlates as high as do the product variables. Furthermore, the simple number of concerns considered relevant also correlated with intensity, to an extent that is hardly less than the strength measures do. Therefore, only the product variables and the number of concerns were included in the further analysis. Whatever the measure used, of these measures, concerns appear to be importantly related to emotional intensity, as predicted. They appear to explain over 20% of the intensity variance.

Table 2 shows that there are large differences in these correlations for the different emotions that could be distinguished in this study. The

TABLE 1
Correlations of Concern Measures with Overall Felt Intensity

	<i>Sum</i> ^a	<i>Maximum</i> ^a
Strength, individual	0.42	0.19
Strength, group	0.42	0.31
Relevance	0.47	0.29
Product relevance and strength, individual	0.47	0.35
Product relevance and strength, group	0.47	0.49

Notes: All emotions, $N = 219$, 3 instances were not included because no concerns were checked. All correlations are statistically significant ($P < 0.05$).

^a *Sum* refers to the summed strength of relevant concerns; *Maximum* to the highest strength of the relevant concerns.

TABLE 2
Correlations of Concern Measures with Overall Felt Intensity of Different Emotions

	<i>Fear</i> ($N = 25$)	<i>Sad.</i> ($N = 17$)	<i>Anger</i> ($N = 41$)	<i>Dis.</i> ($N = 17$)	<i>Pos.</i> ($N = 83$)	<i>All</i> ($N = 19$)
Number concerns	0.48*	0.24	0.32*	0.42	0.47*	0.42*
Sum ^a product relevance and strength, individual	0.47*	0.25	0.39*	0.49*	0.54*	0.47*
Sum product relevance and strength, group	0.49*	0.29	0.36*	0.58*	0.53*	0.47*
Maximum ^a product relevance and strength, individual	0.18	0.05	0.46*	0.28	0.35*	0.35*
Maximum product relevance and strength, group	0.51*	0.35	0.53*	0.61*	0.45*	0.49*

^a *Sum* refers to the summed strength of relevant concerns; *Maximum* to the highest strength of the relevant concerns.

* Statistically significant ($P < 0.05$).

correlations for sadness are very low; none of the correlations with overall felt intensity is statistically significant. A likely explanation is that the relevant concerns for sadness were not included in the concern list. Sadness is often the result of losing a particular person or object; the attachment probably was not tapped by the rather general concerns in the list, such as "my need to receive affection".

The number of concerns, and the sum of the products of concern strength and concern relevance, are not very important for the intensity

of anger; the maximal product of strength and relevance correlates much higher. It appears that the relevance of a single, strong concern is enough to become very angry, whereas in intense joy or disappointment more concerns are involved. Most instances of anger, in our sample, may have been rather superficial emotions.

Table 3 shows the correlations of the concern variables with some of the specific scales from the intensity questionnaire. The highest correlations are with frequency of recollection and re-experience, and with intensity of belief changes and long-term behaviour. The correlations with action tendency and bodily changes are somewhat lower; those with duration are lowest. The results suggest that, not surprisingly, concerns affect the acute emotion manifestations somewhat less than the more enduring and cognitive ones. Concerns represent the importance of the eliciting events more than anything else.

Appraisal

Three appraisal variables were not included in this analysis of the intensity determinants. The variables "*Was it a pleasant or an unpleasant situation?*" and "*Was the situation easy or difficult to bear?*" both correlate very significantly with the intensity variables. However, their highest correlations are with the question "*An emotion itself is pleasant or painful (NOT meaning the situation that caused the emotion). How did you perceive your emotion at that time?*"; these correlations are respectively, $r = 0.77$

TABLE 3
Correlations between Concerns and Various Intensity Scales

	No. Concerns	Sum Prod. 1	Sum Prod. 2	Max Prod. 1	Max. Prod. 2
1. Recollection and re-experience (7, $\alpha = 0.93$) ^a	0.42	0.46	0.44	0.35	0.38
2. Duration of the emotion and delay (6, $\alpha = 0.85$)	0.29	0.29	0.26	0.28	0.17
3. Action tendency, drastictness actual behaviour (3, $\alpha = 0.74$)	0.34	0.39	0.41	0.36	0.38
4. Belief changes and long-term behaviour (5, $\alpha = 0.82$)	0.46	0.47	0.47	0.33	0.40
5. Perceived bodily changes, strength passivity (3, $\alpha = 0.74$)	0.31	0.33	0.35	0.25	0.30
Overall felt intensity (3, $\alpha = 0.87$)	0.42	0.47	0.47	0.35	0.49

Notes: All emotions, $N = 219$, 3 emotions were not included because no concerns were checked. All correlations are statistically significant ($P < 0.05$).

^a Number of items and Cronbach alpha.

and $r = 0.74$. These appraisals are therefore better regarded as referring to the emotional response itself, rather than to an aspect of the eliciting situation. Lazarus and Smith (1988, p. 287) arrive at the same conclusion: "global pleasantness . . . appears better to describe subjective affect, a feature of the reaction itself, than to describe the process of appraising the significance of what is happening for personal well-being". The question "*How important was the situation?*" is left out because this aspect of the appraisal appears redundant with the scores derived from the concerns list. Therefore these questions were omitted from the analysis.

The answers to the question "To what extent do you think the behaviour of the other(s) was blameworthy/praiseworthy?" [very blame-worthy—very praiseworthy] were recoded for the negative emotions to [very praiseworthy—very blameworthy].

The hypothesis of a contribution of appraisal variables to intensity was confirmed. Taking all emotions together, seven appraisal variables correlate significantly with overall felt intensity (see Table 4, "all emotions"): anticipated effort, novelty (that is, not "having experienced such a situation before"), other's well-being involved, felt unreality, outcome uncertainty, and blameworthiness or praiseworthiness of agent behaviour. These correlations all are lower than 0.3. Interestingly, the more an event is felt to be unreal at its first moment, the more the emotion is felt to be intense, presumably because the defensive unreality spells later intensity. The expected correlation between unexpectedness and emotional intensity did not appear.

We did not expect the influence of the appraisal variables on the intensity to be the same for all emotions, an expectation that was confirmed. We also expected certain appraisal variables to influence particular intensity variables. This, too, appeared to be the case; however, for reasons of space only the correlations of the appraisal variables with the overall felt intensity of the different emotions will be discussed here (Table 4).

Fear. Two appraisal variables appear to have a relatively large influence on the intensity of fear: The felt unreality of the situation at the first moment, and self-esteem (if self-esteem is more severely threatened the fear eventually is more intense).

Sadness. The emotions of sadness in this study were more intense to the extent that the subject had not experienced such a situation before and that the situation was a unique one (not part of a pattern), that the well-being of someone else was involved ($r = 0.63$), that the meaning of the situation had not been immediately clear, and that the situation, when it occurred, was felt as unreal, to a rather high degree ($r = 0.53$). Notice the positive (although not statistically significant) correlation with expectedness: Expected situations tend to cause more intense sadness. Examples of

TABLE 4
Correlations between Overall Felt Intensity and Appraisal Variables

	<i>Fear</i> (<i>N</i> = 25)	<i>Sad.</i> (<i>N</i> = 19)	<i>Anger</i> (<i>N</i> = 41)	<i>Dis.</i> (<i>N</i> = 17)	<i>Pos.</i> (<i>N</i> = 84)	<i>All</i> (<i>N</i> = 222)
Self-esteem decreased (pos.) or enhanced (neg.) ^a	0.33	0.25	-0.04	0.08	-0.04	0.11
Clarity of situation's implications	-0.13	-0.33	-0.12	0.02	-0.12	-0.13
Outcome certain (pos.) or uncertain (neg.)	-0.05	-0.05	-0.30	-0.19	-0.30*	-0.18*
Expectedness (pos.) or unexpectedness (neg.)	-0.19	0.38	-0.17	-0.18	-0.17	0.06
Anticipated effort	0.18	0.27	0.31	0.28	0.31*	0.29*
Modifiability (pos.) or unmodifiability (neg.)	-0.04	-0.10	-0.34*	-0.13	-0.34*	-0.14*
Controllability (pos.) or uncontrollability (neg.)	-0.01	-0.01	0.16	0.15	0.16	0.05
Experienced before (pos.) or novel (neg.)	0.01	-0.44	-0.15	-0.44	-0.15	-0.24*
Event part of a pattern or unique	-0.16	-0.41	-0.13	-0.20	-0.13	-0.11
Other's well-being involved	-0.01	0.63*	0.11	0.41	0.11	0.24*
Felt reality (pos.) or felt unreality (neg.)	-0.37	-0.53*	-0.16	-0.35	-0.16	-0.23*
Blameworthy/ praiseworthy behaviour other- recoded ^a	0.09	-0.23	0.46*	0.34	0.46*	0.17*

^a Recoded for negative emotions, see text. In the last row the missing values for the blameworthy variable are recoded to the value "not blameworthy and not praiseworthy".

* Statistically significant $P < 0.05$.

expected situations that caused intense sadness were parting from friends who went to foreign countries, or the divorce of parents.

Anger. In 34 of the 41 (83%) cases of anger, somebody else was held responsible for the situation. The more blameworthy one considered the behaviour of that other to be, the more intense was the anger. The anger was also more intense if the situation could still be modified, and if the event's outcome was uncertain. Also, the higher the anticipated effort, the more the subsequent anger.

Disappointment. The intensity of the emotions of disappointment in this study correlated highly (0.44) with never having experienced a similar

situation before. It also was the more intense, the more someone else's well-being was involved ($r = 0.40$).

Positive emotions. When somebody else was held responsible for the situation (47 of the 84 cases, 55%), the praiseworthiness of the behaviour of the other individual was positively correlated with the intensity of the emotion. Emotions tended to be more intense when the event outcome appeared not to be modifiable, uncertain, and to require effort.

Individual Propensities

Regulation. In the first session, the subjects completed a questionnaire on propensities for regulation, the ECQ. A factor analysis yielded six factors that did not coincide with the original subscales. Correlations of the scale scores with the intensity questions were low, which may reflect the scales' low reliability.

Emotional responsiveness. Emotional intensity might be codetermined by the individual's propensity to respond to emotional events. Evidence for such a propensity was obtained by Larsen and Diener (1987; Larsen, Diener, & Emmons, 1986). It appeared in our study from an analysis of variance that compared the overall intensity scores of the 36 subjects over their six reported emotion incidents. Individual differences in average overall emotion intensity indeed appear to exist ($F = 1.61$, $P < 0.03$). Individual differences are also found in the mean intensities of action tendencies, of emotion durations, frequencies of recollection and re-experience and magnitudes of belief changes (see Table 5).

TABLE 5
Correlations of Mean Intensities with Overall Felt Intensity Scores

	<i>r</i>	<i>F-test</i>	<i>P</i>
1. Recollection and re-experience	0.26	1.586	0.0265
2. Duration of the emotion and delay	0.19	1.516	0.0406
3. Action tendency, drasticness actual behaviour	0.24	1.761	0.0085
4. Belief changes and long-term behaviour	0.24	1.573	0.0288
5. Perceived bodily changes, strength passivity	0.15	1.407	0.0763
Overall felt intensity	0.25	1.606	0.0234

Notes: The first column shows the correlations of each of the intensity variable scores with the mean of the scores of the same intensity variable in the other recent emotions reported by the same subject. The last two columns represent the analyses of variance for each of the relevant variables from the intensity questionnaire; between-subjects: $df = 36$; within subjects: $df = 185$.

The effect of mean emotional intensity on the intensity of the individual emotions was examined by correlating the subjects' scores on the intensity parameters for a given emotional experience with their mean scores on these parameters for the remaining five emotion incidents. The correlations are presented in Table 5, last column. The correlations are positive, although rather low; the correlation of average overall felt intensity with the overall felt intensities per emotion incident is 0.25.

The joint effect of the determinants. Table 6 shows the correlations of the concern variables, the appraisal variables, and the individual propensity variables with overall felt intensity and with some of the specific intensity scales (the effect of regulation will be treated later). It also presents the multiple correlations (stepwise forward) of the major determinants with the intensity variables.

As the last column of Table 6 shows, four variables explain 32% of the variance of overall felt intensity: a concern variable; the maximum product of concern relevance and concern strength; mean overall felt intensity of the other recent emotions reported by the subject; an individual propensity variable; and two appraisal variables, anticipated effort and reality if the situation at the first moment. The three classes of variables that were hypothesised to determine emotional intensity indeed appear to do so, and to make independent contributions. The maximum product of concern relevance and concern strength (group) is the concern measure with the largest influence on overall felt intensity.

Regulation. Four questions about regulation were asked: two about the extent to which the subject had tried to lessen his or her emotion (the feeling, and the expression and behaviour; questions 1 and 3 in Table 7), and, if he or she had done so, how much effort that took (questions 2 and 4 in Table 7). In 48% of the emotion instances, the subject had attempted to regulate his or her feelings, and in 69% of the instances to control the expression or behaviour. Not surprisingly, more regulation was involved in the negative emotions than in the positive emotions.

Table 7 shows the correlation between the four regulations questions and overall felt intensity. The effort needed to control one's feeling correlates 0.56 with overall felt intensity (and 0.69 for the negative emotions alone). The effort needed to regulate one's emotional behaviour correlates 0.35 (for all emotions, 0.41 for negative emotions) with the action tendency.

It can be argued that, in those cases that subjects did not try to regulate their emotions, a zero regulation score should be entered (52% did not attempt to diminish the feeling, and 31% did not attempt to control the behaviour). If these cases are indeed recoded, the correlations of the regulation effort variables with intensity are much lower. Evidently, there are intense emotions which subjects do not attempt to regulate, but if they do attempt to regulate, more effort is needed to regulate a more intense emotion.

TABLE 6
Correlations between Determinants and Intensity Variables

	<i>Recol. & Re-exp.</i>	<i>Dur. & Delay</i>	<i>Act. Tend. & Behav.</i>	<i>Bel. Chg. L-term Behav.</i>	<i>Bod. Chg.</i>	<i>Overall Felt Intens.</i>
Number of concerns	0.42	<u>0.29</u>	<u>0.34</u>	0.46	0.31	0.42
Sum product relevance and strength, group	<u>0.44</u>	0.26	<u>0.41</u>	<u>0.47</u>	<u>0.35</u>	0.47
Maximum product relevance and strength, group	0.38	0.17	0.38	0.40	0.30	<u>0.49</u>
Anticipated effort	<u>0.25</u>	<u>0.28</u>	<u>0.33</u>	<u>0.38</u>	<u>0.30</u>	<u>0.30</u>
Experience before or novel	<u>-0.31</u>	<u>-0.18</u>	-0.10	<u>-0.23</u>	<u>-0.22</u>	-0.24
Well-being others involved	<u>0.33</u>	0.14	0.22	<u>0.35</u>	0.14	0.23
Felt reality or felt unreality	-0.22	-0.07	-0.11	-0.16	-0.15	<u>-0.22</u>
Mean recollection and re-experience	0.28					
Mean duration of the emotion and delay		<u>0.19</u>				
Mean action tendency, drasticness actual behaviour			<u>0.24</u>			
Mean belief changes and long-term behaviour				<u>0.27</u>		
Mean perceived bodily changes, strength passivity					0.16	
Mean overall felt intensity						<u>0.25</u>
Multiple correlation of underlined items	0.55	0.41	0.50	0.60	0.44	0.57

Notes: $N = 219$, 3 cases missing because of missing concerns. The underlined variables are those that entered the stepwise regression analysis resulting in the multiple correlations in the last row, $F > 4$.

It can be argued that felt emotional intensity is weakened by regulation efforts, and that an estimate of "true" intensity is obtained by correcting reported intensity for the attenuating effect of regulation. It can thus be predicted that, if reported emotional intensity is "corrected" for the effect of regulation, to a degree proportional to regulatory effort, then the correlation of this corrected intensity with the determinants will be increased. This

TABLE 7
Correlations between Overall Felt Intensity and the Regulation Questions
(All Emotions and the Negative Emotions Only)

	<i>All Emotions</i>		<i>Negative Emotions</i>	
	<i>N</i>	<i>Overall felt intensity</i>	<i>N</i>	<i>Overall felt intensity</i>
To what extent did you try to lessen your emotional FEELING (for example by trying to think about something else, or trying to do something else)?	222	0.02	137	0.13
How much effort did you need to lessen your emotional FEELING?	106	0.56*	88	0.69*
(Same question with missing values recoded to 0)	222	0.08	137	0.22*
To what extent did you try to control your emotional BEHAVIOUR and EXPRESSION?	222	0.05	137	0.13
How much effort was needed to control your emotional BEHAVIOUR and EXPRESSION	152	0.34*	113	0.44*
(Same question with missing values recoded to 0)	222	0.18*	137	0.31*

* Statistically significant at $P < 0.05$.

means that a linear combination of intensity and regulation effort should correlate more strongly with the determinants than the intensity alone.

Such a linear combination is in fact a canonical correlation, with one of the groups of variables consisting of overall felt intensity and regulation effort, and the other of determinant variables of concerns, appraisal, and individual propensities. By comparing the canonical correlation with the multiple correlation between the determinants and the overall felt intensity (the first part of this section) we obtain an impression of the importance of regulation for the intensity of emotions.

It seemed reasonable to use in this canonical correlation the regulation scores where absence of regulation is given a zero score. In our canonical correlation, one of the groups of variables consisted of four variables that entered the stepwise regression of overall felt intensity (see the last column of Table 6): maximum product of relevance and strength (group measure), anticipated effort, sense of reality at the first moments of the emotion, and the mean overall felt intensity of the other recent emotions of the same subject. The other group consisted of the overall felt intensity and the effort to regulate feeling variable that included zero scores for absence of

regulation. The resulting canonical correlation is 0.61. This means that by correcting for regulation, R^2 increases from 32% to nearly 37%, despite the fact that only the regulation that the subjects were aware of is taken into account. The same procedure was followed for the effort of regulating behaviour and expression. The canonical correlation obtained is 0.59, appreciably higher than the multiple correlation with overall felt intensity as the sole dependent variable.

The coefficients of overall felt intensity and regulation effort in the canonical analysis are positive meaning that in terms of the argument above, "corrected" intensity is indeed the overall felt intensity with a bonus if regulation was involved (approximately 1 point on a 5-point scale was added to the overall felt intensity if the regulation effort was 5 at a 5-point scale, and nothing was added if according to the subject no regulation was involved). The contribution of the regulation effort is statistically significant (β -values in the Roy-Bargman Stepdown F -test of respectively 0.001 and 0.010 for regulation effort feeling and regulation effort behaviour).

DISCUSSION AND CONCLUSIONS

There are several methodological problems when using questionnaires and recalled emotions for ascertaining emotion determinants. First, only a correlational analysis can be performed so inferences about causality are difficult to resolve. Secondly, there can be a floor-effect; emotions with a very low intensity, and of course nonemotions will not be reported, with a consequent restriction of range for all correlations. Thirdly, there is the distortion of memory, reconstructive intrusions, questionnaire unreliability, and the like. All this should be kept in mind in interpreting our results.

With the reservations imposed by those considerations, we may consider the major hypotheses of this study to have been supported. We proposed four groups of determinants of emotional intensity: concerns, appraisal-variables, individual differences, and regulation. The present study demonstrates that all four groups of variables indeed play a role. The variance of overall felt intensity explained by the variables in this study is approximately 35%. That, indeed, leaves 65% of the variance unexplained. We will briefly comment on the contribution of the four classes of determinants.

Concerns. The variables that included both strength *and* relevance correlate higher with intensity than the variables based only on strength *or* relevance, and also yield somewhat higher correlations than just the number of relevant concerns. These results support our expectations. An important question that remains, however, is how multiple relevant concerns combine in influencing emotional intensity. In our study, it is sometimes the sum of the products of strength and relevance, and sometimes the maximum

of these products, that correlates highest with the intensity variables; and other models are also possible.

Another question concerns the relatively low correlations between the concern variables and the intensity of sadness. This may be due to imperfections in this study, notably, the absence of the concerns involved in personal loss from the concern list. It may also be due to a specific structure of sadness, meaning that subjects may have difficulty in identifying the relevant concerns for sadness, which might make the concern variables less reliable. There is some support for this explanation. The stories of the subjects often suggested a difference between the immediate cause of the emotion and what psychologically precipitated it. For example, a mother tells her daughter where she keeps her insurance papers, and the daughter (the subject) becomes sad because of the thought of what will happen if her mother gets ill or dies. Another example is that of a woman waiting for a telephone call from the man she loves. He does not call and she becomes very sad. Clearly, it is not the information about the insurance papers, or the not-calling that matters, but the significance of these events.

In all, concerns explain up to 25% of the variance in emotional intensity. This is a lower bound, because no information exists on how representative the concern list was for concerns involved in emotions. The Andrews and Whitey (1976) list from which ours was in part derived aimed at long-term life satisfaction rather than emotions. It is true that the list was supplemented by information from our pilot study. Still, subsequent research might explore other lists such as those employed by Brandstatter (1983) and by Schwartz (1992).

Appraisal. The general hypothesis that appraisal variables are among the determinants of emotion intensity was supported. Six appraisal variables were found to correlate significantly with overall felt intensity, when lumping all emotions together: anticipated effort, not having experienced a similar event before, someone else's well-being involved, felt unreality, uncertainty, and blameworthiness or praiseworthiness of someone else's behaviour (which implies responsible agency). Anticipated effort shows the highest correlation, which supports the view that something like "difficulty" in coping, or the absence of effective response modes, is essential for an emotion to arise (Frijda, 1986; Lazarus, 1991).

As was mentioned in the Results section, the expected correlation between unexpectedness and emotion intensity failed to appear, which does not support a hypothesis of Ortony et al. (1988). The explanation may be that our data only contained rather intense emotions, in which the variable might not be so relevant. More likely, (un)-expectedness is a local intensity variable, relevant for some emotions and not for others. Our data contain some faint indication that unexpectedness did effect the intensity of most emotions except sadness.

However, the correlation in the case of sadness was distinctly in the opposite direction, and understandably so: It adds to the sadness that one is waiting and waiting for the event to occur, or while it drags on. Apparently, unexpectedness has its cost, but so has expecting, as was in fact suggested by Janis (1958) in connection with the stress of surgery.

The expectation that the intensity of different emotions is influenced by different appraisal aspects was also confirmed. Large differences were found between the emotions. The results by and large conform to those found by others, both quantitatively and with regard to the correlations found. For instance, Ellsworth and Smith (1988) found the intensity of anger to be predicted mainly by "Agency", which corresponds to our blameworthiness/praiseworthiness variable, and by "Situational control", which corresponds to our controllability and modifiability variables. The correlations, in their study, reach up to 0.43, which again is similar to what we obtained. Some discrepancy seems to exist, in that multiple correlations (particularly in Smith & Ellsworth, 1985) were on occasion more substantial than in our study. However, the variables with the strongest contributions (valence, and importance) were not included in our analysis for reasons already mentioned: Valence is better considered a response aspect than a determinant, and importance appraisal is here considered a reflection of concern strength, and thus taken up by the concern strength measures.

In all, the contribution of appraisals, whether global or local ones, to emotional intensity was modest: not quite 10% for the global variables, only occasionally more than 20% for the local ones. Again, unreliability in appraisal measurement may be considerable and have depressed the correlations, but so may the influence of stereotypes that may have enhanced them (Parkinson & Manstead, 1992). More important, perhaps, is the fact that the appraisal list may have needed improvement. "Goal conduciveness or obstructiveness", found to be useful by Smith and Ellsworth (1985) was absent from our list. A variable like "difficulty" may do better as a global variable than "anticipated effort".

Individual Propensities. Our results show a role of individual differences as determinants of emotional intensity, albeit only a limited one. Mean emotional intensity of the other emotion instances than the instance at hand contributed to the overall felt intensity of the latter emotion; the contribution, however, was small, and the simple correlation was low. This does not agree with our hypothesis that individual response propensities would form a major influence on emotional intensity, and with other studies in which such influence has been found to be considerable (e.g. Larsen et al., 1986; Larsen & Diener, 1987). However, successful measures of individual propensities, like scales of Positive and Negative emotionality (Watson & Clark, 1984) or neuroticism and extraversion

(Costa & McCrae, 1980) were not included, and the measures that we did use were weak and unstable. The influence of the individual difference class of determinants may thus have been considerably underestimated; assessment has to await further study.

Regulation. As we argued, the relation between intensity of the emotion and regulation is a complex and reciprocal one. Emotional intensity presumably determines how much regulation is needed, but successful regulation will decrease that intensity. The results of the canonical analysis indicate that the effect of regulation on intensity indeed may be substantial. An adequate understanding of the effect on intensity can, however, only be obtained by experimental research in which regulation is varied.

Subsequent research following the same approach should employ more and better measures of individual propensities for emotional intensity and specific classes of emotions. Also, it should find additional, and presumably better, measures for concern strength. In all, however, we think the study has been successful, and forthcoming studies of emotional intensity should use a similar theoretical framework: multiple determination of emotional intensity, attention for underlying concerns and their mode of combination, and multidimensional measurement of emotional intensity.

Of course, our study only throws light on a small part of what determines the intensity of emotions. As the weighted combination of the variables explains only 35% of the variance in intensity, one may well wonder where the other 65% are. Further research has to show whether that portion is absorbed by measurement error and unreliability, by the incompleteness or inappropriateness of the variables in each class of determinants, or by the absence of some class of determinants. The first two explanations are the most likely ones. Our measurement of concerns and concern strength quite obviously is only a first approximation; the weakness of individual propensity measurement has been remarked on. The validity of self-reports of appraisals, understood as determinants of emotions, remains to be demonstrated.

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APPENDIX

The concerns used in this study and the percentage of the emotion incidents in which the concern was relevant, according to the subjects, over all subjects and emotion incidents. In the last column the mean concern strength of the subjects is displayed

<i>% Emotion Incidents</i>	<i>Concern</i>	<i>Mean Concern Strength (Individual)</i>
1 49.1	My need to mean something to others	2.78
2 46.4	My need to feel safe	2.68
3 45.5	My need to share my feelings with others	3.35
4 45.5	My need to receive affection	2.84
5 44.6	My need to be accepted by others	2.87
6 43.2	My need to be understood by others	2.84
7 41.4	My need for prestige and respect from others	2.11
8 40.5	My need to be treated fairly	3.27
9 39.6	My need to give affection	3.19
10 39.2	My need for freedom	3.41
11 39.2	My need to be trusted by others	3.19
12 39.2	My need to socialise with people I feel comfortable with	3.49
13 36.0	My need to know people with whom I do nice things	2.92
14 34.7	My ideas about justice	2.73
15 34.2	My need to develop/educate myself	3.35
16 33.8	My need to be attractive	2.51
17 32.1	Welfare of family and friends	3.24
18 32.0	My future possibilities	2.76
19 28.8	The reliability of people I go about with	3.16
20 27.5	My need for a regular and quiet life	1.49
21 27.0	The maintaining of my property	1.68
22 25.2	My need to have a moment's rest from time to time	2.78
23 24.3	Success in study	2.65
24 23.9	My need to have influence on others	1.84
25 22.1	Welfare of others (general)	2.60
26 18.9	My health	3.05
27 17.6	A good education	3.00
28 16.7	My need for a good sex-life	2.60
29 15.8	My need for privacy	3.22
30 15.3	My need for a good night's rest	2.87
31 14.9	Material welfare	1.92
32 12.6	The justice of the situation in the world	2.32
33 10.8	Hobbies or sport	2.22
34 9.5	My need to enjoy art (music, literature, theatre)	2.60
35 8.6	My accommodation	2.27
36 7.2	My need to enjoy nature	2.11
37 5.9	My need to enjoy good food and drinks	1.97
12.6	(Otherwise; own description of some concern)	