

Individual Differences in the Memory Representation of Emotional Episodes: Exploring the Cognitive Processes in Repression

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Two studies investigated the influence of a repressive coping style on the availability and accessibility of emotion memories. In Study 1 participants rated the presence and intensity of emotions in several scenarios and then estimated the frequency of emotions in the scenarios. Repressors did not process the scenarios more superficially. Repressors indicated the presence of unpleasant emotions in the scenarios less frequently, but not less intensely. The frequency differences accounted for most of the repression effects in the latter frequency judgments. In Study 2 participants judged the frequency of emotions twice a day for 2 weeks and then judged the frequency of emotions for the 1st and 2nd week. Repression effects in the frequency judgments did not increase with longer retention intervals. The results indicate that a repressive coping style influences mainly the experience of emotions but not so much the accessibility of emotion memories.

Freud's notion of repression has stimulated a continued interest among psychologists to demonstrate the existence of a mechanism that functions to keep unpleasant memories out of consciousness (Dollard & Miller, 1950; Erdelyi, 1985; Greenwald, 1992; Holmes, 1974; Rapaport, 1942; Singer, 1990). Despite this effort, experimental studies have failed to provide conclusive evidence for the existence of a repression mechanism (cf. Holmes, 1974, 1990). However, the lack of supportive evidence for a repression mechanism in experimental studies does not provide conclusive evidence that such a mechanism does not exist. This is due to the implicit assumption of experimental studies (a) that repression is a universal mechanism operating in all individuals—which it might not be—and (b) that repression can be induced under laboratory conditions, which might also not be the case (cf. Holmes, 1990; Rapaport, 1942; Weinberger, 1990). Instead repression might be an acquired way of coping with unpleasant experiences that is only used by some people under specific circumstances (Weinberger, 1990; Weinberger, Schwartz, & Davidson, 1979). If this assumption were correct, it would be necessary to study repression from an individual-differences perspective.

Indeed, many of the most interesting findings related to the concept of repression have been obtained with this research strategy (cf. Weinberger, 1990, for a review). Many of these studies have relied on Weinberger et al.'s (1979) two-dimensional operationalization of repression. According to this ap-

proach, *repressors* are defined theoretically as people with a repressive way of coping with unpleasant emotions and defined operationally as people with high scores on the Marlowe–Crowne Social Desirability Scale (SDS; Crowne & Marlowe, 1960) and low scores on Taylor's Manifest Anxiety Scale (MAS; Taylor, 1953). Within the two-dimensional framework constituted by the SDS and the MAS, repressors are contrasted with low-anxious (LA; low SDS and low MAS), high-anxious (HA; low SDS and high MAS) and defensive high-anxious people (DHA; high SDS and high MAS). Most important however, is the contrast between the repressors and the other groups, especially the LA group (cf. Hock, Krohne, & Kaiser, 1996). Weinberger et al. (1979) suggested that repressors' *disposition* to experience anxiety is as high as the disposition of HA persons, but that repressors use repression to cope with anxiety and hence experience a low level of anxiety comparable to the level of LA individuals. In contrast, the HA people, who do not rely on repression to cope with anxiety, experience a higher level of anxiety than the LA group and the repressors. Theoretically, the existence of defensive HA individuals is puzzling because they are assumed to use a repressive way of coping, but still report high levels of anxiety. However, (a) only few people with high SDS and high MAS scores exist, because the two scales are moderately negatively correlated and (b) several authors (Bonnano, Davis, Singer, & Schwartz, 1991; Krohne & Rogner, 1985) proposed that the DHA group is constituted by *failed repressors*, that is, individuals whose repression mechanism fails to ward off the experience of displeasure.

Although Weinberger et al.'s (1979) operationalization is not without problems, because the theoretical definition of repressors and their operationalization are only loosely connected (cf. Tomaka, Blascovich, & Kelsey, 1992), it has met with success in several studies. For example, several psychophysiological studies (Asendorpf & Scherer, 1983; Newton & Contrada, 1992; Weinberger et al., 1979; Weinberger & Davidson, 1994; see Weinberger, 1990, for a review) found that repressors had stronger physiological reactions than the LA group in a stressful

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situation, but reported less intense unpleasant emotions. More important in the present context, Weinberger et al.'s (1979) operationalization of repression has been used nearly exclusively (see Hock et al., 1996, for a recent exception) in studies of repression effects on emotion memory, including the present studies (see Davis, 1990, for a review).

The investigation of an influence of a repressive way of coping on the recall of memories of emotional experiences was initiated by Davis (1987). In a series of articles, Davis and her colleagues provided evidence that repressors remember fewer experiences of unpleasant emotions from both their childhood (Davis & Schwartz, 1987) and their recent past (Davis, 1987). Furthermore, they demonstrated that this effect was neither due to a simple response or reporting bias (Davis, Singer, Bonanno, & Schwartz, 1988), nor to a general autobiographic memory deficit (Davis & Schwartz, 1987). Furthermore, it did not extend to situations in which other people experienced unpleasant emotions (Davis, 1987). Indeed, repressors were found to remember more unpleasant and pleasant other-related episodes than the other groups (Davis, 1987). Finally, she demonstrated that repeated cueing of unpleasant childhood experiences led to a stronger increase in the number of remembered episodes for repressors than nonrepressors (Davis, 1989). This finding was interpreted as showing that repressors' lower recall rate of unpleasant emotional experiences was at least not exclusively due to fewer unpleasant memories being stored in memory, but also due to differences in the retrieval processes of those memories. Further suggestive evidence stems from the finding that repressors recall fewer negative childhood memories, but at the same time report more parental antipathy and indifference (Myers & Brewin, 1994). Tulving and Pearlstone (1966) made the important distinction between *availability*, which is the number of stored episodes in memory, and *accessibility*, which is the ease of retrieval of emotional episodes. Davis (1990) concluded that repressors and nonrepressors differ mainly in the accessibility—and possibly to a lesser degree also in the availability—of unpleasant emotional episodes.

Most studies investigating the influence of a repressive way of coping on emotion memory used recall of one or several emotional episodes as the dependent variable. However, a study by Kreitler and Kreitler (1990) found repressors to provide lower frequency estimates for the experience of unpleasant emotions. Kreitler and Kreitler's finding shows that frequency judgments can be used to study the influence of a repressive way of coping on the retrieval of emotion memories. In comparison to recall measures, frequency judgments have the advantage that a single response already provides quantitative information about the amount of retrievable memory contents. Hence, it is possible to use more emotion categories as retrieval cues than it was in previous studies that used only four to six different emotions as retrieval cues (e.g., Davis, 1987). As a consequence, frequency judgments were used as the main dependent variable in the present studies.

The results reviewed above indicate that repressors retrieve fewer self-related unpleasant emotional experiences from memory than nonrepressors. However, the studies did not reveal the cognitive mechanisms that are underlying the repression effect. Davis (1990) suggested that repressors engage in less elaborate processing of their own unpleasant emotional experiences at the

time of encoding. The most straightforward prediction following from this hypothesis would be that repressors spend less time processing unpleasant stimuli (Baumeister & Cairns, 1992). However, the evidence concerning this prediction is mixed. Some studies found supporting evidence (Bonanno et al., 1991; Fox, 1993), whereas other studies found even prolonged response times (Dawkins & Furnham, 1989; Hock et al., 1996; Weinberger et al., 1979). A study by Baumeister and Cairns (1992) suggested that superficial encoding occurs only in specific contexts. In two studies, the authors demonstrated that repressors spent less time processing negative information about themselves in a private situation but more time in a public situation, when they expected to be interviewed later about their personality. Hence, superficial encoding might only occur if other goals such as self-presentational concerns do not override the habitual avoidance response.

A second hypothesis, subsequently called *intensity hypothesis*, was explored by Hansen and Hansen (1988), who suggested that repression is associated with an attenuation of the intensity of emotional experiences at the time they are experienced, and that less-intense experiences are less accessible at the time of retrieval. To test this hypothesis, participants in Hansen and Hansen's study first recalled emotional episodes for four emotions (anger, fear, sadness, and embarrassment). Subsequently, the participants rated the intensity of these four and six additional emotions at the time they experienced the recalled episode. The most important finding was that repressors' average intensity scores were lower than those of the nonrepressors for all but the *dominant* unpleasant emotion, where the dominant emotion is the one used as the retrieval cue (e.g., the intensity of anger in an episode recalled to the retrieval cue *anger*). If the intensities of nondominant emotions influence the accessibility of emotion memories, Hansen and Hansen's results could account for Davis's (1990) findings.

Hansen and Hansen's (1988) findings are in close agreement with those of an earlier unpublished study by Weinberger and Schwartz (1982). In this study, participants indicated how intensely they would feel various emotions in several hypothetical scenarios. Repressors' averaged intensity ratings of unpleasant emotions were lower than those of the other groups, especially if the emotion was not dominant in the described situation. Finally, Egloff and Krohne (1996) recently demonstrated the same pattern for the experience of unpleasant emotions after an experimental induction of emotions by means of failure feedback. In sum, three independent studies suggest that differences in the intensity of nondominant unpleasant emotions account at least partly for the retrieval effects observed by Davis (1990).

However, the evidence supporting the intensity hypothesis is ambiguous, because average intensity scores comprise not only information about the intensity but also about the frequency of an emotion (Diener, Larsen, Levine, & Emmons, 1985; Schimmack & Diener, in press). To illustrate, imagine two characters in the movie *Grumpy Old Men*: the emotional, warm-hearted Sophia Loren and the grumpy old man Walter Matthau. Sophia Loren might experience anger only rarely but intensely (say in 100 situations 10 times with intensity 5 on a scale ranging from 0 to 6). In contrast, the grumpy old man experiences anger frequently but mildly (say 50 out of 100 times with intensity 1). Averaged across all 100 situations, the same intensity average

of 0.5 would be obtained for both characters. Hence, repressors' lower overall averages of intensity ratings could be due to less-intense or less-frequent experiences of unpleasant emotions, or both.

The distinction between a frequency and an intensity component in overall averages of intensity ratings gains particular importance because these two components influence the retrieval of emotion memories differently. Differences in the frequency of emotions lead to differences in the availability of memories associated with this emotion. In the previous example, Walter Matthau has more anger memories available than Sophia Loren (50 vs. 10). In contrast, differences in the intensity of emotional experiences lead to differences in the accessibility of emotional memories. That is, Sophia Loren is better able to retrieve her memories of intense anger because intense emotional experiences tend to be more memorable (cf. Rapaport, 1942).

In sum, previous studies showing repression effects for overall averages of intensity ratings (Egloff & Krohne, 1996; Hansen & Hansen, 1988; Weinberger & Schwartz, 1982) are compatible with the intensity hypothesis, but are equally compatible with a *frequency hypothesis*—that is, repressors experience unpleasant emotions less frequently. This hypothesis has already been proposed by Conn and Crowne (1964) and was supported by the results of their experiment. The authors found that repressors were less likely to report anger immediately after being cheated in a prisoner-dilemma game. The results of psychophysiological studies also suggest that repressors are less likely to encode unpleasant events in terms of unpleasant emotions (Asendorpf & Scherer, 1983; Weinberger et al., 1979). In addition, Kohlmann, Weidner, and Messina (1996) demonstrated that repressors do not fail to notice their increased physiological arousal in a stressful situation. However, they do not attribute this increased arousal to anxiety. In other words, repressors are less likely to link their experiences to unpleasant emotion concepts.¹ As a consequence, if emotion words are used as retrieval cues, fewer memories are available that are linked to the retrieval cue. In sum, the frequency hypothesis differs from the intensity and the superficial-encoding hypothesis in that it assumes repression effects to be due to individual differences in the availability of unpleasant emotional experiences.

Overview

A major shortcoming of previous studies of a repressive style of coping on the encoding and retrieval of emotional material has been that each study investigated only one part of the process, either encoding or retrieval. More recently, a few studies appeared that tried to relate repression effects on the encoding and the retrieval of unpleasant information to each other (Baumeister & Cairns, 1992; Cutler, Larsen, & Bunce, 1996; Hock et al., 1996). In Hock et al.'s study, repressors did not have a lower accessibility of unpleasant memories. The authors attributed this finding to the short retention interval. Baumeister and Cairns found that repressors spent more time processing negative self-related information—bogus feedback about their personality—in a public situation, when they expected an interview about their personality, whereas they spent less time studying this material in a private situation, when they did not expect

this interview. In addition, repressors had a lower accessibility of the negative information in a subsequent memory test; however, memory deficits due to repression occurred not only in the private but also in the public condition. Hence, the memory effects were independent of the encoding effects. The authors concluded that no simple relation existed between the obtained encoding and retrieval effects of repression. Finally, in Cutler et al.'s study, participants recorded their emotional experiences two times per day over a 4-week period. Subsequently, they estimated their average unpleasant and pleasant mood level during the diary period. The results indicated that repressors reported experiencing less unpleasant mood than the other three groups in the daily mood ratings. The difference between repressors and the LA group was marginally significant. Furthermore, path analysis showed that after the diary period, repressors did not underestimate their unpleasant mood level. Hence, the study suggests that repression effects influence the encoding of emotions and are not related to a memory bias. However, alternatively it might be argued that repression influenced the memory of emotions relatively early after the emotions were experienced (within half a day) and simply do not increase over longer retention intervals.

In the present article, two approaches were taken to study the encoding and retrieval of emotional memories, with the major aim being to distinguish availability and accessibility effects in the retrieval of emotion memories. In the first study, the material to be remembered was experimentally controlled. As in Weinberger and Schwartz's (1982) study, participants first indicated their likely emotional reactions to several hypothetical scenarios. Subsequently, they also judged how often the emotions occurred in the previous set of scenarios. They also had to recall scenarios in a latency-to-retrieve paradigm (Davis, 1987). The second study is very similar to Cutler et al.'s study. For 14 days, participants recorded the frequency of emotions twice a day. After the diary study, the participants estimated the frequency of emotional experiences for the first and the second week of the diary period.

The first part of Study 1 is essentially a replication of Weinberger and Schwartz's (1982) study. Hence, it was expected that repressors would have lower overall ratings than nonrepressors. However, additional data analyses were carried out to test whether these differences were due to differences in the frequency or the intensity of emotional experiences. The intensity hypothesis predicts differences in the intensity component of the overall average, whereas the frequency hypothesis predicts differences in the frequency component of the overall average. Finally, the experiment was run on a computer and judgment times were measured to test the superficial-encoding hypothesis. According to this hypothesis it was predicted that repressors should take less time to judge the presence and intensity of unpleasant emotions in the scenarios than nonrepressors, be-

¹ The notion of *links* suggests an associative network memory model (cf. Hansen & Hansen, 1988). However, we favor an episodic multiple-trace model of the representation of emotion concepts (Schimmack & Reisenzein, 1997). In the present context, the notion of links simply refers to the classification of an emotional event into an emotion category.

cause longer judgment times indicate deeper encoding of learned material (cf. Baumeister & Cairns, 1992).

In the second part of Study 1, participants first had to estimate the frequency of emotions in the scenarios they rated before. It was expected that repressors provide lower frequency estimates of unpleasant emotions than nonrepressors (cf. Kreitler & Kreitler, 1990). Participants also had to retrieve single episodes related to certain emotions as quickly as possible in a latency-to-retrieve paradigm. On the basis of Davis's (1987) findings, it was expected that repressors would need more time than nonrepressors to retrieve episodes related to unpleasant emotions.

As encoding and retrieval was investigated in the same study, it was then possible to explore the causal relationship between encoding and retrieval effects. According to the superficial-encoding hypothesis, shorter judgment times should account for repression effects in the memory measures. According to the intensity hypothesis, repression effects are expected to be related to repressors' less intense encoding of emotions. Finally, the frequency hypothesis predicts that retrieval effects are due to the fact that repressors indicate experiencing fewer emotions in the scenarios. That is, retrospective frequency judgments simply reflect accurately repressors' lower endorsement of unpleasant emotions at the time of encoding.

In Study 2, participants recorded the frequency of real-life experiences of emotions in a diary. Hence, the encoding process could not be studied in as detailed a fashion as in the controlled experiment in Study 1. However, Study 2 allowed us to test to what degree the findings obtained with hypothetical scenarios generalize to real-life experiences. Furthermore, the delay between encoding and retrieval of emotional memories extends over a 2-week period, whereas in Study 1 retrieval was assessed immediately after encoding. Hock et al. (1996) proposed that repressors' accessibility of unpleasant memories decays faster over time so that stronger repression effects should be obtained after longer retention intervals.

Study 1

Method

Participants

Sixty-one undergraduate psychology students (14 men, 47 women) at the Free University Berlin participated in the study for course credits.

Material

Personality scales. The German versions of the Marlowe-Crowne SDS (23 items) and the short form of Taylor's MAS (23 items) were used to measure repressive coping style (Lück & Timaeus, 1969).

Scenario rating task (SRT). A computerized version of an SRT was used to examine the encoding of emotional experiences. For this purpose, 30 scenarios of emotion-eliciting situations were selected from the stimulus material of Reisenzein and Hofmann (1993), who asked 20 students to report experiences of 23 different emotions. Because previous studies found memory effects of repression mainly for unpleasant emotions, most scenarios (25) described unpleasant emotional experiences, which were selected from reported experiences of disgust, contempt, anger, jealousy disappointment, sadness, fear, and embarrassment. The remaining five pleasant scenarios, selected from descriptions of joy, pride,

love, and gratitude experiences, were included to check for the possibility of general memory deficits or response styles, as repression should not influence pleasant emotional experiences.

The scenarios were about 30–60 words long. The following example is a description of an anger experience: "A while ago, I bought some apples at the supermarket, because they were so cheap. At home, I found out that they were already rotten inside. I thought: 'And this supermarket always advertises with its fresh fruits.'"

Sixteen emotion words were selected for the rating task, including 13 unpleasant emotions (*anger* [Ärger], *anxiety* [Angst], *disappointment* [Enttäuschung], *depression* [Deprimiertheit], *disgust* [Ekel], *embarrassment* [Verlegenheit], *envy* [Neid], *hate* [Haß], *guilt* [Schuld], *loneliness* [Einsamkeit], *jealousy* [Eifersucht], *shame* [Scham]) and three pleasant emotions (*joy* [Freude], *pride* [Stolz], and *gratitude* [Dankbarkeit]). These emotion words were selected to be representative of a wide range of emotional qualities and because a pilot study had shown them to be checked with moderate frequencies in the scenarios, so that individual differences would not be masked by ceiling or floor effects.

A 7-point intensity scale was used for the emotion judgments. The response categories were labeled *not*, *very slightly*, *slightly*, *medium*, *strong*, *very strong*, and *extreme* and were scored from 0 to 6. Note that only a zero rating indicates complete absence of an emotion, whereas all remaining response categories imply the presence of an emotion, although with different degrees of intensity (cf. Schimmack, 1997; Schimmack & Diener, in press).

Procedure

The experiment was described to the participants as a study on empathy. Experiments were run in sessions with 1 to 5 participants. After entering the laboratory, the participants were seated in front of a computer that provided all further instructions. Participants had to work on the following tasks in a fixed order: (a) completion of the SDS, (b) completion of the MAS (c) rating their current mood, (d) completion of the SRT, (e) estimation of frequencies of emotions in the SRT, (f) a latency-to-retrieve paradigm, (g) estimation of their own frequencies of emotional experiences in the last year, and finally (h) rating their current mood a second time. The participants needed between 1 and 2 hr to complete the study.

The mood rating task is not described, because—consistent with previous research (Davis, 1987)—current mood appeared to be unrelated to a repressive coping style. The frequency-of-experience rating task is not mentioned any further because participants were asked to report the absolute frequency of experience in the last year and they could enter whatever number they felt appropriate. This task appeared to be beyond the capability of the participants and several respondents reported later to have entered random numbers.

Personality questionnaires. The personality questionnaires were administered by the computer. Items were presented in the same order as in the paper-and-pencil versions of the questionnaires. Each item was presented separately on the screen, and participants responded with "true" or "false" by pressing one of two keys. The participants could take as much time as they wanted to respond, but after responding they could not change their answers.

SRT. In the SRT, participants were asked to imagine being in the described situation and to indicate how they would feel in each situation. For each emotion they were to consider first whether they would feel this emotion or not and, only if they would feel the emotion, consider the intensity of the emotion. The sequence of the scenarios, as well as the sequence of the 16 emotions that had to be rated for each scenario, were presented in different random sequences generated by the computer. After reading the instructions, the participants pressed the return key to start the SRT. The scenarios were displayed in the upper half of the screen and could be studied by the participants as long as they wanted.

When they had sufficiently studied the scenario, they pressed the return key to start the rating task. After pressing the return key, the rating scale was displayed below the scenario description, which remained on the screen. The rating scale was split into two parts, with the zero category being displayed on the left and all remaining categories on the right, to increase the salience of the difference between zero and nonzero responses. Between the scenario description and the rating scale, the sentence *In this situation I would have felt . . .* followed by the emotion to be rated was displayed. The participants indicated their likely emotional reaction by pressing the appropriate number between zero and six on the keypad. If they made an error, they could repeat the last entry using a special correction key. After the ratings for all 16 emotions had been completed, the next scenario was displayed. Overall, the participants made 480 (30 scenarios \times 16 emotions) judgments in the SRT. For each of these judgments the computer measured the judgment times from the display of the emotion word to the entry of the judgment to the nearest millisecond.

Retrospective frequency judgments. After the SRT was completed, participants were instructed that they would now be asked several questions concerning the episodes presented in the SRT. Their first task would be to estimate the absolute frequency with which various emotions occurred in the previous episodes. For example, if they had rated anger to be present in five of the episodes (i.e., if they had made five nonzero ratings in the SRT), then five would be the correct answer.

Besides the 16 emotions used in the SRT (*salient emotions*), the frequency judgment task also included 16 additional emotions (*nonsalient emotions*), and the participants were asked to estimate the absolute frequency of these emotions as well. This was meaningful because the pilot study showed that these emotions were present in the scenarios, even though they were not included in the SRT. For example, although the participants were not asked to rate the presence and intensity of rage in the SRT, several of the anger-eliciting scenarios also elicit rage. Furthermore, the instructions stated that the frequency judgments had to be made within 10 s and the next item would be presented automatically if the time limit were exceeded. The pilot study showed that people exceeded the time limit very rarely.

After reading the instructions, the participants pressed the return key to start the computer-paced frequency judgment task. The 32 emotion words were displayed in a different random sequence for each participant. After the display of each emotion word, a clock displayed the seconds that had passed since onset, and after 7 s a warning tone was sounded. The clock stopped after participants entered the first figure (e.g., 1), and that was also the response time measured by the computer. After entering the complete number (e.g., 13), the participants pressed the return key to proceed in the task.

Latency-to-retrieve paradigm. In the latency-to-retrieve paradigm, emotion words were used as retrieval cues. Participants were asked to recall an episode from the SRT as quickly as possible in which the emotion used as a retrieval cue was present. Because the experiment was already very lengthy, only five salient and five nonsalient emotions were selected for this task. The 10 emotions were presented in a different random order for each participant. After recalling a scenario from the SRT, the participants pressed the return key and then entered a keyword to describe the recalled scenario (e.g., *apple* for the example given above). The computer recorded the time from the presentation of the emotion word to the pressing of the return key.

Results

Personality Types

The medians were 8 for the MAS and 10 for the SDS (both questionnaires have 23 items). Median splits were used to assign each participant to one of the four personality types (repressors

[$n = 20$], LA [$n = 13$], HA [$n = 17$], and DHA [$n = 11$]). Analyses of variance (ANOVAs) with the between-subjects factors high–low SDS and high–low MAS revealed only a significant main effect of high–low MAS on the MAS scores, $F(1, 57) = 118.81, p < .001$, and only a significant main effect of high–low SDS on the SDS scores, $F(1, 57) = 109.87, p < .001$. These analyses demonstrate that, despite the negative correlation of the two scales ($r = -.38, p < .01$), the four groups differed significantly only on the theoretically relevant dimension. Most important, repressors' MAS mean ($M = 7.00, SD = 2.51$) was nearly identical to the MAS mean of the LA group ($M = 7.15, SD = 2.41$), $t(31) = 0.17, p = .86$.

Emotion Types

In all subsequent analyses, single emotions are assigned to five scales of similar types of emotions to reduce the number of analyses, namely bad-other emotions (anger, hate, jealousy, envy), bad-self emotions (embarrassment, guilt), separation emotions (depression, loneliness), threat emotions (anxiety, helplessness), and pleasant emotions (joy, gratitude, pride).² With regard to the four unpleasant types of emotions, the same four types were distinguished in a recent study on the personality structure of affect (Diener, Smith, & Fujita, 1995). In all analyses a .05 level of significance (two-tailed) was used, if not indicated otherwise.

SRT

The first aim was to replicate the finding in earlier studies (Egloff & Krohne, 1996; Hansen & Hansen, 1988; Weinberger & Schwartz, 1982) that repressors' overall averages of intensity ratings are lower than those of the other groups. For this purpose, the intensity ratings were averaged (including the zero category) across scenarios and across items of the same type of emotions, and planned contrasts between the means of repressors and nonrepressors were computed because this difference is predicted by theory and has been consistently found in previous research. In addition, we also carried out planned comparisons between repressors and the LA group because differences between these two groups most clearly indicate repression effects. Finally, we computed 2×2 ANOVAs with the dichotomized SDS and MAS scores as independent variables.

The obtained pattern of results replicated that of previous studies in that repressors' overall averages were lower than those of the other groups for the unpleasant types of emotions (Table 1). As predicted, no similar effect emerged for the pleasant emotions. For all unpleasant emotion scales, the comparison between repressors and nonrepressors and for all except threat emotions, the planned contrast between repressors and the LA group was significant. The 2×2 ANOVA, which is a very conservative test of the hypotheses under investigation, showed a significant interaction only for bad-other emotions. For the other unpleasant emotion types, these analyses revealed only significant MAS main effects. The rank order of the means of the four personality groups replicates Weinberger and Schwartz's

² Tables with the results for single emotions from Study 1 and Study 2 can be obtained from Ulrich Schimmack on request.

Table 1

Overall Averages of Intensity Ratings (Including Zero Ratings), Significance Tests of the Planned Contrast (REP–Non-REP), and the MAS × SDS ANOVA

Emotion	REP (n = 20)		LA (n = 13)		DHA (n = 11)		HA (n = 17)		MAS	SDS	MAS × SDS	REP–Non-REP
	M	SD	M	SD	M	SD	M	SD	F(1, 57)	F(1, 57)	F(1, 57)	F(1, 59)
Pleasant	0.92	0.34	1.04	0.65	1.05	0.55	0.87	0.28	0.03	0.08	1.60	0.17
Threat	2.19	0.59	2.43	0.51	2.72	0.63	2.79	0.68	7.79*	0.95	0.28	7.88**
Bad Other	1.16*	0.52	1.63*	0.58	1.79	0.58	1.63	0.62	4.88*	1.20	4.82*	12.29**
Separation	1.78*	0.68	2.26*	0.66	2.67	0.93	2.59	0.72	10.00**	1.02	2.14	13.05**
Bad self	1.28*	0.43	1.66*	0.80	1.99	0.75	1.97	0.69	8.75*	1.09	1.40	7.88**

Note. REP = repressors; Non-REP = nonrepressors; MAS = Manifest Anxiety Scale; SDS = Social Desirability Scale; ANOVA = analysis of variance; LA = low anxious; DHA = defensive high anxious; HA = high anxious. Asterisks next to the mean values of the REP and LA group indicate significant (one-tailed) differences between the two means in a planned comparison.

* $p < .05$. ** $p < .01$.

(1982) rank order, in that the repressors had lower overall averages than the LA group, followed by the DHA and HA groups. In sum, the results bear a close resemblance to earlier findings.

In the next analyses, each emotion's overall average was decomposed into an intensity and a frequency component (cf. Schimmack & Diener, in press). The *intensity score* was computed as the mean intensity of those episodes in which a participant had rated an emotion to be present (i.e., zero ratings were excluded). The *frequency score* was determined by counting the number of nonzero ratings, which indicate the presence of an emotion. Then, the intensity and frequency scores were analyzed in the same way as the overall averages. Table 2 shows the results for the intensity scores. In contrast to the previous analyses of the overall averages, repressors revealed the lowest intensity index only for bad-other emotions. However, even for this group of emotions the planned contrast between repressors and nonrepressors was not significant. Indeed, the only significant effect was a MAS main effect on intensity ratings of sadness. In sum, the analyses provide little support for the intensity hypothesis of repression, when a pure measure of intensity of emotional reactions is used that is not confounded with frequency information.

Table 3 shows the results for the frequency index. The pattern of results closely resembles the pattern obtained for the overall averages, which is not surprising because overall averages are usually more strongly determined by the frequency than the intensity component (Schimmack, 1997; Schimmack & Diener, in press). For all unpleasant types of emotions, but not for the pleasant emotions, repressors revealed the lowest frequency scores. For all unpleasant emotion scales, the planned contrast between repressors and nonrepressors was significant. The contrast between repressors and the LA group was only significant for bad-other and separation emotions. In addition, the 2×2 ANOVA replicated the significant interaction effect for bad-other emotions that had been obtained for the overall average. The effects for the frequency scores appear to be somewhat smaller than the effects for the overall averages. This is mainly due to the higher standard deviations of the frequency scores. The standard deviations of the overall averages are smaller due to the small standard deviations of the intensity components. In sum, repressors' lower overall averages of intensity ratings in the present study—and very likely also in previous studies—are due to the frequency component and not due to the intensity component in these averages.

Table 2

Intensity Indices (Excluding Zero Ratings), Significance Tests of the Planned Contrast (REP–Non-REP), and the MAS × SDS ANOVA

Emotion	REP (n = 20)		LA (n = 13)		DHA (n = 11)		HA (n = 17)		MAS	SDS	MAS × SDS	REP–Non-REP
	M	SD	M	SD	M	SD	M	SD	F(1, 57)	F(1, 57)	F(1, 57)	F(1, 59)
Pleasant	3.65	0.63	3.53	0.50	3.46	0.38	3.63	0.70	0.09	0.02	0.86	1.59
Threat	3.58	0.61	3.38	0.39	3.58	0.55	3.73	0.59	3.72	0.27	0.26	0.38
Bad other	3.28	0.72	3.32	0.50	3.35	0.44	3.57	0.67	0.93	0.60	0.30	1.79
Separation	3.22	0.49	3.19	0.39	3.60	0.68	3.54	0.80	5.17*	0.07	0.01	1.82
Bad self	3.02	0.62	2.88	0.52	3.10	0.55	3.32	0.62	2.69	0.06	1.37	0.34

Note. REP = repressors; Non-REP = nonrepressors; MAS = Manifest Anxiety Scale; SDS = Social Desirability Scale; ANOVA = analysis of variance; LA = low anxious; DHA = defensive high anxious; HA = high anxious. There were no significant contrasts between REP and LA.

* $p < .05$.

Table 3

Frequency Indices (Number of Nonzero Ratings), Significance Tests of the Planned Contrast (REP–Non-REP), and the MAS × SDS ANOVA

Emotion	REP (n = 20)		LA (n = 13)		DHA (n = 11)		HA (n = 17)		MAS F(1, 57)	SDS F(1, 57)	MAS × SDS F(1, 57)	REP–Non-REP F(1, 59)
	M	SD	M	SD	M	SD	M	SD				
Pleasant	7.82	3.48	9.67	7.81	9.88	6.08	7.82	3.56	0.00	0.00	1.74	0.57
Threat	19.70	4.92	21.78	5.08	22.54	3.07	22.38	4.48	2.08	0.63	0.87	4.28*
Bad other	10.93*	5.01	15.04*	6.66	15.66	4.20	14.01	4.81	1.82	0.81	4.39*	7.48**
Separation	16.90*	6.37	21.04*	5.21	21.82	4.47	22.09	4.33	4.59*	2.51	1.93	11.29**
Bad self	13.18	5.51	16.90	7.15	18.36	5.22	17.61	5.64	3.63	0.92	2.09	7.75**

Note. REP = repressors; Non-REP = nonrepressors; MAS = Manifest Anxiety Scale; SDS = Social Desirability Scale; ANOVA = analysis of variance; LA = low anxious; DHA = defensive high anxious; HA = high anxious. Asterisks next to the mean values of the REP and LA groups indicate significant (one-tailed) differences between the two means in a planned comparison.

* $p < .05$. ** $p < .01$.

Judgment Times in the SRT

During the SRT, participants made 390 judgments of unpleasant emotions (30 episodes × 13 emotions) and 90 judgments of pleasant emotions. The judgment times of unpleasant emotions were analyzed to test the superficial-encoding hypothesis, which predicts that repressors make faster judgments to avoid thinking about unpleasant emotions.

To test this hypothesis, we computed a 7 × 2 mixed design ANOVA with the seven categories of the rating scale (0–6) as the within-subject factor and the repressor–nonrepressor contrast as the between-subjects factor. A strong main effect for the response category was obtained, $F(6, 354) = 29.73$, $p < .01$. The repression main effect was not significant, $F(1, 59) = 2.14$, $p = .15$. However, the interaction was significant, $F(6, 354) = 2.81$, $p < .05$. The same analysis with judgment times of pleasant emotions revealed no significant repression effects. The judgment times of unpleasant emotions for the four personality groups are displayed in Figure 1, along with the judgment times of the pleasant emotions averaged across all four groups. The strong main effect of response category was due to the fact that zero responses needed the least time, and the judgment times of the other responses decreased with increasing intensity level. More important, the interaction effect was due to the fact that the groups did not differ in the speed of zero ratings (repressor–nonrepressor contrast), $t(59) = 0.65$, $p = .52$, but repressors tended to need more time for the remaining responses, $t(59) = 1.64$, $p = .11$. Hence, the present results do not support the superficial-encoding hypothesis that repressors process unpleasant emotional information faster and more superficially.

Frequency Judgments

After the SRT, the participants made absolute frequency judgments for 16 salient emotions (i.e., those presented in the SRT) and 16 nonsalient emotions (i.e., those not presented in the SRT). Failed responses were replaced by zero frequencies, which happened 13 out of 1,952 times.

First, the frequency judgments of the salient emotions were averaged across emotions of the same emotion group. The internal consistencies (Cronbach's α) of the five frequency judgment

scales were .61 (pleasant), .60 (threat), .82 (bad other), .62 (separation), and .70 (bad self). The five emotion scales were then analyzed as in the previous analyses, reporting the means of all four groups, computing planned contrasts between repressors and nonrepressors, repressors and the LA group, and computing a 2 × 2 ANOVA with the dichotomized SDS and MAS scales as between-subjects factors.

Table 4 shows that, as predicted, for all unpleasant emotions repressors' frequency estimates were lower than those of the other groups. However, surprisingly, this was also true for the pleasant emotions. All of the repressor–LA group contrasts were significant and all of the repressor–nonrepressor contrasts were significant except for threat-related emotions. The 2 × 2

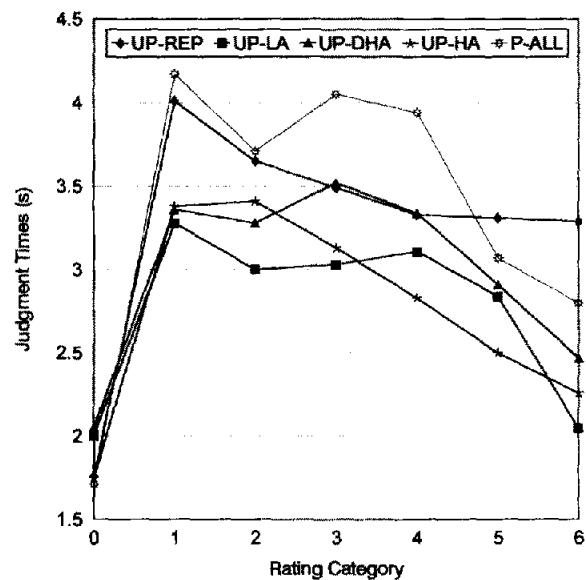


Figure 1. Unpleasant emotions' judgment times in the scenario rating task for ratings from 0–6, for repressors (UP-REP), low-anxious (UP-LA), defensive high anxious (UP-DHA), and high anxious (UP-HA) participants. P-ALL = pleasant emotions' judgment times for all participants.

Table 4

Absolute Frequency Judgments and Significance Tests of the Planned Contrast (REP–Non-REP), and the MAS × SDS ANOVA

Emotion	REP (n = 20)		LA (n = 13)		DHA (n = 11)		HA (n = 17)		MAS F(1, 57)	SDS F(1, 57)	MAS × SDS F(1, 57)	REP–Non-REP F(1, 59)
	M	SD	M	SD	M	SD	M	SD				
Pleasant	5.45*	2.80	9.41*	7.58	5.70	2.77	7.31	4.43	0.57	5.22**	0.92	2.65
Threat	8.95*	4.16	15.04*	10.59	10.32	4.91	11.91	6.72	0.24	4.61*	1.58	3.55
Bad other	6.51*	3.80	11.92*	6.40	8.89	3.80	9.53	4.65	0.00	6.01*	3.73	7.79**
Separation	7.08*	2.35	17.08*	9.97	8.91	4.82	11.65	6.42	1.22	15.27**	4.96*	9.37**
Bad self	6.23*	3.64	12.85*	9.96	7.91	3.78	9.35	4.39	0.36	7.06*	2.91	5.69*

Note. REP = repressors; Non-REP = nonrepressors; MAS = Manifest Anxiety Scale; SDS = Social Desirability Scale; ANOVA = analysis of variance; LA = low anxious; DHA = defensive high anxious; HA = high anxious. Asterisks next to mean values of the REP and LA groups indicate significant (one-tailed) differences between the two means in a planned comparison.

* $p < .05$. ** $p < .01$.

ANOVA revealed significant SDS main effects and a significant SDS × MAS interaction for sadness.

The SDS main effect for pleasant emotions suggests that SDS is related to the underestimation of emotion frequencies in general. To test if repression effects are still obtained when underestimation of pleasant emotions is statistically controlled, the planned contrasts between repressors and nonrepressors as well as the ones between repressors and the LA group were computed again for all unpleasant emotions, controlling for differences in frequency estimates of pleasant emotions. The effects for separation emotions and for bad-other emotions remained significant, whereas the effect for bad-self emotions was rendered marginally significant ($p = .10$). In sum, it can be concluded that the present study also replicated previous findings that repressors provide lower estimates of unpleasant emotions than the other groups. The markedly elevated frequency judgments of the LA group deviated from encoding frequencies and previous findings (Kreitler & Kreitler, 1990). No explanation can be given for this result and it might be a chance finding.

The next analysis explored the presence of repression effects for the nonsalient emotions that were not presented in the SRT. To do so, we compared the frequency judgments for similar salient and nonsalient emotions that were, according to a pilot study, elicited in the scenarios with about the same frequency. The following salient and nonsalient emotions were selected: salient ones were depression (frequency in the 30 scenarios according to the pilot study: 15), disappointment (14), anger (11), and anxiety (8); nonsalient ones were sadness (16), discontent (15), rage (9), and fear (11).

The frequency judgments of the four salient and nonsalient unpleasant emotions were averaged separately. Table 5 shows the means of the two variables for the four groups and the usual significance tests. The analysis of the salient emotions replicated the previous findings reported in Table 4. More interesting, the analysis of the nonsalient emotions did not reveal a significant repressor–nonrepressor contrast. However, the repressors had the lowest frequency judgments for the nonsalient emotions. A comparison between the frequency judgments of salient and nonsalient emotions revealed that all groups provided higher frequency judgments for salient than for nonsalient emotions, a common finding in the experimental literature (cf. Greene,

1989). More important in the present context is the fact that the repression effect was weaker for nonsalient emotions.

Relationship Between the Encoding and the Retrieval of Emotion Memories

In the following analyses, the repression effects at the time of encoding were used to predict the repression effects at the time of retrieval. These analyses addressed the important question of whether the repression effects observed in the frequency judgments were due to the repression effects observed in the frequencies of encoding unpleasant emotions in the SRT, or whether additional processes are associated with a repressive coping style that render the accessibility of unpleasant emotion memories more difficult.

For this purpose, path analyses were computed, following closely a study by Larsen (1992, see also Cutler et al., 1996). Path analysis allowed us to distinguish a direct and an indirect effect of repression on the retrieval of emotion memories. The indirect effect would support the frequency hypothesis, indicating that repressors already experience unpleasant emotions less frequently at the time of encoding and that this effect is accurately reflected in the latter frequency judgments. The direct effect shows whether repression also influences the accessibility of unpleasant emotion memories—that is, repressors' retrospective frequency judgments are lower than their already lower frequencies of unpleasant emotions at the time of encoding.

The repressor–nonrepressor contrast was used as a measure of the personality variable. Repressors were coded as 1 and nonrepressors as 0. Hence, negative path weights are expected. Figure 2 shows the path diagrams for the five types of emotions. The indirect path coefficients are significant for all four groups of unpleasant emotions. This finding strongly supports the frequency hypothesis, showing an availability effect of repression on emotion memory. In addition, the direct path from repression to the frequency judgments was significant for bad-other and separation emotions, suggesting that accessibility also has an effect.

Latency-to-Retrieve Paradigm

The next analyses addressed the question of whether repression influences not only frequency judgments but also the recall

Table 5
Absolute Frequency Judgments of Salient and Nonsalient Emotions, Significance Tests of the Planned Contrast (REP–Non-REP), and the MAS × SDS ANOVA

Emotion	REP (<i>n</i> = 20)		LA (<i>n</i> = 13)		DHA (<i>n</i> = 11)		HA (<i>n</i> = 17)		MAS <i>F</i> (1, 57)	SDS <i>F</i> (1, 57)	MAS × SDS <i>F</i> (1, 57)	REP–Non-REP <i>F</i> (1, 59)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Salient	8.21**	3.44	12.89**	4.16	9.61	3.81	10.88	4.73	0.08	7.72**	2.52	6.94*
Nonsalient	6.10	2.35	7.83	5.06	6.98	5.05	7.90	5.60	0.16	1.23	0.12	1.58

Note. REP = repressors; Non-REP = nonrepressors; MAS = Manifest Anxiety Scale; SDS = Social Desirability Scale; ANOVA = analysis of variance; LA = low anxious; DHA = defensive high anxious; HA = high anxious. Asterisks next to the mean values of the REP and LA groups indicate significant differences between the two means in a planned comparison.

p* < .05. *p* < .01.

of emotional events; in this case the hypothetical scenarios. First, the latency to retrieve a scenario in which one of the salient emotions would have been experienced was analyzed. One emotion of each of the five types of emotions was used as a retrieval cue (pleasant: gratitude; threat: anxiety; bad other: jealousy; separation: depression; and bad self: embarrassment).

If participants failed to retrieve an episode within the time limit of 10 s, retrieval times were set to be 10 s (cf. Davis, 1987). Table 6 shows the groups' retrieval times for the five salient emotions. No significant repression effects were ob-

tained. An unexpected finding was that the two high-SDS groups needed longer to retrieve a pleasant scenario. The significant SDS main effect on retrieval of the bad-self emotion was mainly due to the DHA group. There were also no repression effects for the nonsalient emotions. In sum, the latency-to-retrieve findings were disappointing. The lack of repression effects could be due to the lower number of items for each emotion group or lower reliability of retrieval times. Nevertheless, the present approach might be useful to study recall of emotional memories under controlled laboratory conditions.

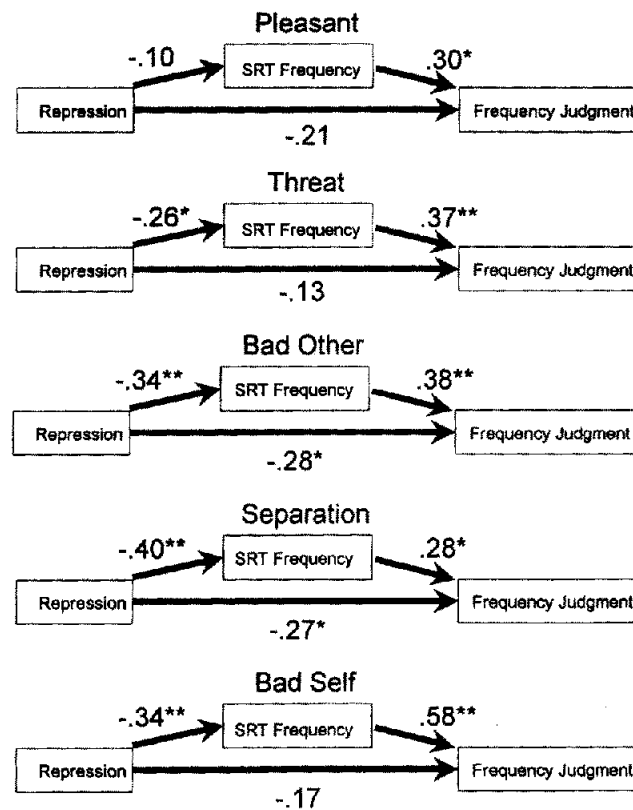


Figure 2. Path models of the direct and indirect influence of repression on the absolute frequency judgments. SRT = scenario rating task.

Table 6
Latency-to-Retrieve a Scenario From the SRT in a Cued Recall Task, Significance Tests of the Planned Contrast (REP–Non-REP), and the MAS × SDS ANOVA

Emotion	REP (<i>n</i> = 20)		LA (<i>n</i> = 13)		DHA (<i>n</i> = 11)		HA (<i>n</i> = 17)		MAS	SDS	MAS × SDS	REP–Non-REP
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i> (1, 57)	<i>F</i> (1, 57)	<i>F</i> (1, 57)	<i>F</i> (1, 59)
Pleasant	5.07	3.24	4.59	3.71	4.75	2.53	3.74	2.21	0.95	5.00*	1.13	0.96
Threat	3.62	2.22	4.15	2.86	3.67	1.40	3.06	2.14	0.05	1.60	0.20	0.01
Bad other	3.81	2.53	3.69	3.23	2.99	1.05	2.83	2.10	2.13	0.43	1.94	1.04
Separation	4.12	2.16	5.66	3.48	4.59	2.24	4.21	2.67	0.48	0.01	4.03	0.81
Bad self	4.24	2.66	4.34	3.21	4.66	2.23	4.21	2.20	0.02	6.78*	0.49	0.04

Note. SRT = Scenario Rating Task; REP = repressors; Non-REP = nonrepressors; MAS = Manifest Anxiety Scale; SDS = Social Desirability Scale; ANOVA = analysis of variance; LA = low anxious; DHA = defensive high anxious; HA = high anxious. There were no significant differences between REP and LA participants.

* $p < .05$.

Discussion

Study 1 replicated findings of earlier studies and provided several new findings that allow a better understanding of the processes underlying repression effects on emotion memory.

Encoding of Emotion Memories

The present study replicated previous findings that repressors' overall averages of intensity ratings of unpleasant emotions are lower than those of other groups (Egloff & Krohne, 1996; Hansen & Hansen, 1988; Weinberger & Schwartz, 1982). However, the present study showed that this effect was not due to individual differences in the intensity of emotional experiences, but due to individual differences in the frequency of emotional experiences. Hence, the findings support the frequency hypothesis rather than the intensity hypothesis of repression.

The present study also provides a simple explanation for the finding of previous studies that repression influences only nondominant emotions (Egloff & Krohne, 1996; Hansen & Hansen, 1988): Repressors report nondominant emotions less frequently, which leads to the lower overall averages. However, the dominant emotion—that is, the emotion most clearly elicited in the situation—is experienced by all people, repressors and nonrepressors alike. Therefore, there are no frequency differences that could attenuate the repressors' overall averages of the dominant emotion.

A second finding was that repressors showed no differences in the speed of zero ratings and tended to need more time for nonzero ratings. This finding is inconsistent with the superficial-encoding hypothesis that repressors process information about unpleasant emotions more superficially at the time of encoding. The findings in other studies concerning the superficial-encoding hypothesis are mixed (Baumeister & Cairns, 1992; Bonanno et al., 1991; Dawkins & Furnham, 1989; Fox, 1993; Hock et al., 1996), probably due to the heterogeneity of the designs used. However, Baumeister and Cairns's study and the present study demonstrate repression effects in a memory measure without superficial encoding. Hence, superficial encoding—at least as measured by encoding times—seems to play a minor role in the memory effects documented by Davis and others. In sum,

the present study provided support only for the frequency hypothesis, but not for the intensity or the superficial-encoding hypothesis of repression.

Retrieval of Emotion Memories

Concerning frequency judgments of emotions, the present study replicated Kreitler and Kreitler's (1990) finding that repressors estimate the frequency of unpleasant emotions to be lower than the other groups. Path analyses showed that for all types of unpleasant emotions the lower frequency judgments of repressors could at least partly be attributed to the less-frequent experience of these emotions in the presented scenarios. This is the first direct evidence linking repression effects in a memory measure to repression effects in an encoding measure: Repression effects in memory-based frequency judgments of unpleasant emotions were due to the fact that repressors linked negative events less frequently to unpleasant emotion concepts. That is, although repressors and nonrepressors saw the same number and types of unpleasant events, repressors nevertheless indicated to experience less unpleasant emotions in these scenarios. This difference in the frequency of unpleasant emotions is to some extent accurately reflected in repressors' retrospective frequency judgments. However, the path analyses revealed additional direct repression effects on the accessibility of bad-other and separation emotions. The direct path coefficients for the other unpleasant emotion groups were also negative but not significant, probably because of the limited sample size. This finding is consistent with Davis's (1990) claim that repression influences the accessibility of unpleasant emotion memories. However, the analyses of the encoding of emotions revealed that neither the intensity nor the superficial-encoding hypothesis could account for the lower accessibility of memories of bad-other and separation emotions. Hence, repression influenced the accessibility of emotion memories in other ways than the ones proposed in the literature (cf. General Discussion). It should also be noted that even the significant direct path coefficients were rather low and could be due to unreliability in the measurement of the mediator variable.

The results of the latency-to-retrieve-paradigm did not show

repression effects for the retrieval of single scenarios, probably for methodological reasons. For example, the frequency judgment task, which always preceded the latency-to-retrieve paradigm, might have rendered scenarios highly accessible; or the retrieval times might have been unreliable.

Study 2

The experimental paradigm used in Study 1 had the advantage that the number and type of emotional events was controlled, but the approach also has its disadvantages. First, the participants presumably did not really experience the emotions perceived in the scenarios, or at least the experiences differed radically from experiences that people would have, if they were in the described situations. Second, the time interval between the encoding of the emotional information and the memory tasks was very brief, so that Study 1 did not investigate the influence of repressive coping on long-term memory of emotional experiences. To compensate for these limitations of Study 1, a second study was conducted that investigated repression in a real-world setting. Study 2 follows closely a recent study conducted by Cutler et al. (1996). Both studies used an emotion diary method in combination with retrospective frequency judgments (cf. Diener, Larsen, & Emmons, 1984; Larsen, 1992) to distinguish between availability and accessibility effects in frequency judgments of emotions. In contrast to Study 1, where the number of unpleasant events was experimentally controlled, repression effects in the twice-daily frequency judgments can be due to various factors, namely (a) differences in the number and types of encountered events, (b) differences in the interpretation of the events, or (c) memory effects over short time periods. Study 2 also did not measure encoding times or the intensity of emotional experiences. Hence, in Study 2 potential differences in the accessibility of emotion memories can be due to a host of factors and it is not possible to distinguish between those. The major aim of Study 2 was to study repression effects on the accessibility of autobiographic emotional experiences after a longer retention interval, but at the same time controlling for individual differences in (a) the encountered events, (b) the interpretation of these events, and (c) the memory representation of emotional experiences shortly after the emotions were experienced.

Method

Participants

The participants were students in a course on emotions in everyday life from April to July, 1995. None of the theories relevant to the present study was the topic of the course before the data collection was completed. All participants were undergraduate students who received course credits for participating in the data collections.

One hundred fifty-six students took part in a first administration of a 20-item personality questionnaire measuring the Big Five (Norman, 1963; see Borkenau, 1988, for the German translation). Eighty participants (24 men, 56 women) with a mean age of 25 years completed all data collections (this dropout rate is quite common at German universities). Comparisons of the dropouts with the remaining sample on the variables of the first assessment revealed no significant differences in age, sex, or any of the five personality dimensions.

Material and Procedure

Personality questionnaires. As in Study 1, the German versions of the SDS and the short form of Taylor's MAS (Lück & Timaeus, 1969) were used to assess the repressive coping style. These two personality questionnaires were administered 2 weeks after the diary period.

Frequency of emotion diary (FED). Participants completed a frequency of emotion diary two times per day (cf. Cutler et al., 1996; Larsen, 1992). The participants determined by themselves when they had reached the approximate middle of a day to complete the first form. The second form was completed at the end of the day. A subjective middle of the day was used because individuals differ greatly in their sleep-wake cycles. At each measurement point, participants first noted the beginning and the end of the judged time period. Then they estimated the absolute frequencies of 36 emotions during the previous half of the day. For this purpose, they were provided with a 7-point scale, ranging from 0 (*none*) to 6 (*more than five*). All categories of this scale represent absolute frequencies but the last one, which comprised all frequencies greater than 5. This category was checked very rarely. Hence, the sum of the ratings can be interpreted as an absolute frequency score.

In previous daily-diary studies (e.g., Emmons & Diener, 1986) participants were asked to return questionnaires on a daily basis to ensure that the forms were indeed completed daily. Though desirable, this procedure was not feasible in the present study because students in Berlin do not live on campus and many students do not visit the university each day. Therefore, the FED was given to the participants in the form of two booklets, one for each week, so that at least the weekly completion of the diary could be controlled.

Retrospective frequency of emotions questionnaire (FEQ). The retrospective frequency judgments were assessed with the FEQ. In this questionnaire, the participants estimated the relative frequency of the same emotions included in the FED. Judgments were made on 7-point scales (0 = *never*, 1 = *very rarely*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, 5 = *very often*, and 6 = *nearly always*). The order of the emotion words in the FED and the FEQ differed, which served the purpose that participants could not simply rely on their modal rating profile in the FED to complete the FEQ. Similarly, they could not use the modal response in the FED to give a valid rating in the FEQ because the same numeric category had different meanings in the FED and the FEQ. For example, a person might rate hate, a very rare emotion, to be present once each time in the FED (a rating of 1), that is, 14 times per week. This person experiences hate very frequently, and not very rarely, as indicated by a rating of 1 in the FEQ.

The retrospective frequency judgments were made during class after the second diary week, after the participants had returned the second FED booklet. At this point they received two forms of the FEQ. The instructions asked them to use the first form to estimate the frequencies of emotions in the first week, and the second form for the frequencies in the second week of the diary period. Hence, participants had to judge the frequency of emotions after a longer (first week) and a shorter (second week) retention interval. If repression influences the storage of emotion memories during the retention interval, repression effects should be more pronounced in frequency judgments of the first week.

Results

Personality Types

The SDS and MAS scores of the sample in Study 2 were very similar to those in Study 1. The MAS median was 8.5 and the SDS median was 10.0. Also as in Study 1 and in previous studies, the two scales were moderately correlated ($r = -.36$, $p < .01$).

After using a median split to assign participants to the four

Table 7
Absolute Frequencies per Week in the Diary Study, Significance Tests of the Planned Contrast (REP–Non-REP), and the MAS × SDS ANOVA

Emotion	REP (n = 30)		LA (n = 10)		DHA (n = 15)		HA (n = 25)		MAS F(1, 76)	SDS F(1, 76)	MAS × SDS F(1, 76)	REP–Non-REP F(1, 78)
	M	SD	M	SD	M	SD	M	SD				
Pleasant	18.19	8.71	21.27	11.25	14.23	7.48	16.18	9.15	4.23*	1.30	0.65	0.57
Threat	5.93	5.99	6.60	5.38	7.98	5.45	9.12	9.35	1.73*	0.27	0.02	2.08
Bad other	4.68	3.11	5.63	3.55	5.13	3.10	6.59	4.51	0.61	1.79	0.08	2.28
Separation	5.13	6.46	5.85	5.67	5.83	5.11	10.89	12.73	1.81	1.83	1.04	2.51
Bad self	3.51	2.91	4.63	4.36	3.29	2.13	4.23	3.33	0.16	1.81	0.01	0.52

Note. REP = repressors; Non-REP = nonrepressors; MAS = Manifest Anxiety Scale; SDS = Social Desirability Scale; ANOVA = analysis of variance; LA = low anxious; DHA = defensive high anxious; HA = high anxious. There were no significant REP and LA group differences.

* $p < .05$.

personality groups, it was found that the total sample included 30 repressors, 10 LA, 15 DHA, and 25 HA participants.

ANOVAs with the between-subjects factors high–low SDS and high–low MAS revealed only a significant main effect of high–low SDS on the SDS scores, $F(1, 76) = 160.11$, $p < .001$. For the MAS scores, a significant high–low SDS effect emerged, $F(1, 76) = 4.88$, $p < .05$, besides the expected strong high–low MAS effect, $F(1, 76) = 105.69$, $p < .01$. However, repressors' MAS mean ($M = 5.40$, $SD = 1.92$) was not significantly lower than the MAS mean of the LA group ($M = 5.80$, $SD = 2.35$), $t(38) = 0.54$, $p = .59$.

Emotion Types

Although more emotions were included in Study 2, only the emotions included in Study 1 were used to render the findings of the two studies more comparable. These emotions were assigned to the same five types of emotions as in Study 1. The report of the results follows the format of Study 1, and the same level of significance was used.

Repression and Frequency of Emotions in the Emotion Diary

The first analyses tested the influence of repression on the frequency of emotions in the averaged daily estimates. A comparison of the 2 weeks revealed neither significant differences between the first and second week, nor any interactions with the individual difference variables. Therefore the data were aggregated across the two weeks. In contrast to Study 1, none of the repression effects was significant (see Table 7). However, the means are patterned as in Study 1: For all four types of unpleasant emotions, the repressors have a lower mean than the LA group. An unusual finding is that the DHA group had a lower frequency of bad-self emotions than the repressors.

Repressive Coping Style and Retrospective Frequency Judgments

As for the diary data, a comparison of the retrospective judgments for the first and second diary week revealed no significant differences between the two weeks, nor any interactions with

the personality variables (all $ps > .10$). This finding implies that the length of the retention interval has no visible effect on the retrospective frequency judgments. As a consequence, the estimates for the two weeks were averaged. Table 8 shows that only a single repressor–nonrepressor contrast was significant, namely for separation emotions. However, this effect cannot be interpreted as a repression effect, because repressors had a higher frequency than the LA group. With regard to the other types of emotions, at least the expected pattern could be found: Repressors had a lower mean than the other groups. Path analyses are not reported because repression had no significant effects, neither at the time of encoding, nor at the time of retrieval.

Discussion

In contrast to Study 1, Study 2 did not reveal significant repression effects. However, the pattern of means was similar to that in Study 1: Repressors showed lower mean frequencies for unpleasant types of emotions than the LA group, except for sadness in the retrospective frequency estimates. The finding that the effects in Study 2 were not significant is not as surprising as it might appear on first sight. For example, even in Kreitler and Kreitler's (1990) study with over 200 participants, the expected pattern (repressors < LA) could be obtained, but only for one emotion (jealousy) was the effect significant. Also Cutler et al. (1996) reported a difference between repressors and LA participants that only tended to be significant. Finally, the only studies that found significant differences in the memory performance between repressors and the LA group are based on the selection of extreme groups from large samples (Davis, 1987; Myers & Brewin, 1994).³ In sum, demonstrating repression

³ In an earlier version of this article, extreme groups were used and significant repression effects were obtained at the time of encoding and retrieval. As pointed out by the two reviewers of this article, Peter Borkenau and Roy Baumeister, the use of extreme groups can lead to differences between repressors and LA individuals in MAS because SDS and MAS are negatively correlated. As a consequence, differences between the two groups can no longer be interpreted as evidence of repression effects. In this respect, it is noteworthy that Davis (1987, Study 1) reported a lower MAS mean for repressors ($M = 3.4$) than for the LA group ($M = 6.3$); MAS scores for Study 2 and 3 are not reported. Myers and Brewin's (1994) data are similar: $M_s = 4.20$ and

Table 8

Frequency Judgments of Emotions for the 2-Week Diary Period of the Four Personality Groups for the Five Types of Emotions and Significance Tests of the Planned Contrast (REP–Non-REP) and the MAS \times SDS ANOVA

Emotion	REP (n = 30)		LA (n = 10)		DHA (n = 15)		HA (n = 25)		MAS F(1, 76)	SDS F(1, 76)	MAS \times SDS F(1, 76)	REP–Non-REP F(1, 78)
	M	SD	M	SD	M	SD	M	SD				
Pleasant	2.56	(0.91)	2.80	(1.18)	2.17	(0.82)	2.26	(0.62)	5.00*	0.63	0.12	1.23
Threat	1.20	(1.06)	1.40	(1.01)	1.87	(0.98)	1.52	(1.03)	2.44	0.09	1.18	2.86
Bad other	0.88	(0.70)	1.09	(0.52)	1.09	(0.69)	1.09	(0.50)	0.50*	0.46	0.53	2.28
Separation	1.10	(1.00)	0.98	(0.84)	1.75	(1.35)	1.88	(1.15)	8.27**	0.00	0.22	4.65*
Bad self	0.64	(0.68)	0.78	(0.57)	0.87	(0.67)	0.82	(0.63)	0.68	0.09	0.36	1.59

Note. REP = repressors; Non-REP = nonrepressors; MAS = Manifest Anxiety Scale; SDS = Social Desirability Scale; ANOVA = analysis of variance; LA = low anxious; DHA = defensive high anxious; HA = high anxious. There were no significant REP and LA group differences.

* $p < .05$. ** $p < .01$.

effects on the retrieval of memories of real-life events has been more difficult than demonstrating effects in the laboratory (Baumeister & Cairns, 1992; and Study 1). Study 2 at least adds to the understanding of repression effects in that it demonstrated that the length of the retention interval (half a day, last week, the week 1 week ago) did not influence the strength of repression effects. Otherwise, the retrospective frequency estimates—especially the ones for the first diary week—should have revealed a stronger repression effect than the averaged twice-daily ratings, which was not the case.

General Discussion

The present studies investigated the encoding and retrieval of the same emotional material, which permitted a direct test of several hypotheses that have been proposed in the literature to account for retrieval effects of repression (Davis, 1990). Two important results were obtained. First, in Study 1 most of the retrieval effects could be attributed to differences in the availability of unpleasant emotions in memory because repressors reported experiencing these emotions already less frequently at the time of encoding. Second, in Study 2 repression effects were not obtained in retrospective frequency estimates when no such differences existed already shortly after the emotions were experienced. The general discussion of these findings first focuses on the cognitive processes underlying the retrieval effects and subsequently on the encoding effects.

Repression and the Retrieval of Emotion Memories

In general, the results of the present studies support the frequency hypothesis, which assumes that repressors are less likely to experience unpleasant emotions when they encounter a negative event. As a consequence, repressors simply have fewer unpleasant emotion memories available that they can retrieve from memory and the differences in frequency judgments between

repressors and nonrepressors accurately reflect these differences in the frequency of experiences.

It is important to note that in Study 1, repressors and nonrepressors saw the same number of unpleasant events, and the ratings of all participants indicated that they elicited unpleasant emotions. However, because each event can elicit several emotions (cf. Weinberger & Schwartz, 1982; Hansen & Hansen, 1988), it is still possible that repressors feel fewer unpleasant emotions than nonrepressors in these events. That is, for repressors unpleasant emotions are less likely to co-occur than for nonrepressors. As a consequence, repressors' memories of the negative events are linked to fewer unpleasant emotion concepts.

At first, this account of repression effects seems to be very similar to Hansen and Hansen's (1988) notion that emotion memories of repressors are more discrete than those of nonrepressors. However, their explanation differs in several important aspects from the present account. Hansen and Hansen assumed that "activation of a memory and its associated emotional tag would enhance the *accessibility* [italics added] of fewer similarly tagged representations within the repressors' memories than the nonrepressors'" (p. 816). That is, Hansen and Hansen assumed that repressors and nonrepressors have the same number of tags (i.e., links between an event memory and an emotion concept) available, but that repressors' tagged memories are less accessible. The lower accessibility is explained by the greater difference in the intensities of dominant and nondominant emotions for repressors. As a consequence, repressors' nondominant tags are less likely to access the related memory than nondominant tags of nonrepressors (cf. Hansen & Hansen, 1988, p. 812).

In contrast, the frequency hypothesis states that repressors' have fewer tags available, but that for the existing tags memories are equally accessible for repressors and nonrepressors. Furthermore, the frequency model does not make the assumption that tags for other emotions than the retrieval cue influence the accessibility of emotional memories. That is, a memory of a mild feeling of embarrassment is not rendered less accessible by a strong feeling of sadness in the same event. In support of the frequency hypothesis, Study 1 demonstrated that the repressors' greater intensity differences between dominant and nondominant emotions are more apparent than real. Repressors do not

6.87, respectively. Hence, a more cautious appraisal of the findings in these studies seems to be required.

experience emotions less intensely but less frequently. However, if one averages intensity ratings of nondominant emotions, repressors' greater number of zero ratings, indicating the absence of an emotion, reduces the average compared to the nonrepressors' average. This, however, does not show differences in the intensity but in the frequency of emotional experiences. As a consequence, differences in the intensities between dominant and nondominant emotions cannot explain repression effects.

The frequency hypothesis and Hansen and Hansen's (1988) distinctiveness hypothesis also make different predictions about repressors' aggressiveness. Hansen and Hansen reasoned that for repressors, dominant anger is not moderated by nondominant emotions such as fear because the nondominant emotions are experienced less intensely. As a consequence, repressors should be more aggressive than nonrepressors. In contrast, the frequency hypothesis states that repressors experience anger less frequently than nonrepressors. As a consequence, they should be less aggressive, which is consistent with the literature (cf. Conn & Crowne, 1964). In sum, Study 1 provides support for the frequency hypothesis, which states that repressors establish fewer links between emotional events and emotion concepts at the time of encoding and that the lower frequency judgments simply reflect the smaller number of available links.

Of particular interest, Study 1 showed that repressors did not differ significantly from nonrepressors in frequency judgments of nonsalient emotions, that is, emotion concepts that were not presented during the scenario rating task. Presumably, neither repressors nor nonrepressors established links between the scenarios and these emotion concepts during the rating task. Hence, the events had to be related to the new emotion concepts at the time of retrieval. Apparently, repressors were as capable to do so as nonrepressors.

If this reasoning is true to the facts, it could also explain Davis's (1990) finding that nonrepressors initially recalled more unpleasant experiences, but that repressors showed a stronger increase in recalled memories after repeated recall attempts. If repressors and nonrepressors have about the same number of unpleasant experiences stored in memory, but nonrepressors possess more pre-established links to emotion concepts, they can come up with more unpleasant events in the beginning. On the other hand, repressors first have to establish these links at the time of retrieval. To do so, repressors have to rely on other retrieval cues (e.g., already retrieved similar episodes) and then link them to the emotion concept that serves as a retrieval cue.

The frequency hypothesis cannot account for the finding in Study 1 that repressors underestimated the frequency of bad-other and separation emotions. However, neither the intensity nor the superficial-encoding hypothesis can account for this finding, because in Study 1 repressors did not differ significantly in the intensity or the encoding times from the other groups. One possible explanation could be the *personality-congruent memory effect*. That is, information congruent with the self-concept is usually more accessible (cf. Martin, 1985). For example, neurotic people have a negative self-concept and have been found to overestimate their amount of displeasure (Diener et al., 1984; see also Cutler et al., 1996) and physical symptoms (Larsen, 1992). With regard to the operationalization of repression in terms of high SDS and low MAS scores, repressors can be expected to have a positive (low MAS) and good-natured

(high SDS) self-concept. This idea is supported by findings that repression is associated with low levels of neuroticism and high levels of agreeableness (Borkenau & Ostendorf, 1992; Weinberger & Schwartz, 1990). At the same time, bad-other emotions are the exact opposite, as frequently experiencing them is correlated with a high degree of neuroticism and a low degree of agreeableness (Watson & Clark, 1992). Apparently, experiencing bad-other emotions is incompatible with the self-concept of repressors, which might be the cause of their lower accessibility. Similarly, the false negative feedback that Baumeister and Cairns (1992) gave repressors about their personality might have been incongruent with their self-concepts, leading to the lower accessibility of this information in the recall task. Future research on repression and memory might benefit from paying greater attention to the influence of the self-concept on the encoding and retrieval of self-related emotional information.

Repression and the Encoding of Emotions

The most clear-cut finding of the present studies was that repressors differed from the other groups in that they already reported fewer unpleasant emotions at the time of encoding. These encoding differences accounted for most of the later differences in frequency judgments. Therefore, one possible question for future research could be why repressors report experiencing unpleasant emotions less frequently. A clarification of this question would also increase the theoretical understanding of the dissociation between self-report of emotions and physiological measures obtained in psychophysiological studies (cf. Asendorpf & Scherer, 1983; Kohlmann et al., 1996; Weinberger et al., 1979).

The investigation of judgment times in Study 1 rules out one, at first sight very plausible, explanation that repressors process emotion-related information more superficially (Davis, 1990). In contrast, repressors tended to need more time than the other groups to make their judgments in the SRT. These longer judgment times suggest that repressors have greater difficulties inferring emotions from situational cues in the descriptions of the situations. That is, repressors might have greater difficulties in appraising the emotional aspects of situations (Conn & Crowne, 1964; Tomaka et al., 1992), possibly because they habitually avoid appraisals that lead to the experience of undesirable emotions. Indeed, Conn and Crowne (1964) proposed 30 years ago that repressors "block the cognitions defining a threatening emotional state" (p. 166). Future research on repression effects on the encoding of emotions might therefore profit from recent investigations of the link between cognitive appraisals and emotions (cf. Frijda, 1986; Lazarus, 1991; Reizenzein & Spielhofer, 1994; Scherer, 1984). For example, after buying rotten apples at a supermarket advertising fresh fruit (see example in the Method section of Study 1), nonrepressors might appraise the supermarket's behavior as unfair and as a consequence feel angry. On the other hand, repressors might find nothing wrong with the practices of the supermarket because the apples were very cheap and they knew that they were running the risk of getting some rotten ones. This appraisal of the situation does not elicit anger. However, there are other explanations that should also be carefully considered: Even if identical appraisals are made and hence presumably the same type of feeling is aroused,

people might still differ in the categorization of their experiences into emotion concepts. That is, the same kind of experience might be named by different people as annoyance, anger, or rage. This categorization might also depend on the social context—that is, whether categorization of an experience is used to make sense of one's own feelings or whether it is used to communicate the experience to others. For example, people might admit feeling a little bit blue to others, and at the same time privately think they are depressed. Finally, it could be that repressors initially appraise the event in a similar manner as nonrepressors, but due to reappraisal and coping mechanisms have a different emotional outcome. This explanation not only comes closest to the notion of a "repressive way of coping," but could also account for repressors' longer encoding times in Study 1. Any of these outlined mechanisms might contribute to the observed, less-frequent report of unpleasant emotions by repressors and deserves examination in future research. For example, the same scenarios as in Study 1 could be presented and participants could indicate their appraisal or coping strategies in the hypothetical situations. Alternatively, one could compare the meaning of emotion concepts for repressors and nonrepressors.

In conclusion, the present study found repression as operationalized by Weinberger et al. (1979) to be a better predictor of individual differences in the experience of emotions rather than in the retrieval of emotion memories. This finding is in hindsight not very surprising because this operationalization of repression was developed and validated with regard to current emotional experiences rather than emotion memories. This also implies that stable individual differences in the accessibility of emotion memories might exist that are not captured by their operationalization of repression. Future research might therefore benefit from looking for alternative ways to operationalize individual differences in memory-based defense mechanisms.

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