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Recall and Recognition of Threatening, Pleasant, and Neutral Words in Repressors

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Abstract

Low accessibility of threatening information is a crucial element in the theory of repression. Despite many attempts, no empirical evidence has been found for such an inverse memory bias in normal subjects. An alternative approach is to study repressive processes as an individual difference. Adopting such a trait approach, several studies have shown impaired memory for threatening memories of real-life episodes in so-called repressors. Several other studies have yielded evidence of avoidant processing of mildly threatening information in the early stages of information processing in repressors. Thus far, little evidence for a similar avoidant bias in memory has been offered for repressors. To demonstrate the presence of memory deficits for mildly threatening information, we tested recall and cued recognition after a 30 min delay, for (i) threatening, (ii) pleasant, and (iii) neutral words in repressors and non-repressors. No proof was found for poorer recall and recognition of threatening words in repressors, or for lower numbers of threatening semantic intrusions in these individuals, while the power of the study was adequate. While repression-related avoidant processing may be present for even mildly threatening stimuli at earlier stages of information processing, the results of the present study indicate that repressed memory may only show up for relatively intense emotional events. Copyright © 1999 John Wiley & Sons, Ltd.

INTRODUCTION

The concept of repression was originally introduced by Freud (1915/1957) and defined as the predominantly unconscious prevention of ego-threatening material

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from entering consciousness. According to contemporary cognitive theories, repression can be conceptualized as the relative inaccessibility of emotional, especially threatening, memories (Davis, 1987; 1990; Davis and Schwartz, 1987; Hansen and Hansen, 1988). In the course of this century, many experimental studies have been conducted to demonstrate the process of repression. However, none of these studies succeeded in providing convincing evidence for the existence of repression as an unconscious process (see Holmes, 1990; Bradley and Baddeley, 1990). More recently, several researchers took a more pragmatic course by choosing to study repression as a trait (for example Byrne, Barry an Nelson, 1963; Gleser and Ihilevich, 1969; Weinberger, Schwartz and Davidson, 1979; Bond, Gardner, Christian and Sigal, 1983). The most influential of these trait methods seems to be the approach taken by Weinberger *et al*. (1979). They defined individuals as repressors, when they were highly defensive (high on the Marlow–Crowne Social Desirability Scale, MC; Crowne and Marlowe, 1964, and low in trait anxiety (low on the Manifest Anxiety Scale, MAS; Taylor, 1953). Similarly, low-trait-anxious subjects who are also low in defensiveness are defined as truly low anxious, while high-anxious subjects are defined as those with low defensiveness scores but high trait-anxiety scores. The fourth group, which is rare in normal samples, and therefore excluded from many of the studies using this method, are the defensive–high-anxious subjects, who are high on both scales.

This trait approach has been shown to be of value in health psychology and related areas (Weinberger, 1990; Schwartz, 1990). During the last 15 years there has been an upsurge in psychophysiological stress studies that generally support the interpretation of the 'repressor personality' (for example Weinberger *et al*., 1979; Asendorpf and Scherer, 1983; Jamner, Schwartz and Leigh, 1988; Esterling, Antoni, Kumar and Schneiderman, 1990). When confronted with mildly threatening stimuli (i.e. instructed to complete anxiety provoking sentences), repressors, in comparison with the other groups, display marked discrepancies between subjective responses on the one hand and physiological and behavioural responses on the other hand (Weinberger *et al*., 1979; Asendorpf and Scherer, 1983). In other words, while objective measures indicate the presence of anxiety, subjective measures do not. During stress, repressors show higher physiological reactivity and slower physiological recovery. Moreover, they are at a higher risk for somatic disease, including cardiovascular disease and cancer (Lane and Schwartz, 1987; Schwartz, 1990). The subjective–physiological discordance and the pronounced stress reactivity which are typical for repressors are thought to be the major mechanisms underlying higher vulnerability to disease in this group (Schwartz, 1991).

However, evidence of the validity of this trait method, with respect to the cognitive mechanisms involved, is still limited. More specifically, experimental demonstrations of avoidant cognitive processing in repressors is scarce. In the study of Weinberger *et al*. (1979) repressors had slower reaction times to threatening sentences, which they had to complete, and they tried to avoid the use of content-related completions when the sentences were threat related. Bonanno, Davis, Singer and Schwartz (1991), using a dichotic listening task, showed that repressors were more capable of ignoring threatening words in the channel to be ignored. A trend was also observed for repressors to show poorer memory for threatening words that had been presented in the channel to be ignored. They concluded that repressors seem to be skilful at avoidant processing of threat-related information. Furthermore, Dawkins and

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Furnham (1989), using a modified Stroop task, demonstrated equal interference in colour naming of threat words in repressors and high-anxious subjects, but more interference by threat words in repressors than in low-anxious subjects. Although this finding could be interpreted as reflecting additional cognitive attempts to repress or inhibit threatening information (see de Ruiter and Brosschot, 1994), it could not be replicated by Fox (1994). More convincing data in support of the hypothetical 'repressor personality' were gathered by Fox (1993), who showed that repressors shifted visual attention away from socially threatening words in an attention allocation task (MacLeod, Mathews and Tata, 1986). Moreover, results from a negative-priming task of Fox (1994) suggested that repressors were better in active suppression of threat-related information. In short, there is some evidence for cognitive operations which hinder the processing of threatful information in so-called repressors. This seems to be true for information that is only mildly threatening, and which has to be ignored during the performance of another task.

Although in general these findings support the interpretation of the repressor coping style, in only one study (Bonanno *et al*., 1991) a memory measure was used. Given the crucial role of defective memory for threatful information in the repression hypothesis, it would seem that more experimental evidence is needed of memory effects in repressors. There is proof that repressors exhibit lower accessibility of memories for threatening affective real-life episodes (Davis, 1987; 1990; Hansen and Hansen, 1988). In contrast with these studies, the stimuli that are typically used in the above-mentioned cognitive experiments, and in the psychophysiological experiment that provided the first validating data on the repressor coping style (Weinberger *et al*., 1979; Asendorpf and Scherer, 1983), are mildly threatening stimuli. None of the studies investigated similar poor memory accessibility for this kind of stimulus, except for the study of Bonanno *et al*. (1991). The trend observed in the latter study, and the obstructions that were demonstrated at the first stages of information processing for repressors in these cognitive and physiological studies, make it plausible that similar avoidant processes are at work in the later stages, i.e. in memory.

A direct comparison between repressors and high-anxious, low-anxious, and defensive high-anxious individuals of memory for generally threatening stimuli has not been made yet. The present study addresses this issue, by comparing the four groups on memory performance for neutral, pleasant, and threatening words, half an hour after displaying them, without the instruction to ignore them. The tasks are similar to standard tests that were used in other studies of emotional memory bias (see for example Bradley and Baddeley, 1990; Watts and Dalgleish, 1991; Rapee, McCallum and Melville, 1994). We tested the hypothesis that repressors, when compared with non-repressors, have a weaker memory for threatening words than for neutral and pleasant words.

Some additional hypotheses were tested in this study. It has been suggested that poor memory for threatening information in repressors is due to the fact that this group elaborates such information less well than other information (Davis, 1990; Hansen and Hansen, 1988). According to Davis (1990), this might be revealed by the presence of differences between repressors and non-repressors in memory for threatening material in free recall tasks, and an absence of such differences in cued recognition tasks. Free recall is thought to require the existence of an elaborated, complex associative network for the material to be remembered. Cued recognition is less dependent on the strength of the associative network. The memory bias that

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Bonanno *et al*. (1991) found was only a trend, but it concerned recognition and not free recall of threatening information. A free recall test might have yielded larger effects.

In the present experiment both a free recall and a cued recognition task were administered, to explore whether poor memory of threatening information in repressors is due to poorer elaboration.

Another way to study the extent to which repressors might be hindered in their processing of threatening words is to compare the number of falsely remembered threatening words with falsely recalled neutral or pleasant words. The number of falsely recalled words from a category might reflect the accessibility of the cognitive scheme for that category at the time of recall. Such accessibility may be enhanced when the category has specific meaning for the subject. For example, spider phobic subjects were found to produce more of these 'semantic intrusions' for spider-related words than normal subjects (Watts and Dalgleish, 1991), and a similar finding was reported for anxious patients (Mogg, 1988, quoted in Watts and Dalgleish, 1991). Watts and Dalgleish speculated that such intrusions are caused by higher accessibility of fear-related information, which is perhaps due to a higher activation of the fear scheme in spider phobics. If, in contrast to the high-anxious individuals, repressors' accessibility of aversive information is reduced—and more reduced than in the low-anxious individuals—it is to be expected that they produce fewer threatening intrusions than in these groups. This would indicate the existence in repressors of what might be called 'categorical repression'.

Finally, in exploratory analyses, the Defence Mechanisms Inventory (DMI) was used as an alternative—paper-and-pencil—test for repression (Gleser and Ihilevich, 1969; Cramer, 1988). There is much less evidence for the validity of this test than for the method of Weinberger *et al*. to measure repression. However, in contrast with the scales used in the latter method, the DMI is explicitly designed to measure defences. The composite scale of the DMI can be regarded as a measure of repression of threatening effect (Juni, 1982; De Jong, Erdman, Van der Brand, Verhage, Trijsburg and Passchier, 1994). In this study, both tests will be evaluated as to their predictive validity for poorer memory of threatening information. Several authors have pointed to the lack of correlations between scales that are assumed to measure the same defence (Olff, Godaert, Brosschot, Weiss and Ursin, 1990; Cramer, 1988). In the present experiment, we will test the additional hypothesis that repressors (according to the 'Weinberger method') score higher on repression according to the DMI.

In summary, we investigated whether repressors, regardless of the method used to define them, recall fewer threatening words than pleasant and neutral words, and, when cued, recognize as many threatening words as non-repressors. We also hoped to find evidence that repressors produce fewer threatening intrusions (falsely recalled threatening words) than the other groups.

METHOD

Subjects

The sample of this study consisted of 60 subjects who were recruited via advertisements in local newspapers. In this way, we avoided the use of a typical student sample. They were financially compensated for their participation. We only accepted persons

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who were older than 27 years and who had a minimal education of high-school level. Their ages ranged from 27 to 58 years (mean 37.7 years); 45 subjects were female and 15 were male.

Dispositional repression

As mentioned, repression was measured by two methods. The first method (Weinberger *et al*., 1979) divided individuals according to their defensiveness scores on the Marlow–Crowne scale (MC; Crowne and Marlowe, 1960; Hermans, 1967) and their trait anxiety scores on the STAI (van der Ploeg, Defares and Spielberger, 1979). We used a shortened version of the MC (Hermans, 1967). The reliability (Cronbach's alpha) of this version in the present study was 0.68. The psychometric properties of the STAI are well known. Like Weinberger *et al*., we used the medians of both scales to split the subjects in four groups: 17 Repressors (high MC–low STAI), 14 Defensive High Anxious (high MC–high STAI), 11 Truly Low Anxious (low MC–low STAI), and 18 High Anxious (low MC–High STAI).

The second method was a shortened version of the Defence Mechanism Inventory (DMI; Gleser and Ihilevich, 1969; Passchier and Verhage, 1986). This test consists of five brief stories about conflict areas, which are followed by questions regarding the subject's actual behaviour, fantasy behaviour, thoughts and feelings in the situations described. The subject's responses reflect five major groups of defence mechanisms: (i) turning against a real or presumed external object (TAO); (ii) projection (PRO); (iii) principalization (PRN), which involves invoking a mechanism that 'splits off' affect from content and represses the former (defences such as isolation, intellectualization, and rationalization fall into this category); (iv) turning aggression towards self (TAS); and (v) reversal (REV), including denial and reaction formation. According to Cramer (1988) the DMI has reasonable validity and reliability. We used a version with Likert scales, to avoid the interdependence of the scales in the original ipsative version (Gleser and Ihilevich, 1969). Previous studies showed that the reliability of the scales was not affected by this modification (Brosschot, 1984). In the present sample, Cronbach's alphas ranged from 0.74 to 0.82. For our purpose we used the composite measure (DMI–REP = [PRN + REV] − [TAO + PRO]) + 100), which is assumed to measure repression of affect (Juni, 1982; De Jong *et al*., 1994).

Materials and presentation

Three groups of 12 target words were used: neutral, pleasant, and threatening words. Three groups of 12 filler words were chosen of the same emotional valence as the target words, for the recognition task (see the appendix). Each word in each category was matched with a word of each other category, with respect to their frequency in daily use (according to Phaf and Wolters, 1989), and with respect to numbers of letters and numbers of syllables in each word.

As an additional validity check, 12 independent judges rated the three word sets on threatfulness and pleasantness. The panel was a random sample of university employees who were in no manner associated with the experiment, and who were also unaware of the purpose of the rating test. The judges were presented a list containing all words in random order, and were asked to indicate for each word, on two 100 mm long visual analogue scales, as how 'threatening' and 'pleasurable' they perceived the

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word. The two scales were anchored, respectively, by 'extremely threatening' versus 'not at all threatening' and 'extremely pleasant' versus 'extremely unpleasant'.

Following the example of the spider phobia study of Watts and Dalgleish (1991), the words were presented in three blocks, corresponding to the emotional categories. Blocked presentation is often used to isolate emotional effects, because effects of emotional words can easily be carried over to subsequent ones (Broadbent and Gathercole, 1990; Kindt, Bierman and Brosschot, 1996). For each subject, both the order of these blocks and the order of the words within the blocks was randomized. Each word was shown on a computer screen for 1 s, and every 2 s a new word was shown. The instruction was to pay careful attention to each word, but no instruction or suggestion was given to remember the words, nor were the subjects told that memory of the words would be tested later.

Recall and recognition tests

The memory test was conducted 30 min after the last word had been shown, during which time the subjects completed questionnaires that were not related to the test. The instruction for the *free recall* test was to write down as many words as they could remember on a blank sheet. They were told that the order was not important, and that it was also not important to remember all of the words. When a subject indicated that he/she could not remember any more words, only one prompt was given. When a subject indicated that he/she was ready, the *recognition* task was presented. The three groups of words were presented again in a randomized order, but this time mixed with the filler words of the same category. The subject had to push a 'yes' button if he/she recognized the word, or a 'no' button if this was not the case. To allow some *post hoc* analyses, reaction times were registered by the computer.

Data analyses

To compare numbers of memorized words between the experimental groups an ANOVA for repeated measures was conducted, with one within-subjects factor (Emotional Valence) and one between-subjects factor (Group). This was done separately for the recall and recognition data. To analyse the relation between DMI-REP and memory performance Pearson correlations were calculated.

RESULTS

Defensiveness and anxiety scores

Mean scores of the Spielberger trait-anxiety scale and the MC scale are shown in Table 1. The four groups differed in trait anxiety ($F(3, 56) = 33.3$, $p < 0.0001$) and MC defensiveness ($F(3, 56) = 59.85$, $p < 0.0001$). Student–Newman–Keuls (SNK) tests for multiple comparisons revealed that the High-Anxious and Defensive–High-Anxious subjects had significantly higher trait-anxiety scores than the Repressors and the Truly Low-anxious subjects, and that the Repressors and Defensive–High-Anxious subjects had higher defensiveness scores than the High-Anxious and Truly Low-anxious subjects.

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Table 1. Means of the Trait-anxiety Scale (STAI), Marlowe–Crowne Scale (MC), and DMI–repression (DMI–REP) for the four experimental groups. Standard deviations are in brackets

	Repressors ($n = 17$)	Defensive High Anx. ($n = 14$)	Truly Low Anx. ($n = 11$)	High Anxious ($n = 18$)
Trait anxiety	35.2 (5.4)	50.1 (6.7)	35.2 (5.5)	49.3 (5.6)
MC	8.2 (1.4)	7.3 (1.2)	2.7 (1.4)	3.4 (1.4)
DMI–REP[a]	105.1 (26.7)	68.5 (26.8)	80.2 (24.7)	68.2 (32.4)

Note: [a]DMI–REP = ([PRN + REV] − [TAO + PRO]) + 100: PRN, principalization, 'splitting off' affect from content; REV, reversal, including denial and reaction formation; TAO, turning against a real or presumed external object; PRO, projection.

The DMI–repression scores for the four groups are also shown in Table 1. The four groups differed on this scale ($F(3, 45) = 5.53$, $p < 0.01$), and the SNK procedure revealed that the only significant difference was that the Repressor group had higher DMI–REP scores than each of the three other groups. This indicates concurrent validity of the two methods.

Threatfulness and pleasantness of the words

Mean threatfulness of the threatening words (64 mm) was clearly much higher than that of both the pleasant words (12 mm) and the neutral words (15 mm), while pleasantness (19 mm) was clearly lower than those for the other word categories, which were also different (79 and 56 mm respectively). These differences were highly significant (all p's < 0.001). Moreover, this was also true when every single threatening word was compared with the average ratings for the pleasant and neutral words. These individual differences too were highly significant. Thus, all threat words were considered clearly threatening and substantially less pleasant than pleasant and neutral words, and the pleasant words were also clearly more pleasant than the threatening and neutral words.

Recall and recognition

For free recall as well as for recognition, no differences were found for the number of correctly remembered words or falsely remembered words. The ANOVAs for the correctly remembered words showed a main effect of Emotional Valence for the recognition test ($F(2, 49) = 8.12$, $p < 0.01$). For the recall test a similar, but non-significant, tendency was found. The *post hoc* Student *t*-tests for dependent variables revealed that more threatening words were recognized than neutral words ($t(53) = -3.61$, $p < 0.01$), or pleasant words ($t(53) = 2.52$, $p < 0.05$). Similar analysis of the recall data showed that, in this test too, more threatening words were recalled than neutral words ($T(59) = -2.32$, $p < 0.05$). Table 2 shows the average number of words recalled and recognized in the four groups. No interaction between Group and Emotional Valence was found for the two memory tests.

Pearson correlation coefficients between DMI–REP and memory indices are shown in Table 3. DMI–REP correlated negatively only with the number of recognized pleasant words, and not with the number of recognized threatening words. Since this result was against our expectations, we calculated the correlations between the individual scales that constitute DMI–REP and the memory indices (see Table 4).

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Table 2. Mean numbers of neutral, threatening, and pleasant words recalled and recognized by the four experimental groups. Standard deviations are in brackets

	Repressors ($n = 17$)	Defensive High Anx. ($n = 14$)	Truly Low Anx. ($n = 11$)	High Anxious ($n = 18$)
Recalled:				
Neutral	1.3 (1.2)	2.0 (1.5)	1.5 (1.0)	1.8 (1.7)
Threatening	2.1 (1.5)	1.9 (1.5)	2.0 (1.6)	2.4 (1.8)
Pleasant	1.5 (1.5)	2.0 (1.6)	1.8 (1.2)	1.8 (1.4)
Recognized:				
Neutral	8.4 (2.9)	8.0 (2.4)	6.6 (2.6)	8.2 (2.4)
Threatening	8.9 (1.8)	9.3 (1.2)	8.9 (1.9)	9.7 (2.0)
Pleasant	7.8 (2.1)	8.6 (2.0)	8.6 (2.1)	9.1 (1.5)

Table 3. Pearson correlations of DMI–REP with numbers of neutral, threatening and pleasant words recalled and recognized

	Recalled			Recognized		
	Neutral	Threatening	Pleasant	Neutral	Threatening	Pleasant
DMI–REP[a]	−0.19	0.08	−0.21	0.27	−0.08	−0.31*

Note: $^*p < 0.05$.
[a]DMI–REP = ([PRN + REV] − [TAO + PRO]): PRN, principalization, 'splitting off' affect from content: REV, reversal, including denial and reaction formation; TAO, turning against a real or presumed external object; PRO, projection.

Table 4. Pearson correlations of individual DMI scales with numbers of neutral, threatening, and pleasant words recalled and recognized

	Recalled			Recognized		
	Neutral	Threatening	Pleasant	Neutral	Threatening	Pleasant
DMIPRN[a]	−0.01	−0.00	0.06	0.12	0.16	−0.05
DMIREV	−0.18	0.01	−0.15	0.22	−0.06	−0.15
DMITAO	0.15	−0.05	0.26	−0.21	0.13	0.31*
DMIPRO	0.12	−0.18	0.16	−0.12	0.19	0.28*

Note: $^*p < 0.05$.
[a]PRN, principalization, 'splitting off' affect from content; REV, reversal, including denial and reaction formation; TAO, turning against a real or presumed external object; PRO, projection.

The scales DMITAO and DMIPRO correlated significantly and positively with the number of pleasant recognized words. Clearly, these correlations cause the negative correlation of DMI–REP with recognized pleasant words.

Post hoc analyses showed that there was no relation between the average reaction times in the recognition task for the different words and the two repression measures.

Semantic intrusions and false alarms

ANOVAs for the falsely recalled words ('semantic intrusions') and falsely recognized words ('false alarms') showed no interaction between Group and Emotional Valence.

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This result remained the same when we performed a more stringent test of the recall data by excluding the words that were very similar to the original words but were only syntactically false. For the recognition test, there were main effects of Group and of Emotional Valence. *Post hoc* SNK comparisons demonstrated that the truly low-anxious group produced significantly fewer 'false alarms' in the recognition test than the other groups. More pleasant than neutral semantic intrusions were found (1.6 versus 1.0; $T = -2.40$, $p < 0.05$). Further, we discovered that there were more pleasant than neutral false alarms (3.5 versus 1.3; $T = -8.31$, $p < 0.001$) and threatening false alarms (3.5 versus 1.7; $T = -6.31$, $p < 0.001$), and more threatening than neutral false alarms (1.6 versus 1.0; $T = -3.12$, $p < 0.01$) (the figures for neutral and threatening intrusions are not always the same because of small differences in sample sizes).

No significant correlations were found between DMI–REP and numbers of falsely recalled and recognized words.

DISCUSSION

In the present study, it was shown that all subjects recognized threatening information better than neutral or pleasant information. This is in line with the evidence in the literature for the predominance of threatening information in memory (see Christianson, 1992). However, no proof was yielded for poorer recall and recognition of threatening words in repressors, in spite of some good reasons to expect it. An obvious first question when not finding significant results is whether the power of the study was adequate. We performed a power analysis, using the means and standard deviations of the current study. The number of 17 subjects, used for the crucial comparison of threatening versus neutral words within the repressor group, is sufficient to decide on the presence of an effect size that Cohen (1977) calls moderate to large, with a power of 0.80 and alpha = 0.05. When we tested between repressors and non-repressors (with or without the high defensive–high anxious), the combined sample size is sufficient for even smaller effects sizes. For the correlational analyses, N was 60, which is also adequate to exclude the unnoticed presence of moderate to large effects. Tests of smaller effects would have required us to use unrealistic numbers of more than 600 subjects for the correlations, more than 300 repressors for the recognition task and more than 150 repressors for the recall task. Moreover, our sample sizes, length of word lists, and the standard deviations of recall and recognition were very comparable with those of Watts and Dalgleish (1991), who found significant effects using spider words and baby words with spider phobics and normal subjects. Doubt may also rise about the comparability of the defensiveness and anxiety scores of our sample. However, these scores are very like those in, for example, the studies of Fox (1993; 1994; corrected, of course, for the fact that we used a shortened version of the MC. Hence, the lack of expected findings cannot be attributed to a lack of power or a lack of correct identification of repressors.

The main reason for the expectation of poorer recall and recognition of threatening words in repressors was that impairment of memory for threatening material is a crucial element in the definition of repression. It has been reported that there is proof of memory biases in repressors. These existed for threatening childhood episodes (Davis, 1987; 1990), which are of a clearly stronger threatening nature than the stimuli

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presently used. So an obvious cause of the absence of effects may be that the stimuli used were not strong enough, and were also not pertinent to the individual's actual experience. However, from a large body of experimental research in cognition and emotion it is clear that stimuli as elementary as words are subject to emotion-based selective processing (Macleod and Mathews, 1991). More importantly, similar stimuli were used in previous research in which avoidant processing biases were found in repressors (Bonanno *et al*., 1991; Fox, 1993; 1994). Preliminary evidence for decreased memory for threatening words of the current type in repressors was found by Bonnano *et al*. (1991). However, this was a secondary finding, because their study was primarily a dichotic listening study and the words were only presented in the to-be-ignored auditory channel. Nevertheless, repressors recognized 46 per cent (which was at chance level) of the generally threatening—and not the neutral—words, as opposed to 71 and 61 per cent of the high and low-anxious individuals respectively. The difference was only a trend, but, at least in our view, enough to prompt a more direct study of memory in repressors such as our present one. In the first of the two studies of Fox (1993) an attentional shift away from (socially) threatening words was detected for repressors (Fox, 1993). In the other study (Fox, 1994) a higher inhibition of (socially and physically) threatening words was demonstrated for repressors in a negative-priming task. These studies suggested that there might be a similar bias in the retrieval of such words in repressors. Since we did not find evidence for this bias, another possible conclusion is that, for this type of elementary and relatively low harmful stimulus, repressors show only avoidant biases in the earlier stages of processing, and suffer no influence on memory for these stimuli.

However, some important differences between our study and the studies of Bonanno *et al*. (1991) and Fox (1993; 1994) may explain the absence of a bias in our study. In the visual probe paradigm (Fox, 1993) the subjects had the opportunity of looking away from the threatening stimulus, and repressors indeed appeared to do this. In the other studies of Fox (1994), a negative-priming paradigm was used in which the threatening stimulus even had to be ignored, so avoidant processing was in fact part of the instruction to the subjects. It had only to be shown that the effect was stronger in repressors, which it indeed appeared to be. In the study of Bonanno *et al*. (1991), the threatening material was to be ignored. In contrast, in our study the subjects were required to watch the crucial stimuli closely, instead of having the possibility—let alone the instruction—of ignoring them. Moreover, we tried to prevent the subjects from anticipating a memory task. Therefore, the expected poorer memory in repressors might still be revealed in a task that measures memory effects of words that have to be ignored. On the other hand, there were memory biases for personally relevant threatening life episodes for which obviously no instructions to ignore were present (see Davis, 1987). Therefore, the role of initial ignoring is perhaps less important than the role of impact and personal relevance of the stimuli.

If the absence of the instruction to ignore is insufficient to explain the lack of negative memory bias in the repressors in our study, what other explanation can be given? More precisely, why should information of a mildly threatening type be processed in an avoidant way in the early stages (Fox, 1993; 1994), and why should this not occur in the later stages of information processing? This question may be answered by considering the explanation that is usually offered for early-stage biases in 'double tasks' with threatening distractors. MacLeod and Matthews (1991) found that anxious individuals only showed a bias for threatening information when they

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had to respond to a target stimulus while they had to ignore threatening information at the same moment. They concluded that anxiety might perhaps be related to changes in the control of processing threatening information, instead of changes in the efficiency with which such information is processed. It may be suggested, on the basis of the results of Fox (1993; 1994), that repressors differ from non-repressors (including high and low anxious) in control, and not in efficiency of processing incoming threatening information. That is, they might initially tend to inhibit the processing of all threatening information, irrespective of its personal relevance. When this information does not appeal to individual concerns, further processing of the threatening information would not be expected to be deviant from that of non-repressors. On the other hand, when the aversive information is personally relevant, repressors might appear to elaborate this information less extensively than non-repressors.

There was also no evidence of poorer threatening intrusions in repressors. Thus there is no support for the hypothesis of a categorical or semantic type of repression—as opposed to a stimulus–specific type. If the number of semantic intrusions is a reliable measure of the accessibility of the corresponding semantic category, then it may be concluded that the cognitive schemes for general threatening information in repressors are not less accessible than in other individuals.

Surprisingly, one of the few significant interactions of valence and repression seem to be in a direction that is the opposite of that predicted by our hypothesis. Repression according to the DMI was related to poorer recognition of pleasant words, instead of threatening words. The *post hoc* analyses showed that this effect was due to the two scales that compose the DMI–REP scale that reflect 'outward-directed aggression–frustration': turning against object (TAO) and projection (PRO) (Juni, 1982). A possible interpretation of this finding is that the retention of pleasant information represents a strategy that is part of a defence mechanism which externalizes threatening feelings. Another possibility is that after initially preferred processing of all emotional information, only the pleasant information is retained, because the threatening emotions are relieved by strategies such as 'acting out' of 'projection'. Since this is a conclusion based on isolated results, further speculation seems inappropriate at present.

In summary, the evidence presently available indicates that, while certain avoidant processing biases seem to be present for simple threatening stimuli, repressed memory only shows up in lack of recall of relatively intense emotional events.

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APPENDIX

English translations of the Dutch words used in the memory task: target words that were initially presented (left-hand column) and the filler words that were used in the

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recognition task (right-hand column). Some other words needed more than one word to be described in English. When the English equivalent was ambiguous as to the categorical valence, another one was chosen with approximately the same meaning.

Pleasant words:		*Neutral words:*	
targets	*fillers*	*targets*	*fillers*
enthusiast	burst of laughter	transparent	symmetrical
joyful	pleasant	town hall	hair
gladness	delicious	carpet	handkerchief
jolliness	giggle	game of goose	program
gift	magnificent	pavement	concrete
succeeded	cocktail	teacher	double
exuberant	wittiness	institute	number-plate
relief	benign	prepare	thimble
entertainment	elated	marmalade	call-box
congratulations	comical	department	transport
comrade	delight	dialect	envelope
feast	beautiful	customer	stone

Threatening words	
targets	*fillers*
attack of anxiety	nuclear war
haemorrhage	pistol
mortal fear	robbery with killing
horrible	revolver
cut with a knife	poisonous snake
horror	bullet
cannibal	frightful
chopped off	torture
satanism	force of arms
shatter	strike down
macabre	monstrous
revenge	serious accident

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