

EFFECTS OF INTENTIONAL SUPPRESSION OF RECALL OF UNWANTED IMAGES IN REPRESSORS AND NONREPRESSORS

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We investigated the ability to suppress recall of visual images, using the think/no-think (TNT) paradigm. Participants were 27 male undergraduates (13 repressors, 14 nonrepressors) who watched video clips of a motorbike accident as we recorded their galvanic skin response (GSR). We then conducted the TNT paradigm using motorbike accident images. Both repressors and nonrepressors recorded higher GSR when watching the video clips than at baseline. Both groups showed greater suppression of imaginary memories in the no-think condition than they did in either the think or the baseline conditions. We found repeated attempts at no-think might be an effective strategy for suppressing imaginary memories and that there were no differences in the ability of repressors and nonrepressors to suppress memory in the imaginary memory condition.

Keywords: repressor, intentional memory suppression, suppression of visual image recall, think/no-think paradigm.

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Most people experience intrusive thoughts they do not want to have, such as thoughts that are aversive and distressing and/or thoughts about traumatic events (Wegner, 1994). Individuals may often use a coping style, such as a suppression strategy, to manage or avoid unwanted thoughts. *Repressor* means a person who has a repressive coping style that is both an automatic and an intentional defensive strategy, a kind of avoidant way of coping with aversive events through not thinking about any painful or distressing things (Weinberger, Schwartz, & Davidson, 1979). A repressor has psychophysiological characteristics that lead to heightened autonomic arousal, despite his or her self-report of low anxiety (Derakshan & Eysenck, 1997).

The findings in studies about memory suppression in repressors have been inconsistent. In some studies, repressors have been found to suppress negative autobiographical memories (Myers & Derakshan, 2004) or unwanted thoughts (Barnier, Levin, & Maher, 2004) successfully. On the other hand, in some recent studies in which repressors have been classified as individuals who are low in anxiety and high in social desirability, no difference was found between repressors and nonrepressors in ability to suppress thoughts (Luciano & Algarabel, 2006; Myers, Vetere, & Derakshan, 2004) or that initially repressors can suppress unwanted, intrusive thoughts, but, because of rebound effects, they show maladaptive long-term consequences of such suppression (Geraerts, Merckelbach, Jelicic, & Smeets, 2006). The reason for these inconsistent results regarding thought suppression in repressors might be that in most previous studies word-based stimuli were used, even though the unwanted, intrusive thoughts comprised visual images. Therefore, further research is needed to establish whether or not repressors can successfully suppress unwanted visual images.

In the present study, we used the think/no-think (TNT) paradigm (Anderson & Green, 2001) to investigate characteristics of memory suppression. The TNT paradigm is used as a measure of the intentional suppression of unwanted memories, and it is suggested that trying not to think about information could increase subsequent memory inhibition. The TNT paradigm consists of three phases: a study phase, a TNT phase, and a cued-recall test phase. In the study phase, participants learn the cue-target pairs, such as word-word pairs (Anderson & Green, 2001; Lambert, Good, & Kirk, 2010), face-word pairs, face-picture pairs (Depue, Banich, & Curran, 2006), and word-neutral picture pairs (Peterson, 2006). In these previous studies the word or neutral picture items used yielded results that showed the TNT paradigm significantly reduced memories for to-be-suppressed items. However, suppression of memories related to aversive or traumatic events might follow different patterns compared to patterns of suppression regarding memories of words or neutral images, because aversive thoughts and trauma consist of sensory images that exposure to relevant cues

could automatically trigger (Holmes, Brewin, & Hennessy, 2004). In the present study, therefore, our aim was to establish whether or not repressors experienced fewer aversive images when using the TNT paradigm than when it was not used.

Thus, we investigated differences in suppression of the recall of visual images between repressors and nonrepressors using the TNT paradigm. Our hypotheses in this study were as follows: We predicted that (a) when instructed to suppress images (no-think condition), repressors would show greater recognition reduction than would nonrepressors; (b) after watching motorbike accident video clips, repressors would show higher negative valence than would nonrepressors; and (c) repressors and nonrepressors would show no differences in degree of galvanic skin response.

Method

Participants

The participants were 87 male undergraduate students who were divided into two groups (repressor and nonrepressor) according to the distribution means of the State-Trait Anxiety Inventory-Trait (STAI-T; Spielberger, Gorsuch, & Lushene, 1970) and the Marlowe-Crowne Social Desirability Scale (MCSDS; Crowne & Marlowe, 1964). The mean scores of the 87 participants were STAI-T = 45.64 and MCSDS = 14.91. Using the results of these tests as a guide we selected 27 undergraduates (13 repressors, 14 nonrepressors) to participate in the experiments (see Table 1). We excluded one participant from the analysis of galvanic skin response (GSR) because of technical malfunctions. We selected male participants only in order to control for gender differences. Mean age [$t(25) = -0.58$, *ns* range = 19-30 years], experience with traffic accidents [$\chi^2(1) = 0.89$, *ns*] and experience witnessing traffic accidents [$\chi^2(1) = 0.16$, *ns*] did not differ significantly between the repressor and nonrepressor groups.

Table 1. *Demographic Data and the STAI-T and MCSDS Scores*

	Repressor (<i>n</i> = 13)		Nonrepressor (<i>n</i> = 14)		<i>t</i> test
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Age	22.23	(2.98)	23.86	(2.66)	-.58
STAI-T	40.69	(5.11)	46.64	(4.89)	-3.09*
MCSDS	17.46	(1.61)	13.71	(3.83)	3.26*

Note. * $p < .01$.

STAI-T: State-Trait Anxiety Inventory; MCSDS: Marlowe-Crowne Social Desirability Scale.

Materials

The modified think/no-think paradigm. We modified the TNT paradigm to measure the effects of intentional suppression of aversive images on repressors. The TNT paradigm consisted of three phases, the study, TNT, and test phases. In

the study phase, participants studied 48 neutral word and traffic-accident-related picture pairings for 5000 ms per pair with an interstimulus interval of 500 ms. They then completed a recognition test to establish whether or not they paired the words and pictures successfully. In this test the participants had to select the correct picture (target) among nine examples when provided with a word (cue). If they did not respond with 50% accuracy, they repeated the study phase until they achieved the criterion of 50% accuracy in the recognition test to ensure that the association level between the words and the pictures was sufficiently well established. The total of the correct and incorrect responses for the recognition test were randomly divided into three conditions; 16 think condition, 16 no-think condition, and 16 baseline condition. In the TNT phase, we instructed participants either to think about (think condition) or suppress thoughts about (no-think condition) the target picture when presented with a cue. After we had presented a participant with a fixation (cross mark = +) for 500 ms, we presented a green cue word (think condition) or a red cue word (no-think condition) for 4000 ms, followed by the mask to prevent the after image of the stimuli in the task. Participants were given a total of 256 trials consisting of 128 think (16 trials x 8 times) and 128 no-think (16 trials x 8 times) trials. The words in the base condition did not appear in the TNT phase. The last phase was a recognition test of all the target pictures, regardless of the prior TNT instruction. In the final recognition test, participants were instructed to choose a correct picture from among nine examples when a word stimulus (total of 48 word stimuli) was presented.

State-Trait Anxiety Inventory–Trait. The STAI-T (Spielberger, Gorsuch, & Lushene, 1970) consists of 20 trait-anxiety items measuring how participants generally feel. This inventory uses a 4-point Likert scale, and scores vary from 0 to 60, with higher scores indicating greater trait anxiety. Reliability for the STAI-T (Cronbach's $\alpha = 0.65$) was marginal in this study.

Marlowe-Crowne Social Desirability Scale. The MCSDS (Crowne & Marlowe, 1964) assesses defensiveness – the tendency to deny one's negative, and to present one's positive characteristics. This measurement comprises 33 true-false items, and the total scores range from 0 to 33. Reliability for the MCSDS (Cronbach's $\alpha = 0.54$) was marginal in this study.

Procedure

Participants first completed a consent form. Then, we measured the participants' emotional valence at baseline by recording GSR and instructing them to report their present positive-negative emotional valences regarding 10 items, using a 9-point Likert scale in which the higher the score the more positive was the emotional state. Next, they watched a video clip of motorbike accidents for 5 minutes, while we recorded their galvanic skin response (GSR). After watching

the video clip, they again completed the positive-negative emotional valence report. Finally, participants completed the phases of the modified TNT paradigm and they were then debriefed.

Data Analysis

To perform the statistical analysis, we used the IBM Statistics SPSS 19.0 for Windows. We conducted the analysis of repressors' emotional characteristics via two methods, a self-report scale and GSR. To analyze the self-report scale, we used three-way, repeated measures analysis of variance (ANOVA). The between-subjects factor was group (repressors and nonrepressors), and the within-subject factors were valence (positive or negative state) and time (before or after watching the video clip). For analyzing GSR, we used two-way repeated measures ANOVA (between-subjects factor, group; within-subjects factor, time). We analyzed the effects of intentional suppression using two-way repeated measures ANOVA (between-subjects factor, repressor or nonrepressor; within-subjects factor, think, no-think, or baseline condition).

Results

Emotional Characteristics of Repressors

The self-report scale results revealed a significant interaction between emotional valence and time, $F(1, 25) = 29.01, p < .01, \eta^2 = 0.54$, and a significant main effect of time, $F(1, 25) = 10.97, p < .01, \eta^2 = 0.31$. These results indicate that both groups had lower positive and higher negative valences after watching the video clip than they did at baseline. However, the main effect of valence and group and the interactions between group and either time or valence were not significant.

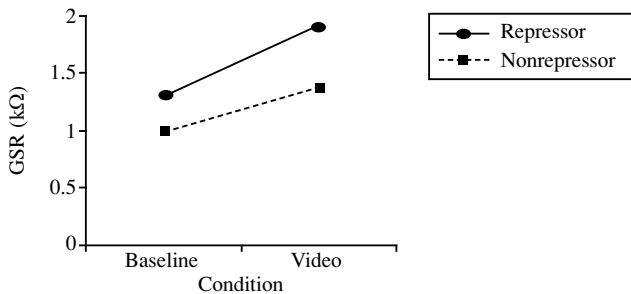


Figure 1. The difference in GSR between a repressor and a nonrepressor in the baseline and video conditions.

In the GSR results, the main effect of group was significant, $F(1, 24) = 5.43$, $p < .05$, $\eta^2 = 0.18$. This result indicates that the repressor group experienced a higher GSR than did the nonrepressor group. The main effect of time was also significant, $F(1, 24) = 26.46$, $p < .01$, $\eta^2 = 0.52$. Both groups had higher GSR while watching the video clip than they had at baseline (see Figure 1). The interaction between group and time was not significant.

TNT Paradigm Effects for Repressors and Nonrepressors

We measured the effects of intentional suppression by means of the ratio of correct answers in the study phase and in the final recognition phase. A three-way interaction (group, time, and condition) and the interactions between group and either time or condition did not reach statistical significance. The main effect of group was also not significant. Analysis of the effect of the TNT paradigm revealed a significant interaction between time and condition, $F(2, 50) = 12.28$, $p < .001$, $\eta^2 = 0.33$. The main effects of time and condition were also significant, time, $F(2, 50) = 20.86$, $p < .001$, $\eta^2 = 0.46$; condition, $F(2, 50) = 11.39$, $p < .001$, $\eta^2 = 0.31$. These results indicate that both repressors and nonrepressors experienced greater memory suppression of visual images in the no-think condition after the TNT paradigm than they did in either the think or baseline conditions (Figure 2).

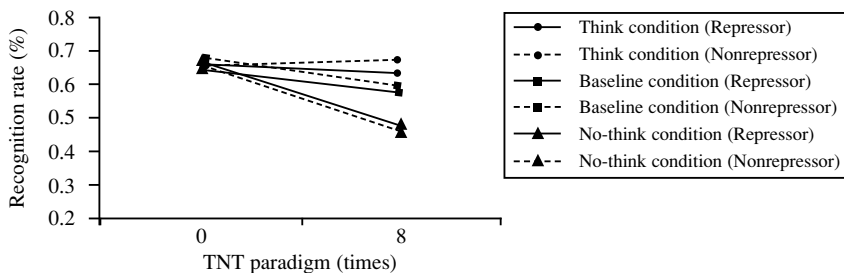


Figure 2. The recognition rates for repressors and nonrepressors before/after the TNT paradigm, for each condition.

Discussion

Our aim was to establish whether or not repressors experience greater memory suppression of visual images than do nonrepressors, using a modified TNT paradigm. Regarding the results of TNT paradigm effects, both repressor and nonrepressor groups showed greater memory suppression of visual images after the TNT paradigm in the no-think condition than they did in either the think condition or the baseline condition. This result indicates that by using

the repetitive memory suppression strategy all participants could successfully suppress, not only words, but also unwanted visual images. Thus, no difference in suppressive ability was found between repressors and nonrepressors. One reason for this result might be that repressors do not have superior suppressive ability in the case of visual images. According to the dual representation theory of posttraumatic stress disorder (Brewin, Dalgleish, & Joseph, 1996), unsuppressed, an unwanted memory might comprise a situationally accessible memory (SAM), containing greater sensory and spatial information, rather than a verbally accessible memory (VAM), which one can readily retrieve and describe in words. When exposure to relevant cues automatically triggers SAMs, individuals who have experienced aversive or traumatic events re-experience them as intrusive images (Holmes, Brewin, & Hennessy, 2004). Repressors also fail to suppress aversive or traumatic memories because of the rebound effect, although initially they could successfully suppress these memories (Geraerts, Merckelbach, Jelicic, & Smeets, 2006). Therefore, further studies are needed to establish whether or not repressors have different suppressive abilities according to whether the stimulus is a word, an image, or some other type.

The other reason for the lack of difference between the groups might be their methods of memory suppression. In the present study, we measured visual memory suppression using a recognition test. Even though we gave participants nine image options, in the final recognition phase there might be a limitation in the effectiveness of the recognition test in that a participant might be able to discern the correct response more readily than would occur in a recall test, because cues may exist among the options. Both repressors and nonrepressors, therefore, could have similar recognition rates in each condition.

One limitation in the present study was that the 8 trial repetitions in the TNT paradigm were fewer than the 16 trial times used in other research in which the TNT paradigm has been used (Anderson & Green, 2001; Wessel, Huntjens, & Verwoerd, 2010). In one prior study a suppression effect was found after just 10 trial repetitions (Depue et al., 2006). Although we used the TNT paradigm with only 8 trial repetitions and a final recognition phase in the current study, it was noteworthy that repeated attempts to no-think successfully suppressed memories for all our participants whether they were repressors or nonrepressors. Further studies are needed regarding the follow-up effects of the TNT paradigm.

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