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The Effects of Thought Suppression on Later Recall of Valenced, Self-Referenced Adjectives

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THE EFFECTS OF THOUGHT SUPPRESSION ON LATER RECALL OF VALENCED, SELF-REFERENCED ADJECTIVES

by

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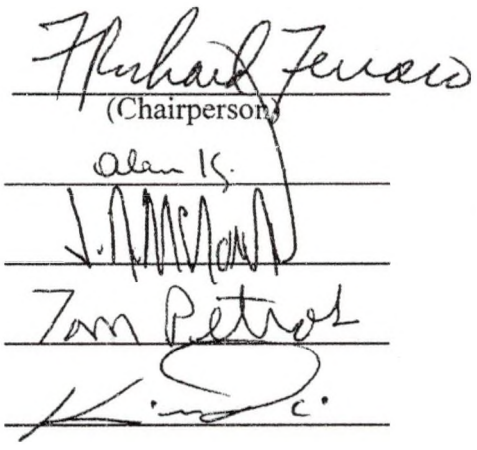

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To my family

ABSTRACT

This study examined the effects of thought suppression on later recall of valenced material. According to Wegner's (1994) theory of ironic mental processes, effortful attempts at thought suppression result in an increased accessibility of the to-be-suppressed thought under conditions of high cognitive load. Participants (N = 180) received an induced-sadness manipulation before being asked to concentrate on associations between visual images (either a white bear or a brown rabbit) and 28 adjectives (14 positively-valenced, 14 negatively-valenced). After a five minute period of suppressing thoughts of one of the visual images, participants were asked to remember as many of the 28 adjectives as possible. It was hypothesized that those participants who used a guided distraction task under conditions of high cognitive load would have higher accessessibility to the suppressed thoughts and recall a greater number of adjectives associated with those thoughts. Although the expected interaction between suppression type and memory load was not observed ($p = .87$), participants in the negative suppression group recalled fewer positive words than either the positive suppression group or the control group (neutral suppression; $p = .04$). In addition, a marginally significant interaction ($p = .06$) did emerge for the difference score between positive and negative adjectives recalled when only individuals with high mathematical-visual memory were included in the analysis. Implications for future research are discussed, as well as how the technique could be applied in a clinical setting.

CHAPTER I

INTRODUCTION

"Try not to think about that," is exceedingly common advice provided to people who are having unwanted thoughts, worries, and feelings of sadness or depression. However Wegner, Schneider, Carter, and White (1987) provided evidence that such advice may often be counterproductive. When participants were asked to not think about a white bear, they were more likely to report thinking about a white bear both during and after the period of attempted thought suppression, as compared to nonthought suppressing control participants. The tendency for thought suppression to actually lead to a greater number of unwanted intrusions is known as an immediate enhancement effect. The tendency for the unwanted thought to occur more frequently after the period of suppression is known as the rebound effect. Lavy and van den Hout (1990) replicated both the enhancement effect and the rebound effect using a less visually stimulating thought of a "vehicle."

Wegner (1989) hypothesized that self-distraction is the major method by which people perform thought suppression. He proposed that the only way that a person can not think of one thing is to fill current consciousness with distracting thoughts. However, this method has been found to actually result in increased accessibility of the suppressed thought under conditions of high cognitive load.

Wegner (1994) has proposed a theory of ironic processes of mental control. He hypothesized the existence of two separate mechanisms involved in thought suppression. First, an effortful operating process works to find and fill consciousness with thoughts that are not the thought that is currently being suppressed. Meanwhile, an automatic monitoring process searches for the actual thought that is trying to be avoided. The monitoring process is necessary in order for a person to know whether or not they have been successful at not thinking of the suppressed thought. However, these two processes are independent of each other in that one process works automatically without awareness (monitoring process) while the other works with conscious control and attention. When the individual is able to devote attention to effortful distraction, the conscious process has a larger impact than the automatic process on working memory, and the thought is successfully suppressed. However, when working memory is somehow limited through divided attention, the theory of ironic processes predicts that the monitoring process will have a larger impact, paradoxically making the suppressed thought even more accessible than if it had not been suppressed in the first place.

Empirical evidence for the ironic theory of mental processes was supplied by Wegner and Erber (1992). Participants in their first of two experiments were asked to either think or not think about a target word (e.g., house). Then, participants engaged in a word association task with prompts that were either related (e.g., home) or unrelated (e.g., adult) to the original target. The researchers varied the cognitive load by subjecting participants to either a long (10 seconds) or a short (3 seconds) delay between prompt and required associative response. As expected, participants who were asked to concentrate

on the target word, gave the target word as an associative answer significantly more often when they had a short time pressure. However, the participants who were subjected to a suppression condition under long time pressure were also very likely to respond with the word that they had been instructed to suppress. In fact, they were more likely to respond with the forbidden word than subjects who had been given the instruction to concentrate on the word and then required to respond under time pressure. In other words, time pressure appeared to reverse the trend of mental control. Ironically, those participants who were concentrating found the word less accessible while those participants who were suppressing found the word more accessible.

A second experiment also demonstrated this ironic effect (Wegner & Erber, 1992). Participants were again presented with word primes and the instructions were to suppress or concentrate on the given words. Then a Stroop (1935) task was performed in which the word primes served as the distractors. Cognitive load was manipulated by asking participants to either remember a two-digit number (low load) or a nine-digit number (high load). Participants who were under conditions of high load and thought suppression exhibited the highest degree of inhibition, as evidenced by longer mean response times (error rates were not reported). Presumably, participants had less attentional capacities to search for distractors. Therefore, the automatic monitoring process made the suppressed word more accessible and, thus, more probable to interfere with the processing of word color.

Another ironic effect was described by Wegner (1994), in which a high cognitive load caused participants to fail to completely ignore irrelevant information during a long-

term memory task. The task involved memorizing the names of unfamiliar cities that were highlighted in yellow. Although memory for the yellow, highlighted cities suffered as a result of cognitive load, these subjects were able to recall more of the nonhighlighted cities than subjects not subjected to high cognitive load.

Wegner (1989) has suggested that failed attempts at thought suppression may be related to the development of depressions and obsessions as well as inabilities to dismiss habitual thoughts (e.g., thoughts of food during dieting or thoughts of substance use during abstinence). Wegner's theory has seen an abundance of theoretical and empirical extensions, as described below.

One experiment has shown that impression formation may be disrupted when people attempt to ignore previously primed traits (Newman, Duff, Hedberg, & Blitstein, 1996). During the experiment, participants were asked to talk about people that they knew. Some of the participants were asked to suppress information about a particular trait. Those participants told to suppress discussion of a trait, however, were more likely to describe a new individual as possessing the previously suppressed trait, but only under conditions of high cognitive load.

The rebound effect (tendency for suppressed information to become more accessible following the period of suppression) has also been suggested as an explanation for why people sometimes succumb to the use of various stereotypes despite intentions to avoid them (Macrae, Bodenhausen, Milne, & Jetten, 1994). In the experiment, participants were presented with a picture of a male skinhead, and asked to write a paper about a typical day for the pictured individual. Half the participants did so while

suppressing stereotypic thoughts of skinheads, while the rest of the participants were given no such admonition. Participants who had suppressed stereotypic thoughts were more likely to (a) write stereotypically on a second writing task, (b) choose a seat further away from a skinhead, and (c) show a facilitatory priming effect on a lexical decision task with stereotypic targets.

Even the suppression of pain may actually increase sensitivity to future pain (Cioffi & Holloway, 1993). Participants instructed to suppress the sensation created during a cold pressor task took longer to show decreases in pain ratings and were more likely to rate subsequent vibrations from a massager as uncomfortable. The rebound effect has social and medical implications, and the current study wishes to suggest specific clinical implications, as well.

Mood Control and Clinical Implications

Empirical results have shown that depression is strongly associated with negative biases in attention, thinking, and memory (Gelder, 1997). Depression facilitates the retrieval of negative information (Clark & Teasdale, 1982), which serves to magnify the significance of negative information, especially in relation to the self (Mathews, 1997).

Early work in the cognitive theory of depression suggested that depression represents an increased accessibility to negative schemas, models of interpreting environmental stimuli that are predisposed to depressive conclusions (Beck, Rush, Shaw, & Emery, 1979). More recent theory suggests that it is not necessarily the schemas themselves that are more accessible. Instead, it is the relationship between negative cognitive schemas and negative interpretations of the self that is more accessible

(Teasdale, 1997). Thus, even when depressed and nondepressed individuals agree on the negative aspects of an event, depressed individuals are more likely to see it as related to personal inadequacy. Such processing occurs automatically.

Teasdale (1997) has suggested that:

> the task of psychological treatments is to create a store of alternative depression-related models associated with a wide variety of possible eliciting contexts . . . . These alternative models will need to be sufficiently similar to depressogenic models that they will be accessed from memory by the same cues or contexts that would otherwise access depressogenic models. . . . These alternative models will need to differ from depressogenic models so that they will not, themselves, elicit depression. (p. 85)

The above goal, in summary, is to create positive schema and then rehearse a relationship between existing automatic negative schema. Oddly, most forms of cognitive therapy involve changes in effortful thinking and meta-cognition (Williams, 1997) such as identifying automatic thoughts and combating irrational beliefs. With practice, these interventions have an impact on automatic processes, but direct manipulation of the automatic processes are rarely the focus of cognitive interventions. Engaging ironic processes in therapy may help to more directly address the goal of change in automatic processing.

Ironic processes involved in mood control were first examined by Wegner, Erber, and Zanakos (1993). They asked participants to: (a) generate either a sad or happy event

from their own experiences, (b) think about the experience, and (c) write whatever came to mind. Then, participants were randomly assigned to one of three conditions: (a) asked to feel the emotion associated with the event, (b) asked to not feel the emotion associated with the event, (c) not given any instructions concerning emotional regulation. Those participants who were asked to remember a nine-digit number while attempting to change their mood in a negative direction, actually ended up with significantly higher ratings of happiness than those people who attempted to elicit a positive mood during high load. In fact, trend analysis supported the hypothesis that participants were able to control moods during low cognitive load. However, under high load, effects of mood control attempts were diametrically opposite those intended. In other words, high load resulted in subjects not being able to control mood.

Clinical depression, therefore, may be at least in part due to failed attempts at suppressing depressive thoughts (Wegner, 1989). Most people in a depressed state attempt to improve their moods by consciously searching long-term memory for positive thoughts. Concurrently, an automatic search for failure (negative or neutral thoughts) also begins and continues until a conscious thought to discontinue the mood-changing effort occurs. Generally, this dual process functions to bring positive thoughts into the conscious work space and alert the individual to failures and the need for additional effort (Howell & Conway, 1992; Wegner, 1992; Wenzlaff, 1993). However, when the individual is operating under conditions of stress, time pressure, and/or cognitive work load, the operating system has less attentional space in order to perform its job. This may lead to the ironic hyper-accessibility of negative thoughts that are being monitored by the

automatic search. Thus, the theory predicts that people who are attempting to improve their mood while under conditions of depleted attentional space will paradoxically become progressively more depressed.

Paradoxical Interventions

Until now, the theory of ironic mental processes has been used as a partial explanation for how depression and anxiety may develop. Shoham and Rohrbaugh (1997) have recently emphasized that clinicians should fully investigate ways of interrupting damaging ironic processes. The present researcher is interested in the possibility of harnessing the theory of ironic mental processes to treat depression.

Since Frankl's (1960) seminal publication on paradoxical treatments, such interventions have become an integral part of mainstream psychotherapeutic practice. Watzlawick, Beavin, and Jackson (1967) have described the therapeutic paradox as a "pragmatic paradox." These occur when the therapist provides a directive in which benefits emerge regardless of whether the client successfully completes the instruction.

Weeks and L'Abate (1982) have reviewed a number of paradoxical techniques. For instance, reframing and relabeling are techniques in which the nature of the symptom is conversely connotated in order to change a person's perspective. Symptom prescription is a technique in which clients are asked to schedule or exacerbate the symptom in some way, with the outcome often being that clients discover increased control over their problems. Restraining client progress by requesting that they not try to change too fast is another technique used to give control of a symptom to the client. If progress is slow or relapses occur, the client can see this as an expected outcome that was predicted by the

therapist, while going against the therapist results in a sense of mastery and control for the client.

Paradoxical treatments can be roughly divided into two varieties: compliance-based and defiance-based. Compliance-based suggestions are those which the therapist truly intends for the client to attempt. Defiance-based directives are those which the therapist believes may act as a catalyst for change or decision-making, even though actually following the directive would likely increase symptoms further.

Meta-analyses have lent empirical support to the effectiveness of many paradoxical techniques (Hampton & Hulgus, 1993). Evidence suggests that reframing is especially useful with depressed clients (Debord, 1989), and that combining symptom prescription with reframing may further increase treatment efficacy (Hunsley, 1993). A recent meta-analysis found little empirical support for defiance-based symptom prescription, while a growing body of literature supports the efficacy of compliance-based symptom prescription (Hunsley, 1997).

Thus, a therapist using a paradoxical treatment with depressed clients may begin by asserting that the depression has some positive attributes. One example may be relabeling the depression as an exceptional ability to understand personal faults. Clients are then requested to schedule extended periods of time experiencing and exaggerating the depressed feelings. Finally, clients are cautioned against giving up their depression too fast, given the "risks" that may exist with such rapid change.

Weeks and L'Abate (1982) have described a particularly relevant technique for the treatment of depression. A depressed man was instructed to note when he began

feeling better. At those times, he was asked to try to prolong the depressed feelings an additional 15 minutes before allowing the positive affect to continue. The authors explained that the man experienced a decrease in his depressive symptoms due to an increased sense of control over his mood states. However, another explanation may exist.

Wegner (1989) has suggested that paradoxical intentions work because they allow the person to turn off the monitoring process that is actually making the thought more accessible and more disturbing. This, is likely to be the case in more traditional forms of symptom prescription, relabeling/reframing, and restraining. However, the above case study may, in fact, be harnessing the ironic process, if the man interprets the task as attempting to suppress the positive affect. If trying to not think about negative thoughts causes depression, it seems reasonable that trying to not think about positive thoughts will lead to elation (or at least a decrease in depression) under certain conditions. Since the combination of cognitive load and intention to change the contents of attention result in the opposite of the intention, one way of treating depression may be to prescribe the structured suppression of positive thoughts. There are several reasons why this may be preferable to traditional paradoxical intentions of prescribing depression.

First, one recent study has shown that thoughts that are both personally relevant and troubling cause the most discomfort when they are suppressed, moderate discomfort when they are intentionally thought about (prescribed symptom), and relatively low discomfort when the thought frequency is simply recorded (Trinder & Salkovskis, 1994). This effect was sustained over a four-day period.

Wegner (1994) theorized that there is more than just a semantic difference between thinking depressed thoughts and not thinking positive thoughts. Theoretically, trying to suppress thoughts requires a completely different set of cognitive functions than trying to concentrate on thoughts. For instance, to think about depressive thoughts, the effortful system will search for depressive thoughts while the ironic automatic system will search for either positive or neutral thoughts. Since depression typically co-occurs with attentional impairments (Hartlage, Alloy, Vazquez, & Dykman, 1993), the effortful search is likely to suffer while the automatic process functions without deficit. The result would be increased accessibility of both positive and negative thoughts.

Now suppose that a depressed person is asked to not think of positive thoughts. This may appear to be the same task, but Wegner (1994) argues that it involves slightly different tasks for the effortful and automatic processes. In this case, the effortful process involves the search for either neutral or negative thoughts, while the automatic process involves the search for only positive thoughts. In a sense, the effect of the automatic process is now more potent because the positive thoughts will not be contaminated by the presence of neutral thoughts.

Of course, one problem is that depressed patients would be more likely to generate negative distractors. For instance, Howell and Conway (1991) found that during induced sadness, participants were more likely to use other negative thoughts to distract themselves from a suppressed negative thought than nonsadness induced participants. Of particular interest is the finding that sadness-induced participants were more likely to use positive distractors when distracting themselves from positive thoughts. The researchers

hypothesized that a depressed state encourages the use of inefficient distractors (e.g., positive distractors for the suppression of positive thoughts). This inefficiency was not replicated when a naturally-occurring depressed population was studied. However, the measure of the distractor valences was done by raters. Perhaps the emotional significance of thoughts from a depressed person were more difficult for raters to understand.

The strongest theoretical basis for the mood-altering properties of positive-thought suppression was laid out in Wegner's (1989) conception of distracting thoughts. As a person attempts to rid her- or himself of a thought, they fill their limited attention with incongruous thoughts. However, because of the automatic monitoring system, the suppressed thought is likely to intrude from time to time. With each intrusion, the distracting thought becomes paired through association with the intruding thought. The failed distractor is abandoned, and a new distractor is obtained. However, the failed distractor is now likely to serve as a reminder of the of the forbidden thought.

Wegner, Short, Blake, and Page (1990) have demonstrated that suppression of an exciting thought (sex) leads to elevations in skin conductance level (SCL). However, in comparison to participants who were asked to <u>try</u> to think of sex, subsequent intrusive thoughts of sex among previous suppressors resulted in significantly greater SCL responses. The authors explained this pattern of behavior as a rebound effect in which the thought of sex had a greater cognitive impact on the previously suppressing participants.

> If a person is ever tempted to suppress pleasant or enjoyable thoughts - . . . the same processes illustrated in these studies might apply. Sex, after all, is a fine example of an enjoyable thought that can seem worthy of

> suppressing in certain circumstances. Like trying not to think of sex, trying not to think of anything that yields positive emotion should promote the perpetuation of a bodily response. So the unwanted positive emotion could be produced by the very attempts one makes to bring it under control. (Wegner, et al., 1990, p. 417).

There are several conditions that would make positive suppression more probable. For instance, Wegner, Schneider, Knutson, and McMahon (1991) demonstrated that the rebound effect is most pronounced when the period following suppression is spent in a similar environment to the place in which the original thought suppression took place (watching the same slide-show over and over again). Thus, although people must eventually learn to deal with intrusive thoughts in their own familiar environments, people are likely to experience a rebound of intrusions if they spend post-suppression time in the environment in which suppression originally took place.

While <u>not</u> thinking about positive thoughts may lead to the use of negative distractors, these negative distractors are likely to become associated with the positive thought that is being suppressed. Thus, one interesting possibility is that even though positive thoughts may be successfully blocked during suppression, future depressive ruminations are likely to be associated with the positive thought. It is this peculiar counterintuitive approach that may help to construct a balance between depressive and positive thoughts.

Now that an established theory supports the proposed paradoxical treatment, it is important to consider whether the mechanisms described are similar in both naturally

occurring and analogue states of depression. There are several reasons why analogue states of depression are preferred for participants in the current study.

Analogue Versus Naturally-Occurring Depression

Martin (1990) has reviewed a number of issues concerning the use of analogues instead of naturally-occurring depression. First, it is difficult to quickly assess the impact of a mood induction, given that there are great individual differences in the effect that mood inductions have on participants. Second, the mood induced may be qualitatively different from a clinically depressed state. Third, results from mood induction experiments could be explained as simply demand characteristics in which the participants attempt to demonstrate the effect desired by the researcher.

While individual differences exist, it should be considered that these differences could represent a constellation of antecedents for and protectors against the development of depression. For instance, Gouaux and Gouaux (1971) have suggested that women may be more likely to respond to certain induction techniques, but women are also more likely to be diagnosed with naturally-occurring depression. Schema theory of mood induction holds that only individuals who have pre-existing negative self-schemas are able to respond to negative mood inductions (Martin, 1990). While the negative schema are activated, it is quite possible that participants are operating similarly to actively depressed individuals.

Evidence supporting this proposition shows that mood inductions have an impact on a number of variables that would be similarly effected by naturally occurring depression. Velten (1968) demonstrated that writing speed, distance approximation,

decision time, word association, and spontaneous verbalization are all abnormal in mood induced participants. Clark (1983) has also shown expected disturbances in psychomotor responses, appetite, and motivation.

One recent study has shown that analogue depression participants have similar patterns of intercorrelations among measures of depressive symptoms (Cox, Enns, Borger, & Parker, 1999). The major differences were in levels of symptoms rather than in types or constellations of symptoms.

Of course, mood induced participants may simply be acting as if they were depressed in order to please the experimenters. The most important arguments against this, however, come from research demonstrating that even involuntary, non-conscious behavior appears to be altered during many mood induction techniques. For instance, Teasdale and Bancroft (1977) have shown that corrugator electromyographic activity (muscle activity in the face) is impacted by mood induction.

Perhaps the most compelling reason to prefer an analogue to naturally-occurring depression, is in response to the potential risks involved. For instance, the treatment proposed requires that an unspecified cognitive load be reached before the ironic effects occur. If the treatment should fail to provide the required load, instructions to suppress positive thoughts will lead to successful suppression. In a naturally-occurring depressed population, such success could lead to a serious decompensation into further depression. Mood induction in normal participants, however, is comparatively short-lived (Gunther, Ferraro, & Kirchner, 1996; Martin, 1990), and suppression of positive thoughts has not

been shown to be aversive to participants with normal emotional regulation (Howell & Conway, 1992).

Vredenburg, Flett, and Krames (1993) have also provided compelling reasons to employ a non-clinical sample in the current research. First, there is a reduced likelihood that the presence of other psychiatric disorders will confound the data. Second, psychoactive medications are far less likely to have been prescribed to members of a "normal" sample. Third, a non-clinical sample is less likely to have undergone other psychological treatments.

The Need for a New Approach

Although the proposed treatment may appear to be somewhat counter to current ideas in the field of cognitive therapy, the treatment is actually quite bound to the concepts put forth by Beck, Rush, Shaw, and Emery (1979). It is assumed that depression is maintained by a negative cognitive schema. Depression is perpetuated by negative self-statements and assumptions about the environment and future. Guiding a depressed client through the process of identifying and testing the validity of negative concepts is an effective way of treating depression. In addition, the proposed treatment may be one that works in an automatic way to restructure negative schemas and add positive, moderating cognitions to the mass of negative thoughts. The ironic process may be able to bypass the negative filter that is hypothesized to be present in the encoding process of depressives. Once set in motion, the effects of the proposed intervention may work on an inside-out basis while more traditional therapies may work on an outside-in basis.

In addition to assumptions concerning cognitive processes, the proposed treatment involves certain assumptions concerning long-term memory. Because it is simpler to suppress a single thought, the proposed treatment will require that the individual form a schema around a particular imagined entity. The imagined entity will represent the individual, and the schema will involve positive thoughts about the individual. In a real-life therapeutic situation, the positive thoughts could be generated in collaboration with the client. Thus, the thoughts could be relevant to the person's life and would necessarily be processed in both an effortful (during discussion of the thoughts to be suppressed) and automatic (during prescribed thought suppression) way. However, for the sake of standardization, the current experiment will use standardized images and standardized descriptors. Thus, the treatment assumes a spreading-activation model of memory (Anderson, 1988) in which activation of the image (through association with multiple distractors) will lead to a higher probability of activation of the ideas associated with the image.

Bower (1981) has supported an associative network theory of memory and emotion. According to his theory, emotions and memories can reciprocally activate each other. Thus, if a certain emotion is activated which has been previously associated with a particular experience, memory for that experience also becomes increasingly activated and accessible to memory. Conversely, activation of memories that were previously associated with particular emotions, result in greater activation of the emotion and schemas supporting the emotional state.

In the current study, it is hoped that thought suppression will result in a rebound effect. If the suppressed element is a vivid visualization which has been associated with a number of positive adjectives, these adjectives should become more accessible during free recall. Finally, since these adjectives will have been processed in a self-referent way, it is hoped that memories for the positive adjectives will cause participants' induced moods of sadness to dissipate more quickly.

However, a depressed state is likely to result in some degree of mood-congruent recall (Blaney, 1986). This pattern is especially true under conditions that encourage the processing of information in a self-referent manner, people are more likely to recall information that is valenced in the direction of their current mood. While the proposed treatment is unlikely to overcome the mood-congruent effect, it is likely that mood-congruent recall will be moderated by the ironic, automatic search process. This is especially likely since effortful processing is adversely affected by depression while automatic processes proceed relatively uninhibited (Hartlage, Alloy, Vazquez, & Dykman, 1993).

Statement of Problem and Hypotheses

Simply telling people to think positive thoughts (Teasdale, 1977) or not think negative thoughts (Trinder & Salkovskis, 1994) are techniques that are ineffective. The current study was designed to test the hypothesis that positive thoughts will become more accessible when the thoughts are subjected to a period of thought suppression under conditions of high cognitive load.

First, it was hypothesized that people experiencing a sad mood will produce paradoxical effects during attempted suppression tasks. Depressed individuals who attempt to suppress positive material will actually remember a greater amount of positive material, while those who attempt to suppress negative material will actually recall a greater amount of negative material.

Second, greater amounts of cognitive load were hypothesized to further increase the inefficiency of suppression attempts. Thus, individuals under conditions of high cognitive load should have greater paradoxical effects than those with low cognitive load.

The greatest differences should be seen between those individuals that attempt to suppress positive material while under a high cognitive load and those that attempt to suppress negative material while under a high cognitive load. Positive suppression and high cognitive load should lead to the greatest recall of positive words, while negative suppression and high cognitive load should lead to the greatest recall of negative words.

Evidence of the effects of cognitive load should also be seen in the number of times that individuals report thinking about the to-be-suppressed material. People who experience high cognitive load should have more failures during the suppression period than those who experience low cognitive load.

CHAPTER II

METHODS

Participants

This experiment was conducted using 180 University of North Dakota psychology students (48 men and 132 women). This group emerged after screening 278 students for eligibility in the experiment. Thirty-two students were excluded due to pre-existing "probable" depression as measured by the Geriatric Depression Scale - Short Form (Seibert, & Ellis, 1991). Another 56 students were excluded because they failed to show a change in mood following the mood induction technique. Such failure rates are quite common in mood induction studies (Martin, 1990). Finally, seven students were excluded because they were unable to correctly recall the load number. Participants received extra credit for their participation. For means, standard deviations, and ranges of both demographic, questionnaire, and dependent data, please see Appendix A.

Design and Procedure

Prior to the actual experiment, participants were given a series of questionnaires in a counterbalanced order. These questionnaires included the Symbol Search Subtest of the Wechsler Intelligence Scale for Adults - Revised (WAIS-R; Wechsler, 1981), the Geriatric Depression Scale - Short Form (GDS-SF; Ferraro & Chelminski, 1996), the Thought Control Questionnaire (TCQ; Wells, & Davies, 1994), the White Bear

Suppression Inventory (WBSI; Wegner, & Zanakos, 1994), and the Vividness of Visual Imagery Questionnaire (VVIQ; Marks, 1973). They were also asked to provide information concerning their ages, genders, and current use of medications. Participants gave permission to obtain the American College Testing (ACT) Mathematics subtest scores (from the University of North Dakota Registrar's Office) because this score has been implicated as a moderator variable for whether a person shows the rebound effect (Rutledge, Hoolenberg, & Hancock, 1993). With the exception of the ACT and WAIS-R subtests, please see Appendix B for questionnaire items. As a baseline for recall ability, all participants were administered the WAIS-R Vocabulary subtest as the first task. After all of the above measures were completed (a period of approximately ten minutes), participants were given two minutes to free-recall as many of the vocabulary words as they could.

Using the mood induction technique described in Seibert and Ellis (1991; see also Gunther, et al, 1996), participants were given an induced mood of sadness (see Appendix C). As a manipulation check, the Depression Adjective Checklist (Lubin, 1967) was administered after mood induction (see Appendix B). Then participants were asked to visualize a white bear and a brown rabbit (which animal was visualized first was counterbalanced). The following instructions were given for each visualization:

> Please close your eyes and imagine a _____. Try to get as vivid a picture as you can of the _____. Pretend that you are preparing to tell a friend exactly what you are now seeing. Please spend the next 30

> seconds thinking about the image you have created and try to observe as much detail about the image as you can.

After the participant had one minute to consider both images, the participant was given the following instructions:

> Now, you are going to receive a series of cards with words that describe how one of the animals you have just visualized feels. You will receive a card every 20 seconds. With each card, pretend that you are the animal that you have visualized and try to feel the feeling on the card. Try to absorb yourself in the feeling as much as you can.

The adjectives that were used were taken from Denny and Hunt (1992). These words have been used in several memory experiments and are recognized as appropriately valenced (Kuiper, Derry, & MacDonald, 1982). The words are displayed in Appendix D. There are 14 positive adjectives and 14 negative adjectives. Half of the participants received pairings of the white bear with positive statements and pairings of the brown rabbit with negative statements, and the pairings were reversed for the other half of the participants. Adjectives were presented in a standardized random order for all participants. However, positive and negative statements were interspersed (pseudo-randomly) in such a way that each valenced adjective was followed by an adjective of the opposite valence.

In the next phase, participants were asked to either not think of the animal associated with the negative items, not think of the animal associated with the positive items, or not think of a "vehicle." Participants were also assigned to either high (memory

of a seven-digit number) or low (memory of a two-digit number) cognitive load. Thus the experimental design is a 3 (positive suppression, negative suppression, or no suppression) x 2 (high cognitive load or low cognitive load) between-subjects factorial design. Please see Table 1 for a schematic of group membership.

Table 1: Schematic of Groups

SUPPRESSION	COGNITIVE LOAD
Positive animal	1. High, memory of 7-digit number
	2. Low, memory of a 2-digit number
Negative animal	3. High, memory of a 7-digit number
	4. Low, memory of a 2-digit number
No suppression	5. High, memory of a 7-digit number
	6. Low, memory of a 2-digit number

The following instructions were given to thought-suppressing individuals. (These instructions are loosely based on instructions from Zeitlin, Netten, & Hodder, 1995):

> Now, I want you to spend the next five minutes thinking about whatever you want. I want you to try <u>not</u> to think about the image of a _____. Try to distract yourself with thoughts about the things you see in this room.

You may find it difficult to keep the image out of your mind. Each time the image appears in your mind, please push the counter in front of you.

In a moment, you will receive a number from the research assistant. It is very important that you remember this number at the end of the five minute period. If you are unable to recall the number accurately, your data cannot be used.

Remember, during the following five minutes, try to not think of _____, keep track of the number of times you do think of the image, and remember the number you are given. Please let the research assistant know when you are ready to begin.

Non-suppressing individuals were given the following instructions:

Now, I want you to spend the next five minutes thinking about whatever you want. However, each time you think about a 'vehicle', please push the counter in front of you.

In a moment, you will receive a number from the research assistant. It is very important that you remember this number at the end of five minutes. If you are unable to recall the number accurately, your data cannot be used.

Remember, during the following five minutes, think about whatever you want, keep track of the number of times you think of a vehicle, and remember the number you are given.

All groups were given a thought monitoring task. However, the control group kept track of a thought that is unrelated to the valenced words, while experimental participants were asked to monitor the thoughts of an image that is being suppressed. A hand-held counter was given to each participant so that they could record the times that they thought about the to-be-suppressed item.

In the final phase of the experiment, participants were asked to simply recall as many of the previously memorized words as possible. Participants filled out an alternate form of the Depression Adjective Checklist (forms A and B were alternated as pre- and post-experimental measures). Gunther, et al. (1996) have shown that this mood induction should be effective for approximately 20 minutes, as have others (Frost & Green, 1982; Isen & Gorgoloine, 1983).

This experiment involved two major precautions in order to insure the continued well-being of subjects. First, GDS-SF scores were calculated before any mood manipulation. If the score indicated the slightest possibility of a preexisting depressed state (a score of five or higher, out of a possible 15), the participant was told his or her score, alerted to its possible meaning as well as its inconclusiveness, and given information concerning the University of North Dakota Counseling Center and Psychological Services Center. For those participants who did complete the mood induction, they were required to complete a shortened, happy mood induction found in Appendix C. In this way, no naturally-occurring depressed participants were allowed to participate. Also, given the known effects of the happy mood induction, those who did

participate, were likely to leave the session in a better mood than when they first arrived to the experimental session (Seibert & Ellis, 1991).

CHAPTER III

RESULTS

Unless otherwise specified, the alpha level for significance will be set at $p \leq .05$.

ANOVAs were conducted in order to assure that groups did not differ significantly across gender, age, year in college, health, mood, verbal ability, or scores on questionnaires. Please see Appendix F for related ANOVA source tables. Correlations between demographic information and the various questionnaires can be found in Appendix G. Appendix H shows the correlations between questionnaire data and the dependent variables.

A series of two-way ANOVAs and ANCOVAs were performed on each of the dependent variables: 1. number of positive adjectives recalled (PLUS), 2. number of negative adjectives recalled (NEG), 3. the difference scores between positive and negative adjectives remembered (PL-NG), 4. the number of reported intrusions during suppression period (INTRUSIONS), and 5. the ending mood score on the final DACL (MOOD3). (Remember that DACL forms A and B were used with half the participants receiving A before B and the other half receiving B before A.) All of the source tables for the following analyses can be found in Appendix I.

ANCOVA for PLUS

Both for theoretical and statistical reasons, it was decided to conduct the analysis using the number of WAIS-R vocabulary words recalled (WAISRECALL) as a covariate. First, the WAISRECALL measure serves as a baseline for general memory ability and is likely to explain some of the error variance in a subsequent memory task. Secondly, WAISRECALL and PLUS are positively correlated ($r = .31$, $p = .00$).

The main effect for suppression group was significant, $F(2,173) = 3.18$, $p = .04$. Since three a priori hypotheses were being tested, the Fisher's Least Significant Difference test (Fisher, 1970) was used for testing the statistical significance of simple effects. Both the positive suppression group (adjusted $M = 3.72$, $SD = 0.23$) and control group (adjusted $M = 3.72$, $SD = 0.23$) recalled significantly more positive adjectives than the negative suppression group (adjusted $M = 3.03$, $SD = 0.23$, $p = .03$). The effect size was moderate (eta squared = .04). Please see Table 2 for observed and covariate-adjusted means and standard deviations. Both the main effect for memory load and the interaction were not significant [$F(1, 173) = 0.23$, $p = .64$ and $F(2, 173) = 0.14$, $p = .87$, respectively].

Table 2. Observed and Estimated Means and Standard Deviations for PLUS by Types of Suppression

Suppression Type	Obs. M (Est. M)	Obs. STD (Est. STD)
Positive	3.78 (3.72)	1.93 (0.23)*
Negative	2.97 (3.03)	1.38 (0.23)*
Neutral	3.72 (3.72)	2.05 (0.23)*

* Given the way that an ANCOVA adjusts the dependent variable according to variance in the covariate, the standard deviation ends up the same for all groups.

ANCOVA for NEG

Once again, WAISRECALL was chosen as a covariate in order to account for baseline memory ability and because of its correlation with NEG ($r = .36$, $p < .001$). Both main effects and the interaction were not significant [suppression type: F (2, 173) = 0.90, p =.41; memory load: F (1, 173) = 0.05, p = .83; interaction: F (2, 173) = 2.09, p = .13].

ANOVA for PL-NG

Since the effects of baseline memory were expected to cancel each other out and no correlation exists between WAISRECALL and PL-NG ($r < .01$, $p = .99$), a two-way ANOVA was used in this analysis. Both the main effects and the interaction were not significant [suppression type: F (2, 174) = 1.98, p = .14; memory load: F (1, 174) = 0.09, p = .77; interaction F (2, 174) = 1.37, p = .26].

Since previous research has suggested that the rebound effect may be stronger in people with high visual-spatial math skill ability (Rutledge, Hoolenberg, & Hancock, 1993), another analysis was conducted with participants who had the highest scores on the WAIS-R Digit Symbol subtest. Separate rankings on digit symbol scores were conducted within each of the six original groups. Next, the top 20 ranks in each group were selected. This process selected only those individuals who achieved scores greater than the 60th percentile relative to the normal population (Wechsler, 1981). The resulting groups were not significantly different on Digit Symbol scores, F (5, 110) = 1.16, p = .33. Please see Table 3 for the means, standard deviations, and minimum and maximum values found in each group.

Table 3. Means, Standard Deviations, and Minimum and Maximum Scores on Digit Symbol

Group #	Mean	SD	Min	Max
1	77.65	8.36	65	90
2	76.90	9.07	66	93
3	77.50	4.97	69	91
4	77.95	9.08	65	97
5	77.70	7.62	70	93
6	78.40	7.20	69	93
TOTAL	77.68	7.69	65	97

While results showed no significant main effects [suppression type: F (2, 114) = 2.50, p = .09; memory load: F (1, 114) = 0.17, p = .68], the interaction emerged as marginally significant [F (2, 114) = 2.91, p = .06]. The effect size was moderate (eta squared = .05). Please see means and standard deviations of the various cells as displayed in Table 4.

Table 4. Means and Standard Deviations for PL-NGs of the High Digit Symbol Sample

Group #	Suppression	Memory Load	N	Mean	SD
1	Positive	High	20	1.25	2.15
2		Low	20	0.30	1.69
3	Negative	High	20	0.20	1.32
4		Low	20	0.70	1.84
5	Neutral	High	20	0.90	1.92
6		Low	20	1.75	1.59

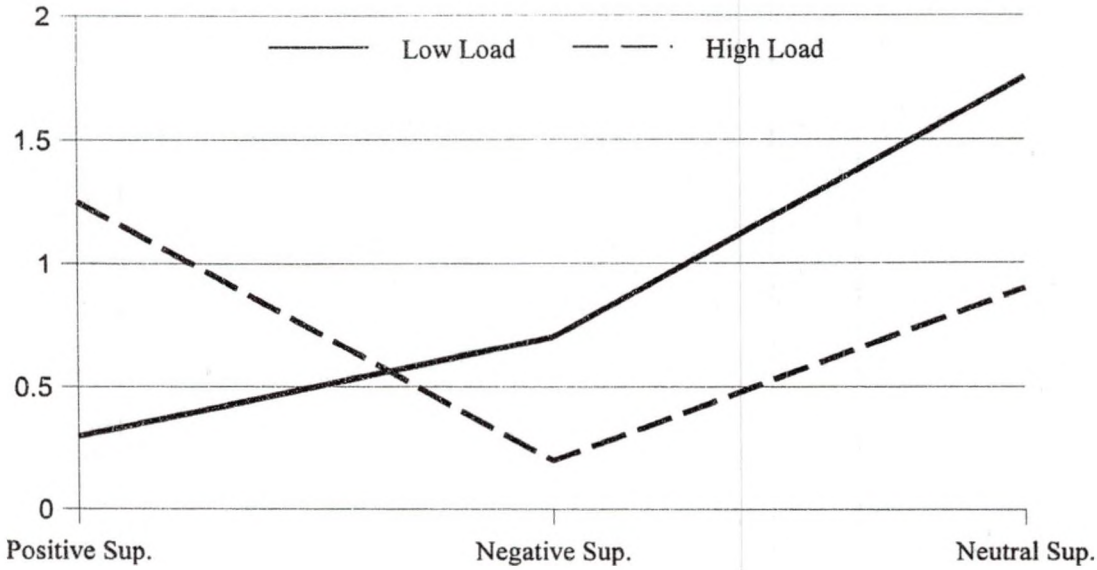

Figure 1. Interaction for high Digit Symbol analysis (positive adjectives minus negative adjectives).

Inspection of the plot in Figure 1 suggests that memory load may differentially effect PL-NG depending on the type of suppression. For a more detailed, exploratory analysis of the pairwise comparisons, please refer to Appendix J.

ANOVA for Intrusions During Suppression Period

Given severe violations of normality (skewness = 3.72, kurtosis = 19.43), the variable representing the number of reported intrusions (of the to-be-suppressed thought) was transformed using the square root of each case (Tabachnick & Fidell, 1989). The resulting variable was then used in a two-way ANOVA considering the effects of memory load and suppression type.

The main effect for memory load was statistically significant [F (1, 174) = 5.84, $p < .01$]. Participants with low memory load instructions tended to report a greater

number of intrusions than participants with high memory load instructions (eta squared = .06).

The main effect for suppression type was also significant [F (2, 174) = 5.68, p = .02], and eta squared was .03. Given the fact that observations went against the current hypothesis, the Bonferroni Inequality method of controlling family-wise error was used (Stevens, 1992). It was found that the neutral suppression group reported more intrusions than either the positive or negative suppression groups (p < .01 and p = .03, respectively).

ANCOVA for Final Mood

The DACL score collected immediately following the mood induction (MOOD2) was used as a covariate in this analysis because it represented the level of impact that the mood manipulation had on each individual. (Remember that DACL forms A and B were used with half the participants receiving A before B and the other half receiving B before A). However it should be noted that the correlation level between MOOD2 and the final mood (MOOD3) was quite small (r = .19, p = .01) and is likely to statistically detract from any effect, should there be one present. The two-way ANCOVA yielded no significant effects [suppression type: F (2, 173) = 0.82, p =.44; memory load: F (1, 173) = 0.40, p =.53; interaction: F (2, 173) = 1.67, p = .19].

CHAPTER IV

DISCUSSION

The current research adds further credence to the theory of ironic processes. Despite the fact that all participants were equally primed with a negative mood induction, the positive suppression group remembered more positively-valenced words than the negative suppression group (approximately one extra word). The experimental design also allows consideration of a most intriguing concept: the ironic effects of thought suppression appear to spread to other related concepts. Thus, even though the negative suppression group was attempting to not think about the animal paired with negative adjectives, the result on the dependent variable was a decreased availability of the positive adjectives.

Since the positive suppression group and the neutral suppression group were approximately equal in the number of positive adjectives recalled, two possibilities exist. First, it may be that there really is no difference between trying to suppress positively-valenced material and trying to suppress unrelated material. A second possibility is that both tasks assisted participants in remembering positive words, but each group was assisted through a different mechanism. For instance, the positive suppression group may have experienced the rebound effect following the suppression period. Meanwhile, the neutral suppression group may have allocated more attention to the experimental stimuli upon being given a novel instruction (i.e., to not think about a "vehicle"). Novel or

unexpected material often engenders greater attentional efforts (Ashcraft, 1994). This may have sparked a series of thoughts and memories concerning the experiment and increased processing of the previously presented words.

Although it had been hypothesized that negative words would be remembered better by the negative suppression group, there were no significant differences among the groups on this measure. Once again, two possibilities should be considered. It could be that suppression of negatively-valenced information has no impact on later recall. Another alternative is that the mood induction created a mood-congruent memory effect that resulted in a ceiling effect in the memory for negative adjectives. Thus, perhaps each individual was primed to recall the greatest number of negative adjectives regardless of other interventions. Although no convincing evidence exists to support the hypothesis of a ceiling effect, the total number of words remembered was fairly consistent across conditions, thus suggesting a limited recall capacity. In addition, the participants that did not respond to the mood induction, showed no difference in the total number of words recalled ($\underline{M}$ = 5.91, SD = 2.89, minimum = 1, maximum = 16) in comparison to mood-induced participants ($\underline{M}$ = 6.04, SD = 2.24, minimum = 1, maximum = 13), $\underline{F}$ (1, 237) = .09, $\underline{p}$ = .76.

Analyses indicate that the experimental manipulations did not produce differences among the groups on the DACL measure taken at the end of the experiment. This is not surprising given that the negative mood induction used here has a short-lived effect. Participants' moods were likely to have drifted back to near baseline levels by the time the final mood rating was taken. Also, there is some evidence that the emotional processing or suppression of information may not have immediate mood impacts, despite

the fact that mood has been shown to be altered in follow-up assessments 24-hours later (Hunt, 1998; Trinder & Salkovskis, 1994).

Perhaps the most surprising effects found in this experiment were those surrounding participants' reported intrusions. Completely counter to the original hypotheses, the low memory load participants reported more intrusions than the high memory load participants, and the neutral suppression participants reported more intrusions than participants suppressing emotionally-laden adjectives. Incidental reports from participants suggested that the high memory load task served as a distraction in-and-of-itself, while low memory load participants did not have their working memories filled with a memory rehearsal task. In returning to Wegner and Erber's (1992) original set of studies using memory for digit strings as a load manipulation, it should be noted that the load was imposed during a period of dual encoding and behavioral response. Thus, memory load may increase the effect of ironic processes when used in conjunction with an encoding task but have no effect when used during memory consolidation or incidental rehearsal.

Previous research has suggested that it is more difficult to suppress emotional information (Edwards & Bryan, 1997; Wegner & Gold, 1992.) However, in the present study, the neutral suppression group reported a greater number of intrusions during the suppression period. One possible explanation for this is that the instructions to not think about a "vehicle" were particularly novel and unexpected. If the instruction was seen as unique and striking, this may have made it even more difficult to not think about it. Participants may have responded by allocating greater attention to the events in the experiment. Perhaps, participants instructed to suppress neutral information were more

likely to distract themselves with thoughts of the adjectives, despite the instruction to use items seen in the experimental room as distractors.

Considering the specific variables that correlated with the number of intrusions leads to some intriguing possibilities. These correlations were also different depending on the group membership (see again, Appendix H). In the positive suppression group, a greater number of intrusions was associated with higher self-reports of physical health (r = .29, p = .02). This was not true in the negative suppression or neutral suppression groups (r = .06, p = .67 and -.06, p = .69, respectively). Thus, it would appear that people who showed more difficulty suppressing positive information tended to perceive themselves as healthier than those who were highly successful at suppressing positive information. However, the White Bear Suppression Inventory, a measure of people's difficulty suppressing unpleasant thoughts, was associated with poorer health (r = -.15, p = .04). This suggests that suppressing positive information may be a skill that is independent of suppressing negative information.

The positive suppression group was also unique in that low scores on the Vividness of Visual Imagery Questionnaire were associated with more intrusions (r = .27, p =.03), while negative and neutral suppression revealed no such relationships (r < -.01, p =.98 and -.16, p = .22, respectively). Thus, poorer ability to visualize relates to increased positive intrusions but not increases in negative or neutral intrusions.

Of particular interest was the relationship between intrusions and final mood found in the negative suppression group. Members of this group should have been the most similar to depressed individuals that are trying to not think about negative thoughts. Each intrusion would equal a failure, and it is hypothesized that such failure would

eventually have an impact on mood. In the current experiment, the negative suppression group was unique in that there was a negative correlation between number of intrusions and final mood score ($r = -.36$, $p < .01$), whereas the relationship for the positive and neutral groups was not significant ($r = -.06$, $p = .65$ and $-.13$, $p = .33$, respectively).

The most promising results from this experiment are those indicating that participants who scored high on Digit Symbol performance may represent a subset of the population that responds differently to the current experimental demands. Although the initial analysis of the positive adjectives minus the negative adjectives (PL-NG) showed no significant results, a subsequent analysis which used only two-thirds of the data, yielded a marginally significant interaction ($p < .06$). Thus, despite a loss of power, the effect was suggested when considering participants with Digit Symbol scores above the 60th percentile (in reference to normal population samples). Low memory load was associated with the greatest difference in memory for positive adjectives minus negative adjectives in the neutral suppression condition. Also, the positive suppression group had a marginally greater PL-NG mean than the negative suppression group when compared across high cognitive load ($p = .07$). In other words, the data suggests that both high load, positive suppression and low load, neutral suppression groups remembered more positive than negative words in comparison to the high load, negative suppression group. Thus, telling sadness-induced participants to not think of a positive icon may be better than telling them to not think of a negative icon.

This result is significant because it shows, that under the right conditions and with the appropriate subgroup, counterintuitive instructions may skew people's memories toward more positive retrievals. Even in this study, the association between mood and

memory is shown in the positive correlation between PL-NG and participants' final moods ($r = .19$, $p = .01$).

One weakness in the current study is that it was assumed that only mood-congruent memory effects would be operating. However, Rinck, Glowalla, and Schneider (1992) have shown that mood-incongruent effects sometimes occur. In their experiment, words that were rated by participants as being "very" pleasant or unpleasant were subject to a mood-congruent memory effect. However, words that were rated as only "slightly" pleasant or unpleasant were subject to a mood-incongruent effect (individuals experiencing an induced mood of sadness during encoding remembered more slightly positive words while individuals experiencing induced mood of elation remembered more slightly negative words). The authors explained this effect as a result of increased elaboration. For instance, participants who were in an induced mood of sadness required additional time to recognize a word as pleasant when it was only slightly pleasant. This led to additional processing and greater accessibility during recall. In the future, it is suggested that researchers take into consideration the level of valence as well as the direction, since slightly valenced words may actually result in mood-incongruent memory bias.

In the short run, the effect may account for an impractically small amount of the variance (eta squared = .05). However, this study does not consider cumulative effects over time. Consider a treatment in which depressed individuals would be asked to bring in a number of items from their home that have significant, unchanging, positive memories (i.e., family pictures, etc.). What might happen if the client was asked to engage in periods of thought suppression for these items? If the items were systematically

moved around the client's home, the objects could become associated with numerous other items. This may increase the likelihood that the client would "fail" during suppression and have intrusions of the positively related memories.

Although such an intervention is still in the realm of experimental development, clinical psychologists should already be ready to entertain the idea of ironic treatments:

> One possible direction . . . is to include training procedures to modify biases that patients cannot control, even when made aware of them . . . . effortful control eventually fails because it depends on capacity-limited resources. In this light, what is required is to automate the processes that oppose the selective intake of negative information, in order to reduce the load placed on vulnerable individuals when under stress (Mathews, 1997, p. 62).

Clinical Implications

Clinical implications are limited at this time, but several tentative suggestions can be offered. First, the current research adds to the steadily-growing body of research that counterindicates thought suppression as a technique for dealing with cyclical depressive thoughts. At best, it is a short-term fix that only briefly circumvents entrenched negative schemas. At worst, as in group three presently, positive information becomes increasingly less available as negative intrusions become associated with an increasing number of environmental stimuli.

A second suggestion is that if distraction techniques are employed, they should be done so when cognitive load is at (or near) its lowest point possible. Group six was the group with the highest proportion of positive to negative words recalled (although not

significantly greater than groups one, three, or five), thus "benefitting" from suppressing the thought of a neutral stimulus. Such neutral distraction was successful when cognitive load was low, but less successful when cognitive load was high.

Third, while other screening techniques will no doubt be developed (also see Rutledge, Hancock, & Rutledge, 1996), administering the Digit Symbol task to depressed clients may assist in making decisions about whether or not to assign homework that could elicit the rebound effect. The current author suggests that a Digit Symbol raw score of 70 be used as a cut off when false positives are less problematic than false negatives.

Fourth, this research lends initial support to paradoxical techniques as debuggers of malfunctioning cognitive systems. When clients are prescribed symptoms, the automatic search is for failures at being symptomatic. However, paradoxically inclined therapists may want to consider the wording of their prescriptions more closely in order to ensure that the automatic search is for positive behavior or thoughts rather than failures at being sick. This may strengthen the effects that have already been observed. In addition, paradoxical psychologists should closely follow emerging data on predicting rebounders. Non-rebounders may be poor candidates for paradoxical interventions.

Final Thoughts

Obviously, more research is needed before considering whether a new paradoxical treatment could be both effective and additive in conjunction with current approaches to treating depressed states. First, research should be conducted using participants experiencing naturally-occurring, mildly-depressed states. While mood induction techniques allow for safe study of effects over a short period of time, it is difficult to develop analogues for mild depression over a period of hours, days, or weeks.

Second, different distraction techniques should be compared. In the current study, participants were asked to use thoughts about objects in the room to distract themselves. However, other kinds of tasks may be more helpful, such as counting or vigilance tasks.

Third, other variables should be included in selecting participants that are likely to benefit from a paradoxical treatment. For instance, Kelly and Nauta (1997) have shown that participants with higher levels of psychological reactance are more likely to show the rebound effect than those who are low in reactance. Dowd, Wallbrown, Sanders, and Yesenosky (1994) have demonstrated a number of correlates with reactance including: (a) lower interest in making good impressions on others, (b) less concern with meeting obligations or adhering to rules, (c) higher concern for future events, and (d) greater tendency to show strong emotional reactions. Future research should continue to carefully measure reactance and visual memory skills, as well as other possible moderating variables.

Rutledge, Hancock, and Rutledge (1996) have suggested a number of variables that may identify thought rebounders from non-rebounders. Most surprising, is their finding that 30% or fewer of the population is likely to respond with thought rebounding following suppression. People who are likely to show the rebound effect may have higher ACT composite scores, lower tendency toward obsessionality, and lower trait anxiety. Initial evidence suggests that Caucasians are more likely to show the effect than African-Americans. Females in their study were more likely to show a rebound effect, as well. However, men with more thought intrusions during suppression were more likely to show the rebound effect, despite the fact that the number of intrusions had no relationship to rebounding in women. These are intriguing relationships which warrant further research.

One difficulty with the present research was that there was no way to know when a memory ceiling had been reached. In the future, it is suggested that researchers gather preliminary data about memory for target materials using participants that have had no mood induction. In that way, when there are no differences between a valenced suppression group and a neutral suppression group, it will be possible to know whether the approximate equality is due to statistical floor effects or the truth of the null hypothesis.

Conclusions

In conclusion, the current research suggests that when certain individuals are under conditions of high cognitive load, not thinking about positive elements increases the later accessibility of those elements in memory. Future research should focus on studying groups who are high in visual-spatial math skills and psychological reactance. Also, selecting naturally-occurring, mildly-depressed participants and using suppression material that is participant-generated, would increase external validity in future studies. Finally, other techniques should be used in order to determine the best way of controlling cognitive load. Regardless of whether the effect described in the current experiment will someday be tapped as a paradoxical treatment for certain subgroups, it is hoped that people will not so lightly tread down the path of attempted thought suppression unless they are prepared to face the very thing intended to be left behind.

APPENDICES

APPENDIX A

DEMOGRAPHIC AND QUESTIONNAIRE INFORMATION

Table 5. Means, Standard Deviations, And Frequencies For Demographics and Questionnaires

Variable	Sample (N=105 unless otherwise specified)	
Gender	Males	48
	Females	135
Age (years)	Mean	22.60
	Standard Deviation	4.70
	Range	18-43
Year in College	First Year	44
	Second Year	52
	Third Year	49
	Fourth Year	35
	Not Specified	3
Health (1 = excellent; 5 = poor)	Mean	2.33
	Standard Deviation	0.75
	Range	1-4
Mood (if > 4, excluded from study)	Mean	1.07
	Standard Deviation	1.18
	Range	0-4
Wechsler Adult Intelligence Scale - Revised Vocabulary Subtest	Mean	48.12
	Standard Deviation	10.45
	Range	22-69
Digit Symbol Subtest	Mean	72.88
	Standard Deviation	10.65
	Range	43-97

Appendix A, continued,
Table #5 continued,

American College Testing (ACT) Mathematics Subtest Score (N=106)	Mean	23.28
	Standard Deviation	3.98
	Range	14-33
Vividness of Visual Imagery Questionnaire	Mean	64.96
	Standard Deviation	20.50
	Range	32-150
White Bear Suppression Inventory	Mean	44.68
	Standard Deviation	10.30
	Range	15-69
Thought Control Questionnaire		
Distraction	Mean	16.24
	Standard Deviation	2.84
	Range	9-24
Reappraisal	Mean	14.92
	Standard Deviation	3.22
	Range	6-24
Social	Mean	15.33
	Standard Deviation	3.76
	Range	6-24
Worry	Mean	9.69
	Standard Deviation	2.32
	Range	6-17
Punishment	Mean	8.60
	Standard Deviation	2.16
	Range	6-17
TOTAL	Mean	64.78
	Standard Deviation	7.3[illegible]
	Range	34-82

Appendix A, continued,
Table #5, continued,

Recall of WAIS-R Vocabulary Words		
Correct Words	Mean	6.78
	Standard Deviation	3.44
	Range	0-20
Intrusions	Mean	0.51
	Standard Deviation	0.84
	Range	0-5
Depression Adjective Check List (negative number represents more negative adjectives than positive)		
After Mood Induction	Mean	-6.58
	Standard Deviation	4.66
	Range	-22-0
Post-experiment	Mean	0.76
	Standard Deviation	4.31
	Range	-14-10
Reported Intrusions of Suppressed Thought	Mean	5.75
	Standard Deviation	6.99
	Range	0-57
Positive Adjectives Recalled	Mean	3.50
	Standard Deviation	1.83
	Range	0-9
Negative Adjectives Recalled	Mean	2.69
	Standard Deviation	1.57
	Range	0-8
(Positive - Negative) Adjectives Recalled	Mean	0.80
	Standard Deviation	1.57
	Range	-3-6

APPENDIX B

QUESTIONNAIRES

Included in this appendix are copies of the questions from the pencil and paper measures.

(a) Vividness of Visual Imagery Questionnaire (VVIQ)

(b) Thought Control Questionnaire (TCQ)

(c) White Bear Suppression Inventory

Appendix B, continued

Vividness of Visual Imagery Questionnaire (VVIQ)

Directions: Using the rating scale below, rate the image conjured up for each of the described images. Please make one rating that describes the vividness of your visualization once with your eyes open and once with your eyes closed.

Rating Description:

1 "Perfectly clear and as vivid as normal vision"

2 "Clear and reasonably vivid"

3 "Moderately clear and vivid"

4 "Vague and dim"

5 "No image at all, you only 'know' that you are thinking of the object"

For items 1-4, think of some relative or friend whom you frequently see (but who is not with you at present) and consider carefully the piture that comes before your mind's eye.

1. The exact contour of face, head, shoulders and body.
2. Characteristic poses of the head, attitudes of the body, etc.
3. The precise carriage, length of step, etc., in walking.
4. The different colours worn in some familar clothes.

Visualize a rising sun. Consider carefully the picture that comes before your mind's eye.

5. The sun is rising above the horizon into a hazy sky.
6. The sky clears and surrounds the sun with blueness.
7. Clouds. A storm blows up, with flashes of lightning.
8. A rainbow appears.

Appendix B, continued

Think of the front of a shop you often go to. Consider the pictures that come before your mind.

9. The overall appearance of the shop from the opposite side of the road.

10. A window display including the colours, shapes and details of the door.

11. You are near the entrance. The colour, shape and details of the door.

12. You enter the shop and go to the counter. The counter assistant serves you. Money changes hands.

Finally, think of a country scene which involves trees, mountains and a lake. Consider the picture that comes before your mind's eye.

13. The contours of the landscape.

14. The colour and shape of the trees.

15. The colour and shape of the lake.

16. A strong wind blows on the trees and on the lake causing waves.

(Marks, 1974)

Appendix B, continued

Thought Control Questionnaire

Directions: Most people experience unpleasant, and/or unwanted thoughts (in verbal and/or picture form), which can be difficult to control. We are interested in the techniques that you generally use to control such thoughts. Below are a number of things that people do to control these thoughts. Please read each statement carefully, and indicate how often you use each technique by circling the appropriate number. There are no right or wrong answers. Do not spend too much time thinking about each one.

Response format: 1 = never; 2 = sometimes; 3 = often; 4 = almost always

When I experience an unpleasant/unwanted thought:

1. I call to mind positive images instead.
2. I tell myself not to be so stupid.
3. I focus on the thought.
4. I replace the thought with a more trivial bad thought.
5. I don't talk about the thought to anyone.
6. I punish myself for thinking the thought.
7. I dwell on other worries.
8. I keep the thought to myself.
9. I occupy myself with work instead.
10. I challenge the thought's validity.
11. I get angry at myself for having the thought.
12. I avoid discussing the thought.

Appendix B, continued

13. I shout at myself for having the thought.

14. I analyze the thought rationally.

15. I slap or pinch myself to stop the thought.

16. I think pleasant thoughts instead.

17. I find out how my friends deal with these thoughts.

18. I worry about more minor things instead.

19. I do something that I enjoy.

20. I try to reinterpret the thought.

21. I think about something else.

22. I think more about the minor problems I have.

23. I try a different way of thinking about it.

24. I think about past worries instead.

25. I ask my friends if they have similar thoughts.

26. I focus on different negative thoughts.

27. I question the reasons for having the thought.

28. I tell myself that something bad will happen if I think the thought.

29. I talk to a friend about the thought.

30. I keep myself busy.

(Wells & Davies, 1994)

Appendix B, continued

White Bear Suppression Inventory

Directions: Please circle a number indicating how true the following statements are of yourself. Response format: 1 = strongly agree; 2 = agree; 3 = not sure; 4 = disagree; 5 = strongly disagree

1. There are things I prefer not to think about.
2. Sometimes I wonder why I have the thoughts I do.
3. I have thoughts that I cannot stop.
4. There are images that come to mind that I cannot erase.
5. My thoughts frequently return to one idea.
6. I wish I could stop thinking of certain things.
7. Sometimes my mind races so fast I wish I could stop it.
8. I always try to put problems out of mind.
9. There are thoughts that keep jumping into my head.
10. Sometimes I stay busy just to keep thoughts from intruding on my mind.
11. There are things that I try not to think about.
12. Sometimes I really wish I could stop thinking.
13. I often do things to distract myself from my thoughts.
14. I have thoughts that I try to avoid.
15. There are many thoughts that I have that I don't tell anyone.

(Wegner & Zanakos, 1994)

APPENDIX C

MOOD INDUCTION TECHNIQUE

Directions

1. I will read each of the following cards to myself and then I will read the card aloud.

2. In this part of the experiment, I will be reading series of cards with statements typed on them. These statements represent a mood state. In order to participate fully and successfully, I will need to be willing to feel and experience each statement as it would apply to me personally. In other words, when I read each statement, I will allow myself to respond as though the statement had been my own original thought. I will go with the feeling and not try to stop it.

3. At first I might feel like resisting the mood. However, I will see that is the case that I have the opportunity to learn to talk myself into a mood, and obviously, I will also learn how to talk myself out of one. When this happens I will find that I have learned something valuable about myself; I can learn to control my moods. Thus, I will try to experience the mood suggested.

4. I will feel each item, making the statement my own. I will experience the mood suggested and will not attempt to stop it. I will visualize a scene in which I have had such a feeling or thought. Then I will begin to say whatever comes to my mind that relates to

Appendix C, continued

the feeling. This is a type of free association - letting thoughts that pertain to the feeling flow freely.

5. I am now ready to experience the statements that follow. From this point forward whenever I hear the tone, I will go on to the next page. I will spend the time between tones reading the statements and experiencing the feelings they suggest to me. I am ready to begin.

Sad Mood Induction Scale

1. I feel a little down today.
2. My classes are harder than I expected.
3. Everyone else seems to be having more fun.
4. Sometimes I feel so guilty that I can't sleep.
5. I wish I could be myself, but nobody likes me when I am.
6. Today is one of those days when everything I do is wrong.
7. I doubt that I'll ever make a contribution in the world.
8. I feel like my life's in a rut that I'm never going to get out of.
9. My mistakes haunt me, I've made too many.
10. Life is such a heavy burden.
11. I'm tired of trying.
12. Even when I give my best effort, it just doesn't seem to be good enough.
13. Nobody understands me or even tries to.
14. I don't think things are ever going to get better.
15. I feel worthless.

Appendix C, continued

16. What's the point of trying?

17. My parents don't know who I am.

18. When I talk no one really listens.

19. I feel cheated by life.

20. Why should I try when I can't make a difference anyway?

21. Sometimes I feel really guilty about the way I've treated my parents.

22. Every time I turn around, something else has gone wrong.

23. I'm completely alone.

24. There is hope.

25. I feel I am being suffocated by the weight of my past mistakes.

Happy Mood Induction Scale

1. When I have the right attitude, nothing can depress me.

2. Most people like me.

3. I've got some good friends.

4. I can make things happen.

5. I feel creative.

6. I can make any situation turn out right.

7. I'm in charge of my life and I like it that way.

8. I know I can do it; I'm going to seize the day.

9. I'm energized.

10. It's great to be alive.

(Seibert & Ellis, 1991)

APPENDIX D

STIMULUS WORDS

Table 6. Stimulus Words for Memory Task.

(Numbers in parentheses are written frequencies according to Francis and Kucera, 1982).

Negative		Positive	
guilty (3)	jealous (4)	sociable (1)	amiable (2)
withdrawn (4)	inferior (7)	playful (3)	kindness (6)
anguish (8)	dismal (8)	gracious (9)	cheerful (10)
defeated (10)	depressed (10)	advancement (11)	energetic (11)
bitterness (18)	despair (20)	delighted (15)	loyalty (18)
troubled (23)	lonely (25)	orderly (19)	exciting (27)
inadequate (32)	empty (64)	helpful (29)	capable (66)
MEANS (16.86)		(16.21)	
SD (16.26)		(16.71)	

Note: With alpha set at .05 (two-tailed), the two groups do not differ significantly on word frequency, t (26) = .10.

APPENDIX E

DEPRESSION ADJECTIVE CHECKLIST

Form A

1. Wilted	9. Unwanted	17. Strong	25. Criticized
2. Safe	10. Fine	18. Tortured	26. Grieved
3. Miserable	11. Broken-hearted	19. Listless	27. Dreamy
4. Gloomy	12. Down-cast	20. Sunny	28. Hopeless
5. Dull	13. Enthusiastic	21. Destroyed	29. Oppressed
6. Gay	14. Failure	22. Wretched	30. Joyous
7. Low-spirited	15. Afflicted	23. Broken	31. Weary
8. Sad	16. Active	24. Light-hearted	32. Droopy

Form B

1. Downhearted	9. Forlorn	17. Clean	25. Morbid
2. Lively	10. Alert	18. Dispirited	26. Heavy-hearted
3. Unfeeling	11. Exhausted	19. Moody	27. Easy-going
4. Alone	12. Heartsick	20. Pleased	28. Gray
5. Unhappy	13. Bright	21. Dead	29. Melancholy
6. Alive	14. Glum	22. Sorrowful	30. Hopeful
7. Terrible	15. Desolate	23. Bleak	31. Mashed
8. Poor	16. Composed	24. Light	32. Unlucky

(Lubin, 1967)

APPENDIX F

ANOVA SOURCE TABLES SHOWING RANDOM ASSIGNMENT ACROSS SUPPRESSION AND MEMORY LOAD GROUPINGS

Table 7. Gender by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	0.63	0.32	1.64	.20
Within subjects	180	34.78	0.19		
Total	182	35.41			

Table 8. Age by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	10.02	5.01	0.22	.80
Within subjects	180	4118.05	22.88		
Total	182	4128.08			

Table 9. Year in College by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	3.51	1.75	1.57	.21
Within subjects	180	198.24	1.12		
Total	182	201.75			

Appendix F, continued

Table 10. Health by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	0.48	0.24	0.43	.65
Within subject	180	101.85	0.57		
Total	182	102.33			

Table 11. Geriatric Depression Scale by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	0.28	0.14	0.10	.91
Within subjects	180	247.77	1.42		
Total	182	248.05			

Table 12. WAIS-R Vocabulary by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	545.39	272.70	2.54	.08
Within subjects	180	19,313.97	107.30		
Total	182	19,859.36			

Table 13. White Bear Suppression Inventory by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	83.40	41.70	0.39	.68
Within subjects	180	19,242.58	106.90		
Total	182	19,325.98			

Appendix F, continued

Table 14. Vividness of Visual Imagery Questionnaire by Suppresssion Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	1097.58	548.79	1.31	.27
Within subjects	180	75,369.15	418.72		
Total	182	76,466.73			

Table 15. WAIS-R Digit Symbol by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	114.06	57.03	0.51	.53
Within subjects	180	20,519.30	112.00		
Total	182	20,633.36			

Table 16. Thought Control Questionnaire (TCQ), Distraction by Suppression Group

Between subjects	2	10.31	5.15	.60	.55
Within subjects	180	1537.10	8.54		
Total	182	1547.41			

Table 17. TCQ, Punishment by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	5.27	2.63	0.56	.57
Within subjects	180	844.82	4.69		
Total	182	850.08			

Appendix F, continued

Table 18. TCQ, Reappraisal by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	24.64	12.23	1.19	.31
Within subjects	180	1858.47	10.33		
Total	182	1882.93			

Table 19. TCQ, Worry by suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	20.26	10.13	1.89	.15
Within subjects	180	964.99	5.361		
Total	182	985.25			

Table 20. TCQ, Social by Suppression Group

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	7.17	3.58	0.25	.78
Within subjects	180	2563.50	14.24		
Total	182	2570.67			

Table 21. TCQ, TOTAL by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	64.11	32.05	0.59	.56
Within subjects	180	9780.81	54.34		
Total	182	9844.92			

Appendix F, continued

Table 22. WAIS-R Recall by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	18.73	9.37	0.79	.46
Within subjects	180	2130.52	11.84		
Total	182	2149.56			

Table 23. WAIS-R Intrusions by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	2.41	1.21	1.82	.17
Within subjects	180	119.33	0.66		
Total	182	121.74			

Table 24. First DACL, Positive Words by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	1.18	0.59	0.85	.43
Within subjects	180	125.71	0.70		
Total	182	126.90			

Table 25. First DACL, Negative Words by Suppression Group.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	2	22.48	11.24	0.59	.56
Within subjects	180	3449.50	19.16		
Total	182	3471.98			

Appendix F, continued

Table 26. Gender by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	0.00	0.00	0.08	.90
Within subjects	181	35.41	0.20		
Total	182	35.41			

Table 27. Age by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	27.39	27.39	1.21	.27
Within subjects	181	4100.69	22.67		
Total	182	4128.08			

Table 28. Year in College by Memory.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	0.12	0.12	0.11	.74
Within subjects	181	201.63	1.13		
Total	182	201.75			

Appendix F, continued

Table 29. Health by Memory.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	0.14	.14	0.24	.62
Within subjects	181	102.19	0.57		
Total	182	102.33			

Appendix F, continued

Table 30. Geriatric Depression Scale by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	0.93	.93	0.66	.42
Within subjects	181	247.12	1.40		
Total	182	248.05			

Table 31. WAIS-R Vocabulary by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	42.68	42.68	0.39	.53
Within subjects	181	19,816.68	109.48		
Total	182	19,859.36			

Table 32. White Bear Suppression Inventory by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	369.59	369.59	3.53	.06
Within subjects	181	18,956.39	104.73		
Total	182	19,325.98			

Table 33. Vividness of Visual Imagery Questionnaire by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	27.47	27.47	0.07	.80
Within subjects	181	76,439.27	422.32		
Total	182	76,466.73			

Appendix F, continued

Table 34. WAIS-R Digit Symbol by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	79.18	79.18	0.70	.41
Within subjects	181	20,554.17	113.56		
Total	182	20,633.36			

Table 35. TCQ, Distraction by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	9.28	9.28	1.09	.30
Within subjects	181	1538.13	8.50		
Total	182	1547.41			

Table 36. TCQ, Punishment by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	1.62	1.62	0.35	.56
Within subjects	181	848.46	4.69		
Total	182	850.08			

Table 37. TCQ, Reappraisal by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	4.22	4.22	0.41	.53
Within subjects	181	1878.71	10.39		
Total	182	1882.93			

Appendix F, continued

Table 38. TCQ, Worry by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	18.98	18.98	3.74	.06
Within subjects	181	912.56	5.01		
Total	182	931.50			

Table 39. TCQ, Social by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	0.02	0.02	0.00	.97
Within subjects	181	2570.65	14.20		
Total	182	2570.67			

Table 40. TCQ, Total by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	53.13	53.13	0.98	.32
Within subjects	181	9791.79	54.10		
Total	182	9844.92			

Table 41. WAIS-R Recall by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	5.83	5.83	0.43	.48
Within subjects	181	21430.43	11.84		
Total	182	2149.26			

Appendix F, continued

Table 42. WAIS-R Intrusions by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	.16	.16	0.24	.62
Within subjects	181	121.57	.67		
Total	182	121.74			

Table 43. First DACL, Positive Words by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	0.15	0.15	0.03	.87
Within subjects	181	1041.62	5.76		
Total	182	1041.77			

Table 44. First DACL, Negative Words by Memory Load.

	df	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between subjects	1	1.67	1.67	0.28	.64
Within subjects	181	1394.74	7.71		
Total	182	1396.40			

APPENDIX G

CORRELATIONS ACROSS DEMOGRAPHICS AND OTHER MEASURES

Table 45. Correlations Across Demographics and Other Measures

Variables	2	3	4	5	6	7	8	9
1. AGE	.35**	.03	-.07	.20**	.18	.02	-.11	-.10
2. YEAR	-----	-.02	-.04	.25**	.10	-.12	.15*	-.00
3. HEALTH	-----	-----	.22**	-.14	-.15*	.03	-.08	-.06
4. MOOD1	-----	-----	-----	.05	-.29**	.05	-.03	-.09
5. VOCAB	-----	-----	-----	-----	.06	.00	.14	-.10
6. WBSI	-----	-----	-----	-----	-----	-.06	.04	-.04
7. VVIQ	-----	-----	-----	-----	-----	-----	-.02	-.05
8. DIGSYM	-----	-----	-----	-----	-----	-----	-----	.04
9. TCQD	-.01	-.05	-.09	-.10	-.03	-.05	.02	-----
10. TCQP	-.07	.14	.24**	-.02	-.44**	.10	.04	.06
11. TCQR	.06	.15*	.15*	.20	-.08	.02	.05	.04
12. TCQW	-.09	.17*	.27**	-.12	-.35**	.06	.01	.05
13. TCQS	-.05	-.02	-.14	.04	.09	-.10	.05	-.02
14. TCQTO	-.05	.13	.11	.03	-.24**	-.01	.07	.44**
15. W-REC	.24**	-.05	-.05	.19*	-.02	.03	.33**	-.02
16. W-INT	-.13	.05	.11	-.18*	-.05	.04	-.25**	-.02
17. ACT	.13	.13	.01	.36**	.11	.03	.13	-.03

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

Please see pages 69 and 70 for explanation of abbreviations.

Appendix G, continued,
Table #45, continued,

Variables	10	11	12	13	14	15	16	17
1. AGE	.11	-.09	.13	.07	.12	-.03	-.04	-.01
2. YEAR	-.07	.06	-.09	-.05	-.05	.24**	-.13	.13
3. HEALTH	.14	.15*	.17*	-.02	.13	-.05	.05	-.11
4. MOOD1	.24	.15*	.27**	-.14	.11	-.05	.11	.01
5. VOCAB	-.02	.20**	-.12	.04	.03	.19*	.18*	.36**
6. WBSI	-.44**	-.08	-.35**	.09	-.24**	-.02	-.05	.11
7. VVIQ	.10	.02	.06	-.10	-.01	.03	.04	.03
8. DIGSYM	.04	.05	.01	.05	.07	.33	-.25**	.13
9. TCQD	.06	.04	.05	-.02	.44**	-.02	-.02	-.03
10. TCQP	-----	.19**	.43**	-.10	.49**	.03	.02	-.03
11. TCQR	-----	-----	.20**	.09	.62**	-.00	-.04	.09
12. TCQW	-----	-----	-----	-.07	.51**	.07	.04	-.16
13. TCQS	-----	-----	-----	-----	.49**	-.12	.10	-.09
14. TCQTO	-----	-----	-----	-----	-----	-.04	.04	-.08
15. W-REC	-----	-----	-----	-----	-----	-----	-.31**	.19*
16. W-INT	-----	-----	-----	-----	-----	-----	-----	-.22*
17. ACT	-----	-----	-----	-----	-----	-----	-----	-----

Explanation of Abbreviations

1. AGE is how old (in years) participants were at the time of participation.

2. YEAR refers to the participant's year in school (1 = first year, 2 = second year, etc.)

3. HEALTH is a self-report rating where "1" is excellent health and "5" is poor health.

Appendix G, continued,
Table #45, continued

4. MOOD1 is the Geriatric Depression Scale - Short Form. All scores are subclinical (1-4) with higher scores indicating greater endorsement of depressive elements.
5. VOCAB is the WAIS-R Vocabulary subtest.
6. WBSI is the White Bear Suppression Inventory. Lower scores represent greater endorsement of difficulties suppressing unwanted thoughts.
7. VVIQ is the Vividness of Visual Imagery Questionnaire. Lower scores represent greater visual imagery ability.
8. DIGSYM is the WAIS-R Digit Symbol.
9. TCQD is the Dorry factor on the Thought Control Questionnaire. Greater scores on all of the TCQ factors indicate higher tendencies to rely on that technique to deal with unwanted thoughts.
10. TCQP is the Punishment factor of the TCQ.
11. TCQR is the Reappraisal factor of the TCQ.
12. TCQW is the Worry factor of the TCQ.
13. TCQS is the Social factor of the TCQ.
14. TCQTO is all of the TCQ factors added together (total).
15. W-REC is the number of words correctly recalled from WAIS-R Vocabulary.
16. W-INT is the number of intrusions during WAIS-R Vocabulary recall.
17. ACT is the American College Testing Mathematics subtest.

APPENDIX H

CORRELATIONS BETWEEN DEPENDENT VARIABLES

AND DEMOGRAPHIC/QUESTIONNAIRE DATA

(SEPARATED BY SUPPRESSION GROUP)

Please see pages 69 and 70 for explanation of most abbreviations.

Table 46. Correlations with Positive Adjectives Recalled (PLUS).

	Suppression Group			
Variable	Positive	Negative	Neutral	All Participants
AGE	.27*	.16	.15	.17*
YEAR	-.07	-.02	-.04	-.02
HEALTH	.03	-.06	-.11	-.04
MOOD1	.14	-.12	-.00	.03
VOCAB	.19	.13	.08	.16*
WBSI	.01	.11	-.12	-.02
VVIQ	.10	.04	.03	.05
DIGSYM	.27*	.05	.10	.15*
TCQD	.08	.27*	-.24	-.01
TCQP	.12	-.03	.18	.09
TCQR	.29*	-.04	.11	.17*
TCQW	.00	-.23	.08	-.01
TCQS	.18	.02	.02	.06

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

Appendix H, continued
Table #46, continued

	Suppression Group			
Variable	Positive	Negative	Neutral	All Participants
W-REC	.36**	.15	.33**	.31**
W-INT	-.15	-.29*	-.16	-.21**
ACT	.10	-.00	.02	.06
INTRUS	-.06	.18	.01	.04
MOOD2	.20	.09	.03	.12
FINALMOOD	-.03	.12	.08	.04
NEG	.57**	.27*	.51**	.48**
PL-NEG	.54**	.59**	.70**	.62**

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

INTRUS is the number of times that participants reported thoughts of the to-be-suppressed material during the suppression time.

MOOD2 is the Depression Adjective Checklist (DACL) taken after the mood induction.

FINALMOOD is the DACL taken after all experimental manipulations and measures.

NEG is the number of negative adjectives recalled.

PL-NEG is the positive adjectives recalled minus the negative adjectives recalled.

Appendix H, continued

Table 47. Correlations with Negative Adjectives Recalled (NEG).

	Suppression Group			
Variable	Positive	Negative	Neutral	All Participants
AGE	.29*	.12	.27*	.20**
YEAR	-.06	.02	.09	.03
HEALTH	.20	-.16	-.09	.01
MOOD1	.24	-.03	.14	.13
VOCAB	.11	.08	.25	.15*
WBSI	.07	.10	-.34**	-.05
VVIQ	.04	.22	-.04	.08
DIGSYM	.29*	.16	.25*	.24**
TCQD	-.14	.12	-.09	-.04
TCQP	.08	-.16	.45**	.12
TCQR	.17	.05	.06	.11
TCQW	.05	-.03	.42**	.14
TCQS	-.17	-.16	-.19	-.17*
TCQTO	-.00	-.08	.15	.02
W-REC	.44**	.15	.42**	.36**
W-INT	.03	.03	-.23**	-.06
ACT	.24	.20	.17	.21*
INTRUS	-.04	.03	-.24	-.11
MOOD2	-.03	.09	-24	-.05
FINALMOOD	-.29	.07	-.22	-.16*
PLUS	.57**	.27*	.51**	.48**
PL-NEG	-.39**	-.62**	-.26*	-.40**

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

Appendix H, continued

Table 48. Correlations with Positive minus Negative Adjectives (PL-NEG).

	Suppression Group			
Variable	Positive	Negative	Neutral	All Participants
AGE	.01	.04	-.05	.01
YEAR	-.01	-.03	-.11	-.04
HEALTH	-.18	.09	-.04	-.05
MOOD1	-.09	-.08	-.11	-.09
VOCAB	.10	.04	-.12	.03
WBSI	-.05	.01	.15	.03
VVIQ	.07	-.15	.06	-.02
DIGSYM	-.00	-.10	-.10	-.05
TCQD	.23	.12	-.20	.03
TCQP	.05	.11	-.17	-.02
TCQR	.14	-.08	.08	.07
TCQW	-.04	-.16	-.26*	-.13
TCQS	.38**	.15	.18	.22**
TCQTO	.28*	.08	-.08	.11
W-REC	-.04	-.00	.02	.00
W-INT	-.20	-.25	.01	-.16*
ACT	-.13	-.05	-.11	-.14
INTRUS	-.02	.12	.21	.14
MOOD2	.25	-.21	.23	.17*
FINALMOOD	.26*	.02	.28*	.19*
PLUS	.54**	.59**	.70**	.62**
NEG	-.39**	-.62**	-.26*	-.40**

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

APPENDIX I

ANOVA AND ANCOVA TABLES FOR MAIN ANALYSES

Table 49. ANCOVA for PLUS.

Source	Sum of Squares	df	Mean Squares	F Ratio	F Prob.
Corrected Model	79.84	6	13.31	4.38	.00
Intercept	210.98	1	210.98	69.50	.00
WAISRECALL	54.53	1	54.53	17.96	.00
Suppression	19.29	2	9.65	3.18	.04
Memory Load	0.69	1	0.69	0.23	.64
Supp. By Mem	0.82	2	0.41	0.14	.87
Error	525.14	173	3.04		
Total	2796.00	180			
Corrected Total	604.98	179			

Appendix I, continued

Table 50. ANCOVA for NEG.

Source	Sum of Squares	df	Mean Squares	F Ratio	F Prob.
Corrected Model	71.49	6	11.91	5.50	.00
Intercept	91.13	1	91.13	42.07	.00
WAISRECALL	57.39	1	57.39	26.50	.00
Suppression	3.89	2	1.95	0.90	.41
Memory Load	0.10	1	0.10	0.05	.83
Supp. By Mem	9.04	2	4.52	2.09	.13
Error	374.71	173	2.17		
Total	1753.00	180			
Corrected Total	446.19	179			

Table 51. ANOVA for PL-NEG.

Source	Sum of Squares	df	Mean Squares	F Ratio	F Prob.
Corrected Model	20.69	5	4.14	1.36	.24
Intercept	113.61	1	113.61	37.25	.00
Suppression	12.08	2	6.04	1.98	.14
Memory Load	0.27	1	0.27	0.09	.77
Supp. By Mem	8.34	2	4.17	1.37	.26
Error	530.70	174	3.05		
Total	665.00	180			
Corrected Total	551.39	179			

Appendix I, continued

Table 52. ANOVA for Intrusions During Suppression Period.

Source	Sum of Squares	df	Mean Squares	F Ratio	F Prob.
Corrected Model	23.10	5	4.62	3.66	.00
Intercept	790.36	1	790.36	626.41	.00
Suppression	14.72	2	7.36	5.84	.00
Memory Load	7.19	1	7.19	5.70	.02
Supp. By Mem	1.19	2	0.59	0.47	.63
Error	219.54	174	1.26		
Total	1033.00	180			
Corrected Total	242.64	179			

Table 53. ANOVA for Final Mood.

Source	Sum of Squares	df	Mean Squares	F Ratio	F Prob.
Corrected Model	259.96	6	43.32	2.04	.06
Intercept	7910.51	1	7910.51	371.76	.00
WAISRECALL	106.36	1	106.36	5.00	.03
Suppression	34.97	2	17.49	0.82	.44
Memory Load	8.47	1	8.47	0.40	.53
Supp. By Mem	70.82	2	35.41	1.66	.19
Error	3681.24	173	21.28		
Total	11782.00	180			
Corrected Total	3941.20	179			

APPENDIX J

PAIRWISE COMPARISONS FOR PL-NG OF THE HIGH DIGIT SYMBOL SAMPLE

Inspection of the plot in Figure 1 (see page 31) suggests that memory load may differentially effect PL-NG depending on the type of suppression. In order to test this hypothesis, the following simple effects were tested using independent t-tests: one vs. three, one vs. five, three vs. five, two vs. four, four vs. six, and two vs. six. Each level between .05 and .10 will be discussed as a trend in need of further replication. Please see Table 54 for a summary of the results from these comparisons.

Table 54. Pairwise Comparisons for Differences in PL-NG.

Comparisons	Mean Differences	df	t	p
1 vs 3	1.05	38	1.86	.07
1 vs 5	0.35	38	0.54	.59
3 vs 5	-0.70	38	-1.35	.19
2 vs 4	-0.04	38	-0.72	.48
2 vs 6	-1.45	38	-2.80	<.01
4 vs 6	-1.05	38	-1.94	.06

The only comparison which was statistically significant showed that the mean of group six was greater than the mean of group two ($p < .01$). However, a trend appeared and suggested that the mean of group six may be greater than the mean of group four

($p = .06$). In summary, low memory load was associated with greater recall of positive adjectives in relation to negative adjectives only when neutral material was being suppressed.

Testing the relationship between high memory load and the types of suppression yielded no statistically significant results (all p's $> .19$) . However, a trend was noted suggesting that the mean of group one may be larger than the mean of group three ($p = .07$).

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