Abstract

BRATTON, KEVIN M. Suppression of Negative Experiences: Cognitive Cost

(Under the direction of Katherine W. Klein.)

 The purpose of this research was to examine the relationship between suppression of different types of intrusive thoughts and performance on an attentional processing task. Participants were randomly assigned to suppress either a neutral, a non-personal negative, or a personally relevant negative experience. The study was a 3 X 3 experimental design with target thought as a between groups variable and task difficulty (low, medium, and hard) as a within participants variable. Participants completed a sentence verification task as they continued to suppress their target thought. Although participants had equal success at suppressing the different thoughts, most experienced some intrusive thoughts. The negative experience conditions slowed on the sentence task compared to those in the neutral condition. Higher levels of intrusive and avoidant thinking about the experiences were found in the two negative experience conditions compared to the neutral condition. Higher levels of intrusiveness were associated with more suppression failures during the Silly Sentences task. Findings are discussed in terms of Wegner's Ironic Processing model.

Suppression of Negative Experiences: Cognitive Cost

by

KEVIN MICHAEL BRATTON

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Committee Chair

BIOGRAPHY

Kevin Bratton was born in Champagne-Urbana, Illinois on August 12, 1969. He graduated from Northmont Senior High School in 1987 and entered the University of Toledo in the fall of 1995. He graduated in 1999 with a Bachelor of Arts in Psychology.

Realizing his enjoyment of research, he entered the graduate program in Social Psychology at North Carolina State University in the fall of 2000. Since then, he has been active in research and teaching Social Psychology in the undergraduate program.

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This research has been a lengthy collaborative experience including many faculty, graduate, and undergraduate students. There have been a number of people who assisted in developing the design, collecting the data, and statistical analyzing the results. This research is a product of these very talented individuals and I wish to express my gratitude.

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I would like to thank Dr. Lynne Baker-Ward for also always seeming to make time for me when I would drop by. I spoke with her early in my graduate career about my research and she showed great interest. She continually encouraged me in my research, and this was very welcome.

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Researchers have been studying unwanted intrusive thoughts for years. Reports of these unwanted thoughts have been found in numerous populations ranging from healthy well-adjusted groups to those with the most severe forms of mental illness. These unwanted thoughts about stressful events are numerous and occur in many settings. Fear of being dismissed from a job, memories of a bad automobile accident, arguments with a spouse, and worries about health break into consciousness daily. They may occur while at work or church, during playtime or reading, or when one is attempting to go to sleep. People generally do not want to think about stressful events and they try not to do so. They may try to replace the unwanted thought, distract themselves with some task, or use drugs or alcohol to impair normal thought processes. Regardless of their strategy, mental energy is required to hold these thoughts out of consciousness. If people are successful, suppression prevails. If they are not successful, these unwanted thoughts break through to consciousness. Because this loss of mental control is often experienced as distressing and taxing, studying unwanted thoughts may have many possible applications. The purpose of the research conducted here was to examine the cognitive costs of suppressing various kinds of personal experiences. I also wanted to examine the relationship between the ease of suppressing these differing events and the level of intrusiveness these events produce in peoples' everyday lives.

Intrusive thoughts

First I will present some literature on intrusive thoughts. There have been numerous studies examining these topics, (e.g., Primo, Compas, Oppedisano, Howell, Epping, & Krag, 2000; Wroe, Salkovskis, & Richards, 2000; Purdon, 1999; Schooler,

Dougall, & Baum, 1999). Researchers have used the frequency and the magnitude of intrusive thoughts to study the severity of numerous psychological illnesses. For example, individuals who show high patterns of avoidance at diagnosis for breast cancer tend to have more intrusive thoughts (Primo et al., 2000). Additional research has found that individuals who have a tendency to have more intrusive thoughts have more sleep complaints (Hall, Buysse, Nowell, Nofzinger, Houck, Reynolds, & Kupfer, 2000). So the sheer number of intrusive thoughts is related to overall mental health.

The interpretations of these unwanted thoughts have also been considered. Obsessive Compulsive Disorder sufferers report more frequent intrusive thoughts and higher irrational interpretations of those thoughts (Yao, Cottraux, & Martin, 1999). Schizophrenic patients who experienced auditory hallucinations had more intrusive thoughts and found their intrusive thoughts more upsetting and unacceptable than did psychiatric controls and non-patient controls (Morrison & Baker, 2000).

Intrusive thoughts have been linked with stressful events. Hall et al. (2000) stated that, "Stress is defined as the interaction between the tendency to experience stress-related intrusive thoughts and the number of recent stressful events" (p. 227). In clinical studies, exposure to highly stressful situations has an effect on the number of intrusive thoughts and long-term symptomology. Tallis (1999) found that intrusive thoughts are associated with a history of actual or perceived trauma. Schooler, Dougall, & Baum (1999) note that, "Intrusive thoughts have been identified as key elements of chronic or traumatic stress," in rescue workers after a plane crash (p. 571).

Intrusive thoughts have been examined in regard to gender differences in strategies to inhibit unwanted thoughts. Self-reports suggested that women were more successful at replacing and suppressing intrusive thoughts, and experience positive outcomes from using both strategies, while men were not successful with either strategy (Borton, 1998).

In summary, intrusive thoughts have been linked with the severity of numerous psychological illnesses, sleep complaints, actual or perceived trauma, and long-term symptoms of stress. Although most research has examined the relationship between intrusive thinking and health disorders, there is also evidence that intrusive thoughts produce a draw on working memory capacity.

Working memory

A model of working memory function that I will use is the one proposed by Baddeley and Hitch. Their model contains three integrated components. These components include a central executive function and two sister systems, the visuospatial sketchpad and the articulatory loop (often called the phonological loop). The visuospatial sketchpad is a short-term memory store for visual images. The articulatory loop is a short-term memory store for speech. The central executive function is responsible for supervising the two dependent systems, integrating information from numerous sources, and involves the control of attention (Baddeley, 1986). It is important to note here that all three components have a finite amount of energy resources. The central executive function decides where and how much of the resources will be allocated. While attempting to satisfy needs in one area, the central executive may have to temporarily

deprive another. Why intrusive thoughts occur can be explained by the premise of limited resources. When resources run low, an individual should be more likely to experience intrusive thoughts, or performance on other cognitive tasks should suffer.

Teasdale, Dritschel, Taylor, Proctor, Lloyd, Nimmo-Smith, & Baddeley (1995) conducted one of the first experiments showing that task-irrelevant thoughts compete with on-task thoughts for scarce working memory resources. Teasdale et al. (1995) coined the term, "Stimulus Independent Thoughts (S.I.T.'s)" to describe "Streams of thoughts and images unrelated to immediate sensory input" (p. 551). Participants in their research were asked to report what they were thinking about while performing tasks that tapped various aspects of the working memory system. Teasdale et al found that production of S. I. T's declined as task demands on the central executive increased. While the evidence from their experiments supported the hypothesis that the central executive function is responsible for the production of S.I.T.'s, Teasdale et al. did not examine the costs of suppressing unwanted thoughts, their content, or whether the S.I.T.'s were related to stressful events.

Individuals differ in their ability to control their attention in the face of distraction. This ability is called working memory capacity. Working memory capacity has been linked to a person's ability to inhibit simple words and nonsense syllables in laboratory studies (Rosen & Engle, 1998). There is recent evidence that people with more intrusive thoughts have lower working memory capacity (Klein & Boals, 2001a). Participants who performed poorly on a standard working memory task reported having more intrusive thoughts about stressful life experiences. Furthermore, reducing these

intrusive thoughts improves working memory (Klein & Boals, 2001b). Asking people to write about these stressful experiences produced "sizable and lasting improvements in working memory resources" (p. 530). Expressive writing also produced a decline in avoidant and intrusive thoughts, especially for those who wrote about a negative experience. There is growing evidence that intrusive thoughts about stressful events do compete with other tasks for working memory resources.

Wegner's (1994) ironic processing model

The present research is designed to examine the effects of suppressing such thoughts while performing other tasks. How unwanted thoughts are suppressed is the focus of Wegner's (1994) ironic processing model. Wegner proposed that suppression of unwanted thoughts was a result of two complementary processes (Wegner, 1994). These processes were, "An operating process that promotes the intended change by searching for mental contents consistent with the intended state, and a monitoring process that tests whether the operating process is needed by searching for mental contents that are inconsistent with the intended state" (p. 35). Wegner's theory of "Ironic Processes of Mental Control" (1994) holds that, "processes that undermine intentional control of mental states are inherent in the very exercise of such control" (p. 35). So if an individual were trying to feel optimistic, the operating process would search for mental contents that would yield the desired state, and an ironic monitoring process would search for mental contents that would not yield the desired state. Now if the monitor finds thoughts about being pessimistic, it will run the operating process again to provide a controlled distracter. The mind is sensitive to the fact that the operating process has been reinitiated,

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and then remembers the qualifications for the operating process. The monitoring process then thinks about the fact that it does not want to think about being pessimistic which initiates a stream of thoughts associated with pessimism. So the monitoring device may not only seek out mental contents that contain pessimism, but may also create them.

Wegner found that when people are asked to think about something neutral (a white bear), and then told not to think of the white bear, they were generally unable to suppress the white bear completely. The ironic monitoring device seemed efficient at finding cues that would elicit the white bear, and would re-initiate the operating system to find a controlled distracter. The mind realizes the operating system has been re-booted and the white bear surfaces into consciousness. Wegner called the paradoxical effect of suppression a rebound effect. So it is this monitoring process that constantly reminds one of what one does not want to think about. Ironically, according to this processing model, the only way to reduce these counter-intentional thoughts is to decease attempting to control them.

A study by Wegner, Schneider, Carter, and White (1987) attempted to investigate the rebound effect. After practicing how to report their stream of consciousness, participants were instructed to either express or suppress a white bear for five minutes. Next, participants were asked to do the opposite. They were also instructed to ring a bell on the table whenever a white bear came to mind in both express and suppress conditions. While the number of thoughts about a white bear were more prevalent in the expression condition, tokens of thought were more frequent in the expression period following initial suppression than in the initial expression period. A

similar effect was not found in the suppression period following initial expression. They concluded that initial suppression appears to produce a rebound effect. A negative cue hypothesis was developed to explain this phenomenon. The negative cue hypothesis suggests that thinking without focus is difficult and proposes that participants attempt to distract themselves by using cues in the environment. However, in the following expression period, these negative cues constantly remind one of what was previously forbidden to think about. Wegner et al.'s (1987) second study investigated the possibility of this negative cueing hypothesis.

The design of the second study was exactly the same as the first with the addition of a third condition: a focused distraction condition in which participants were asked to distract themselves during initial suppression with a single cue, a red Volkswagen. Results showed that while white bear thoughts were not significantly reduced during suppression in the focused-distracter group, the mean number of occurrences during expression was reliably lower in the focused-distracter group than in the initial suppression group. These results imply a tendency for the rebound effect to disappear when initial suppression is engaged with a single focused-distracter. It is also important to note here that the mean number of thought occurrences of a white bear in the initial suppression group without a focused-distracter was significantly greater than the mean for the initial expression group. Thus the findings support a rebound effect. So while using a focused-distracter does not appear to be useful for suppression, it does appear to ameliorate the rebound effect.

Hyperaccessability

In another study, Wegner, and Erber (1992) investigated a mechanical process that occurs during thought suppression. They believed that "during thought suppression, the thought we try to eliminate from attention remains remarkably near the surface and ready to return to consciousness with minimal prompting" (p. 903). They termed this phenomenon a state of "hyperaccessability". Wegner & Erber (1992) stated that the concept of hyperaccessability suggests that suppression could render the thought "even more accessible than it is during intentional concentration on the thought under similar conditions" (p. 907). For five minutes participants were asked to either concentrate on or suppress a target thought (house, child, mountain, or car). After the five-minute period, the experimenter asked the participants to continue to concentrate on or suppress their assigned target while performing another concurrent task. The task involved listening to a list of words from a tape recorder and generating a word associate for each. In some trials participants had ten seconds to respond (low time pressure) and in other trials they had only three seconds (high time pressure) to generate a word associate. Of the sixteen tape-recorded prompts, four were closely related to the target thought (for house: home, door, brick, and roof). These prompts were the non-target prompts for child. The target prompts for child were mother, little, adult, and young. These were the non-target prompts for house. The other eight prompts were unrelated. The primary dependent measure was the number of prompted responses per trial. For target prompted trials, this was the occurrence of the thought they were trying to suppress or concentrate on. For non-target prompted trials, this was the occurrence of the comparison word for which the participant

had been given no instructions. Results showed a significant three-way interaction between instruction (suppression vs. concentration), prompted words (target vs. non-target), and time pressure (low vs. high). Under high time pressure participants who were suppressing the target responded to target prompts with the target more often than did participants concentrating on the target. Interestingly, under low time pressure, the difference was reversed. Participants suppressing the target responded to the target prompts with the target word less often than those who were concentrating on the target. In short, the results reveal that people suppressing the target under high time pressure whom were prompted to give the target response, tended to give it more often than people consciously attempting to concentrate on the target, or for people suppressing but responding with low time pressure. So under time pressure, people found themselves giving the very word they were to be suppressing as the word associate. These findings support the hyperaccessability hypothesis.

The researchers thought that the low time pressure condition might have induced a leisurely pace, giving participants time to make strategic replacements. To eliminate the strategic response possibility, Wegner and Erber completed another study using a version of the Stroop (1935) color-word interference paradigm. In the second study, participants were again asked to either concentrate on or suppress one of the four target words from the first study. During the task they performed a two-color Stroop reaction time task. Half the participants did these tasks while rehearsing a one-digit number and the other half a nine-digit number. After practicing the Stroop task, they were given their number to commit to memory. After the participants had memorized the number, they were

instructed to continue to concentrate on or suppress their target word and to begin the Stroop task. Results showed a significant main effect for cognitive load showing that participants responded with the colors of all words slower when in the high load than in the low load condition. Instruction also had a significant main effect revealing that participants were slower to indicate colors when suppressing than when concentrating. For participants suppressing under high cognitive load, reaction time was reliably greater for target words than non-target words. These results suggest that when under cognitive load, the suppressed thought becomes more rather than less accessible to consciousness. Again, cognitive load seems to attenuate individuals' ability to suppress, as if they are just running short of cognitive resources. The draining of these resources causes participants to say the word they are trying to suppress. Therefore, the availability of the target word produced by suppression is even greater than the availability produced by consciously concentrating on it. Suppression may be successful as long as there are adequate cognitive resources to find a distracter. With the addition of cognitive load or other kind of stressor, the controlled distracter search is undermined. One is actually distracted from looking for distracters, and suppression is difficult or impossible.

In 1993, Wegner, Erber, and Zanakos examined the ironic processes paradigm in relation to mood control and mood related thoughts. The study included an examination of the content of the thought to be suppressed. Participants were first instructed to practice writing down their stream of consciousness for three minutes. Participants were then either instructed to think back to a sad or happy event in their life. They were asked to try to visualize it as clearly as possible. Mood control instructions were given next.

Participants were randomly assigned to a positive, negative, or no instruction condition. They were asked not to feel sad, to feel the sadness you felt at the time of the event, or no instructions at all. Some participants were placed in a condition of cognitive load by asking them to remember a nine-digit number. The participants were instructed to think back to their target event and continue the mood instructions while they wrote their stream of consciousness for seven minutes. When the time was up the experimenter asked them to rate their mood using ten adjectives. Results showed a strong main effect for the mood to be controlled. The mean rated happy mood was much lower for a sad event than for a happy event. There was also a main effect of instruction suggesting overall mood controlling effectiveness. A significant interaction between cognitive load and mood instruction was also found. These findings qualify the previous findings that mood control was only effective for those not under cognitive load. With no load, the negative mood instruction produced less happiness than no instruction, and the positive mood instruction produced more happiness than no instruction. With load, however, neither instruction differed from the no instruction group. Once again, cognitive load undermined the attempt to control thought.

There was no evidence of an ironic effect however, as there was not a tendency to experience the polar opposite of the desired mood. The researchers decided to see if the way the instructions were framed could have hidden any ironic effects present. Wegner, Erber & Zanakos (1993) proposed that, "instructions emphasizing not having a mood should produce slightly stronger ironic effects under load than instructions that emphasize having a mood" (p. 1102). They re-analyzed the data and found that

participants suppressing a mood had less control under load than without load. Participants generating a mood had only slightly less control under load compared to those without load. These results suggest that without load mood control can be effective, but with a cognitive load, significant ironic reversals are produced.

In the second part of the study, Wegner et al. (1993) used an indirect technique to measure the ironic effects of suppression. Participants were asked to think about a past success or failure and write about it for five minutes. Participants were then asked to write their stream of consciousness for a five-minute period with instructions to either try to think about their success or failure or try to stop thinking about their success or failure. They were also instructed to make check marks by the stream of consciousness when the thought came to mind. After this period, all participants were asked to begin a computer task. During each trial a number would appear and need to be remembered, and then a word would appear printed in either red or blue. The words were either of a success, failure, or neutral nature. They then were instructed to press the corresponding key on the keyboard that went with the colors and to then repeat the number. After a short practice session, the experimenter told them to begin the task and to remember to continue to think about or try not to think about their personal success or failure. Results show that suppression participants reported target thoughts less often than did the concentration participants. Without load, mental control was effective. A significant main effect was observed for cognitive load revealing that participants under load responded with the colors of all words more slowly than those not under load. Interestingly, a reliable interaction between load, instruction, and target relevance of the word was found. The

pattern of the means is what one would expect to find if cognitive load influences the accessibility in the opposite direction of intended control. Under cognitive load, participants concentrating on a success or failure showed faster reaction times for naming colors of target relevant words than for non-target relevant words. Trying to concentrate on success or failure under load makes that success or failure less accessible than other irrelevant thoughts. Participants attempting to suppress thoughts of a success or failure under high cognitive load named target relevant word colors more slowly than target irrelevant word colors. These results suggest that suppression of a success or failure under cognitive load makes that success or failure more accessible than other irrelevant thoughts.

In contrast to the rebound effect found in the studies discussed, Kelley and Kahn (1994) did not find evidence of a rebound effect for personally relevant material. In their experiment, participants first practiced free writing for five minutes. They were then asked to either think of their most pleasant or unpleasant frequently occurring intrusive thought and to visualize an image of that thought. Participants were then instructed to write their thoughts for nine minutes, with half being asked to try not to think about the image and half being told to try to keep image and thoughts in mind and to make check marks on the margin when the thought came to mind. Next, the participants were asked to write for another nine minutes with the instructions reversed. They then filled out an Intrusive Thoughts Questionnaire (Edwards & Dickerson, 1987). Results showed that participants made significantly more check marks during expression than during suppression. It is important to note here that as in the other studies participants were

attempting to follow directions, but were not totally successful at suppression. An interaction qualifies this finding. Participants in the initial expression period made significantly more check marks during expression than did participants in the initial suppression period, though they did not differ in the number of check marks made during the suppression period. These findings suggest that suppression seemed to diminish subsequent expression of intrusive thoughts, indicating a reverse-rebound effect. Moreover, participants in the unpleasant condition made fewer check marks during the expression period than the participants in the pleasant condition. However, again there was no difference in the number of checks during the suppression period. These results suggest that the rebound effect observed for neutral, concrete images may not be generalizable to people's own intrusive thoughts.

In a follow up study Kelley and Kahn (1994) attempted to replicate this finding by comparing personal intrusive thoughts with the white bear. The procedure was the same as the previous study except participants either thought of their most frequently occurring intrusive thought or a white bear. For the suppression period, participants in the white bear condition made reliably more check marks, implying that it is more difficult to suppress a white bear than personal intrusive thoughts. In the expression period there was a main effect for type of thought. Again participants in the white bear condition made significantly more check marks than did the personal intrusive condition. The white bear condition results showed participants in the initial suppression group made more check marks during the expression period than did participants in the initial expression group. For the personal intrusive thought condition, there was no significant difference between

the numbers of check marks made by the initial suppression and expression groups. These results suggest that a rebound effect occurs with thoughts of a white bear, but not with personal intrusive thoughts. The researchers offer a distracter explanation for the lack of a rebound effect. They analyzed the writings and found that participants suppressing the white bear used distracters in the immediate environment, whereas those suppressing personal relevant intrusive thoughts used distracters outside the immediate context.

Purdon and Clark (2001) conducted an experiment to examine the relationship between suppression of obsessional thoughts and mood. They had participants monitor a target stimulus about either a neutral thought, an emotionally relevant positive thought, or an obsessional thought across two, six minute time periods. In the first period, half of the participants were instructed to suppress their target, and the other half were instructed not to suppress any thought. In the second period, all participants were instructed not to suppress any thought. To keep participants focused on the experiment, they were asked to perform a simple vigilance task by pressing the spacebar on a computer keyboard whenever a letter appeared on the monitor. Results showed no paradoxical effect of suppression on frequency of any type of target thought. Purdon and Clark (2001) proposed that "suppression of cognitions, regardless of their content or valence, appears to interfere with the natural decline, or habituation of thoughts" (p. 1177), and that "suppression of obsessional, but not positive or neutral thoughts resulted in higher levels of self-reported discomfort" (p. 1175). It is important to note here that the vigilance task was very easy. Previous research has shown that paradoxical effects are more likely when

participants are under cognitive load. It is the load that drains mental resources and produces the suppression effects. Therefore, without load, Purdon and Clark's task might not have been sensitive enough to find any differences in suppression related effects.

Why suppression leads to a rebound effect in some contexts but not in others has been the focus of much speculation. In a review of the literature examining the suppression of unwanted intrusive thoughts, Clark & Purdon (1995) point out that, "Most research on unwanted intrusive thoughts has not been clear on content, preferring instead to define the construct in terms of process characteristics alone. The result has been the development of intrusive thought measures that cut across a variety of negative thought content domains resulting in instruments with low discriminant validity" (p. 969). One issue of concern is how intrusive thoughts are reported. Clark and Purdon suggest that to reduce self-reporting biases, researchers should use information-processing dependent measures to investigate the presence of unwanted thoughts in addition to self-report data.

In a recent essay on thought suppression and psychopathology, Purdon and Clark (1999) address other reasons for inconsistent findings regarding the effects of suppression. First, novel laboratory settings may provide ample external cues for distraction compared to the internal cues such as thought replacement, that individuals might use in naturalistic settings. Second there is evidence that a rebound may only occur in the contexts where there have been previous suppression attempts (Kelly & Kahn, 1994). Third, the motivation to suppress may vary according to the nature of the emotionally relevant material, and the emotional thought recurrences may be quite different (Salkovskis & Campbell, 1994). There may be little need for thought

suppression for non-emotional thoughts because the motivation is externally imposed. Because suppression of personal emotional thoughts may be internally motivated, it may be more appropriate to have participants choose their experiences to suppress instead of the experimenter. Reynolds & Salkovskis (1992) found that negative and positive intrusions were different. These results imply that positive and negative intrusive thoughts may have different relationships. Purdon argued that, "studies investigating specific types of emotionally relevant thoughts may have limited generalizability to other kinds of negative, emotionally relevant thoughts" (p. 1051).

Suppression may require working memory resources

The controversy over the rebound effect notwithstanding, there is another aspect of thought suppression that has received little investigation. In addition to its paradoxical effect, suppression may require working memory resources. The diversion of these attentional resources may affect other information processing tasks. I have already reviewed the experiments by Wegner, Erber & Zanakos (1993) in which performance on a Stroop task was slowed under cognitive load when the stimulus word was related to an experience participants were suppressing. Another example of the effects of suppression on other tasks can be seen in Hodges and Wegner (1997) study in which participants were asked to assume or reject the perspective of another person. Participants read a story in which two boys play in a house that is described in detail. The experimental conditions included either thinking like a burglar or not thinking like a burglar. Without load, the think like group recalled more burglar relevant information. When under cognitive load, the suppression group recalled more burglar relevant information than did the

suppression group without load. In another experiment involving memory, Wegner, Quillian and Houston, (1996) predicted that one effect of suppression is the disruption of episodic memory for extended event sequences. They gave participants instructions to suppress or actively think about a film about a coal miners' strike that had a clear beginning, middle and end. Five hours later, participants asked to suppress thoughts about the film were less accurate in recalling the sequence of events depicted in the film compared to participants told to think about the tape or a control group given no instructions.

The primary motivation for the use of these cognitive measures appears to be in response to the need to overcome self-report problems. Wenzlaff and Wegner (2000) suggest using measures of automatic cognitive processes such as "Stroop interference, sentence completion, word completion, sentence unscrambling and silly sentences. These measures can be made of processes that the participants are unaware of, processes that occur before the participant is able to establish conscious control, or ones that occur when cognitive resources are diverted from attempts at conscious control." (p. 74). As yet, there has been little if any attention paid to the idea that if suppression affects cognitive processing, these effects in themselves can have important implications. Several recent experiments are directly relevant to the research proposed here.

In a study by Harvey & Bryant (1999) participants were shown either a neutral film or a distressing film immediately after completing an anxiety scale. The participants were also randomly assigned to either a suppression condition or a 'think anything' condition for three minutes. Participants were instructed that if the film did come to mind

to press a button with their dominant hand. In the second period, participants were instructed to read a word that flashed on a computer screen and to decide as quickly as possible whether what they saw was an animate or inanimate word by pushing a button taped to a desk nearby. Attempted suppression of film-related thoughts caused a delayed increase in film-related thoughts in a following expression period for the low-anxious participants only. The rebound effect is consistent with ironic control theory. However, high-anxious participants did not exhibit the rebound effect. Highly anxious participants may have engaged in defensive suppression, which may have reduced the rebound effect. There were no effects of the suppression manipulation on the word identification task.

Impact of suppression on cognitive processing

Beavers & Scott (2001) also examined the impact of suppression on cognitive processing. They asked participants to write a stream of consciousness about college life and romantic relationships; both of which contain positive and negative experiences. In a following period, participants were randomly assigned to a suppression or expression condition. Those in the suppression condition did show a significant increase in mood compared to those in the expression condition. However, those in the suppression condition used significantly fewer causal words in their stream of consciousness in the final period suggesting that cognitive processing had been compromised.

Working memory capacity and suppression

Finally, Brewin & Beaton (2001) examined the relationship between individual differences in working memory capacity and suppression. Wegner's white bear design was used in three five-minute periods. The first period involved the participants'

reporting their stream of consciousness. The second period required the suppression of a white bear. Participants were asked to ring a bell if the white bear came to mind. In the final period, participants were asked to think of a white bear and to ring a bell if it came to mind. At the end of expression period, participants were asked to complete questionnaires assessing their working memory capacity, fluid intelligence, and crystallized intelligence. Results showed that successful suppression was strongly related to higher working memory capacity and fluid intelligence. Brewin's findings suggest that working memory resources are indeed implicated in the suppression process.

The present research hopes to use theory and previous findings to enhance the body of knowledge available concerning intrusive and unwanted thoughts. The experiment was designed from a broader perspective than some of the literature cited here. Many of the studies cited examine intrusive thoughts and suppression use within specific populations such as sufferers of obsessive-compulsive disorder, generalized anxiety disorder, phobic disorders, and schizophrenia. I will use participants drawn from a non-clinical population. Most research in this area also emphasizes the rebound effect initially proposed by Wegner. The rebound effect is not of direct importance here, as I am more concerned with indirectly measuring the cost of suppressing these different types of thoughts. Finally, much of the previous research has involved neutral concrete images (e.g. white bears, houses). The research proposed here is designed to examine the differential costs of suppressing a neutral, a non-personal negative, and a personal negative experience. The cost of suppression will be assessed with response times to an

attentional processing task. I will also examine the relationship between self-reports of the intrusiveness of the stimuli and the reaction time to the task.

In preparation for the experiment I have conducted three pilot studies to verify that the design I will use is appropriate for the questions I pose. In the first study I examined people's abilities to suppress memories of personal and non-personal events. In the second study, I pre-tested a set of experimental stimuli designed to entail varying degrees of cognitive load. In the third study, I further refined the experimental stimuli and explored the nature of the experiences people recall when asked for memories of personal and non-personal experiences.

Pilot study #1

The first pilot study examined whether people are able to suppress personal and non-personal negative events as well as they can suppress a neutral thought. I hypothesized that the number of suppression failures would be the same for all three stimulus conditions: a red Volkswagen, the Columbine school shooting incident, and a personal negative event.

Participants

The study included 24 students from an introductory to Psychology class at North Carolina State University. The students received research credits for being involved in the study.

Materials

The materials used in the study were a personal computer, a stopwatch, and a hand-held clicker.

Procedure

Participants were brought into the laboratory and were asked to complete an informed consent form. They were then asked to think and write about the Statue of Liberty for one minute. They were instructed to write down as many details and thoughts that came to mind when they thought about the Statue of Liberty.

After one minute, the participants were asked to fold their papers in half and place them under a computer mouse pad. The participants were then asked to try to NOT think about the Statue of Liberty for one minute. They were instructed that if the Statue of Liberty or any of the details or associated thoughts did come to mind, they were to press a hand-held clicker with their left hand. The experimenter then recorded the number of suppression failures. Participants were then instructed to complete a brief computer task. Next, the participants were randomly assigned to one of three target stimulus conditions: a red Volkswagen, the Columbine shooting incident, or a personal negative event they had experienced in the last six months. In the latter condition, participants picked their own stimulus. Again the participants were asked to think and write about their stimulus for one minute. After the time period, the participants were again asked to fold their paper in half and place them under a computer mouse pad. As before, the participants were then instructed to try not to think about their stimulus for one minute. They were instructed that, if the stimulus or any of the details or associated thoughts came to mind, they were to press a hand-held clicker with their left hand. The experimenter then recorded the number of suppression failures. Participants were de-briefed and thanked for their participation.

Results

Number of suppression failures during the one-minute suppression period was analyzed between stimulus conditions. No significant differences were found in suppression failures between the red Volkswagen (*M*=2.75), the Columbine shooting incident (*M*=3.125), or the personal negative event (*M*=3.125), F (2,21) = .06 ns. These findings support the hypothesis that people are able to suppress personal negative events and non-personal negative events as well as they can suppress a neutral stimulus. This equivalence is important to demonstrate. If during a response time task, more suppression failures occur, response times will include motor movements to signal the failure as well as the slowing attributable to suppression. If suppression failures are equal, interpretation of response times is more straightforward.

Pilot study #2

The second study was conducted to establish three different levels of cognitive load for the experimental task and to examine whether there were significant differences in reaction times between the three levels. The task is a modified version of the Silly Sentences task (May, Alcock, Robinson, & Mwita, 2001), based on Baddeley et al.'s (1992) Speed and Capacity of Language Processing Test and is described as a "sensitive indicator of environmental stress" (p. 5). The task presents a series of sentences that are obviously true or false, and in the version I have developed, vary in complexity as described below. The task is programmed with "Superlab" and presented on a computer that records response times and whether or not the response is correct. Participants used their dominant hand to press one of two buttons on a response box to indicate whether

they thought the statement is true or false. The sentences within each test phase were randomly ordered for each participant.

In the present experiment, the sentences were constructed (half true and half false) of 1) simple active sentences (easy), participant-verb-object; 2) simple passive sentences (moderate), object-verb-participant; or 3) complex clause sentences (difficult), participant-clause-verb-object. I hypothesized that reaction times would be slowest for the simple active sentences, followed by the simple passive sentences, which in turn would be followed by the complex clause sentences.

Participants

The study included 40 undergraduate students enrolled in an Introduction to Psychology class at North Carolina State University. Students received research credit for their involvement in the study.

Materials

Materials included a personal computer, and the Superlab computer program. The computer program was used to present the sentences and measure response times to the Silly Sentences in milliseconds.

Procedure

Participants were asked to complete an informed consent form. Next, they were seated at the computer and told that sentences in the form of statements would appear on the monitor. They were instructed to read the sentences and decide whether they were true or false. They were to press a blue button on the response pad if the statement was true, and to press a red button on the response pad if the statement was false. The

sentences remained on the screen until the participant pressed one of the buttons. They were given the opportunity to practice six items, two easy, two moderate and two difficult sentences. They then completed the computer task consisting of 30 sentences. There was an even number of easy, moderate, and difficult items. Moreover, within each difficulty level, half the sentences were true and half were false.

Results

Response times to the different Silly Sentences followed the pattern hypothesized. Response times to the easy sentences (M=1745), were faster than reaction times to the moderate sentences (M=2120), which in turn were faster than reaction times to the difficult sentences (M=2660), $F (2,37) = 61.55$ $p<. 0001$. These results confirm that the three levels of sentence difficulty were statistically significantly different.

Pilot #3

In the third experiment I further examined the Silly Sentences constructed and tested in the previous study. In addition, I investigated the type of experiences people would nominate in response to requests for particular types of experiences. In the first pilot study the target stimuli were not consistent. I assigned the stimulus condition for the neutral and non-personally relevant negative experience conditions, whereas participants themselves produced the stimulus for the personally relevant negative condition. The stimuli may have differed in their concreteness and vividness due to this confound. The inconsistencies in stimulus assignment may also have caused differences in how often memories of these experiences intruded into consciousness when they were not wanted.

In this experiment, participants were asked to nominate an experience from their life that fit the description of either a neutral experience, a non-personal negative experience, a personally relevant negative experience that involved sadness or anger, or a personally relevant negative experience that involved shame or guilt. The participants were then asked to complete the Silly Sentences task.

Participants

The study included 42 undergraduate students enrolled in an Introduction to Psychology class at North Carolina State University. Students received research credit for their involvement in the study.

Materials

Materials were the 36 sentences described in the previous experiment.

Procedure

Participants were asked to complete an informed consent form. Next, participants were asked to nominate an experience from their life that fit the description of either a neutral experience, a non-personal negative experience, a personally relevant negative experience that involved sadness or anger, or a personally relevant negative experience that involved shame or guilt. This was used as a between groups variable. Participants then completed the Silly Sentences task.

<div align="center">Results</div>

Three of the 36 sentences did not elicit unanimous agreement regarding the correct response. I modified those sentences as little as possible, while making sure that there would be no question as to whether the sentence was true or false. For example, the

sentence, "People, who are born in America, are Americans" was changed to "People, who are born in France, are French".

Forty of the participants did nominate an appropriate stimulus for the conditions. One participant stated that he could not think of an experience that involved either guilt or shame. Another participant nominated an experience involving anger even though their condition was shame or guilt.

Current study

The goal of this current study was to investigate the attentional costs associated with the suppression of various kinds of autobiographical memories, using Wegner's directed suppression paradigm. As noted above, much of the experimental research on suppression has involved concrete images. As Wegner, Quillian, and Houston (1994) note, "the traumatic experiences that people might suppress thoughts about are not white bears or concrete nouns, of course, but rather are temporally extended sequences of events with a range of sensory aspects, many personal implications, and multiple forms of potential memory representation" (p. 681).

A second distinction of this current study was its emphasis on concurrent costs of suppression, as opposed to its paradoxical delayed effects. A third distinction was that the experimental task tapped attentional processes, as opposed to explicit memory processes used in several previous experiments.

Similar to much of the experimental work cited in the literature review, the current experiment involved a cognitive load condition. As noted earlier, the rebound effect is more likely to be observed following suppression attempted under a cognitive

load. The cognitive load manipulation in the experiment was the level of sentence difficulty, described in the second pilot study.

The current study was a 3 (stimulus condition) X 3 (sentence difficulty) design with repeated measures on the second factor. In all three conditions, participants produced the stimulus in response to the experimenter's instructions in a counter-balanced fashion. The primary hypotheses involved the effect of thought suppression on response times. Following the administration of the task, participants were asked about the extent to which the thought they suppressed during the experimental session had intruded into their consciousness when they had not wanted to think about it during the previous week.

This current study attempted to examine the differential costs of suppressing different types of experiences. In this experiment, suppression difficulty was indexed by response times (RT) to verify the truthfulness of the Silly Sentences. Sentence level difficulty was used as the cognitive load. First I hypothesized that suppressing negative experiences would require more cognitive resources than suppressing neutral experiences. Second I hypothesized that suppressing a personally relevant negative experience would require more cognitive resources than suppressing a non-personally relevant experience. Third, I hypothesized that there would be an interaction between stimulus condition and sentence difficulty. Response times to the Silly Sentences would be slowest on the most difficult sentences for participants suppressing a personally relevant negative experience. Finally, I hypothesized that intrusiveness and avoidant

levels would be different for each stimulus condition, and that these levels would be related to response times to the Silly Sentences.

<center>Method</center>

Participants

The study included 78 students from an introductory to Psychology class at North Carolina State University. Fifty-three women and twenty-four men participated in the study. One participant's data was not used in the analyses because he answered half of the Silly Sentences incorrectly. Students received research credit for their involvement in the study.

Materials

The materials used in this study included: a personal computer, the Superlab™ computer program for measuring response times and errors to the Silly Sentences, a stopwatch, a hand held clicker, pen and paper, and the Impact of Events Scale (Horowitz, Milner, & Alvarez, 1979). The 36 Silly Sentences were those developed in the second pilot study, and further refined in the third pilot study (See Appendix 3). The Impact of Events Scale (IES) measured reactions to the memories associated with positive and negative stressful life events. The IES consisted of 15 items and asked about the frequency of unwanted intrusive thoughts in the last seven days. Seven questions measured the level of intrusiveness, and eight questions measured the level of avoidant thinking. The response scale range included zero for, "not at all", one for, "rarely", three

for, "sometimes", and five for, "often". The developers report test-retest reliabilities of .89 with internal reliability estimates ranging from .79 to .92. Participants completed the IES (See Appendix 4) in regard to the experience they nominated in the current experiment.

Procedure

Participants were asked to complete an informed consent form. They then were asked to think of a coat rack for three minutes and to write down as many details as they could think of when the word coat rack came to mind. Next, the participants were asked to suppress their target thought for three minutes. They were also instructed that if the word coat rack came to mind or any of the details they were to press a hand-held clicker. Next, they practiced nine Silly Sentences, three of each level of difficulty presented in a random order. The participants were then randomly assigned to nominate a neutral, a non-personally relevant negative, or a personal negative experience. They spent three minutes thinking and writing about their target thought, and then three minutes trying to suppress their target thought. Suppression failures were measured by number of clicks. Participants then completed the Silly Sentences task while continuing to try to suppress their target thought. Again, suppression failures were measured with clicks. Finally, the participant was asked to complete the IES. The participants were then thanked and de-briefed.

Results

Participants nominated a variety of target experiences. Brushing teeth, walking to class, and getting dressed are examples of nominated experiences in the neutral condition. Observing homeless children in Jamaica, the illness of a friend, and the attacks on September eleventh are examples of experiences nominated in the non-personal negative condition. Date abuse, failing a class, and guilt over teasing a classmate are examples of the experiences nominated in the personal negative condition.

I first analyzed gender to see if there were any significant differences in clicks, errors, and response times to the Silly Sentences. Because no differences were found, gender was not analyzed further.

Next I looked at how often participants signaled that they experienced the return of the thought they were trying to suppress. Table 1 shows the means for suppression failures by period and condition. I conducted a repeated measures ANOVA with stimulus condition as a between groups factor on suppression failures across the three suppression periods in the experiment. There was no effect of condition or the interaction of period and condition. Inspection of the means in all three suppression periods shows consistently fewer suppression failures in the personal negative experience condition, but this difference did not approach significance. Suppression period did have an effect, F (2,74)

Table 1

Mean Number of Suppression Failures By Period and Condition

Condition	Practice clicks	Stimulus clicks	Sentence clicks
Neutral	8.24	6.72	2.08
Non-personal	8.31	7.58	3.00
Personal	6.88	5.88	1.42
Total	7.81	6.73	2.17

= 159.96, $p < .001$. Failures were significantly diminished in the third period while participants were performing the Silly Sentences task.

Further analysis of the suppression failures during the Silly Sentences task revealed no significant differences $F(2,74) = 1.082$, $p < .344$. As was predicted, participants were equally able to suppress a neutral, a non-personal negative, and a personal negative experience. This equivalence is important to demonstrate. If during a response time task, more suppression failures occur, response times will include motor movements to signal the failure as well as the slowing attributable to suppression.

The first three hypotheses concerned response times to the Silly Sentences in the three suppression conditions. Before analyzing the response times, I followed the

recommended practice of performing a skew test on the distribution (Tabachnick &
Fidell, 2001). I found a substantial positive skew (5.140) and conducted square root
transformations on the data. The skew was still outside of the recommended range
(3.254) so I conducted a log10 transformation on the raw response times. The
transformation brought the skew into the recommended range (1.160).

A 3 (condition) X 3 (sentence difficulty) repeated measures ANOVA was
conducted on the transformed response times to the Silly Sentences with transformed
practice response times used as a covariate. Table 2 shows the mean transformed
response times to the practice block, the three different sentence difficulty levels, and the
raw data means.

Table 2
 Mean Response Times to the Silly Sentences by Condition (LOG TRANS.)

Condition	Log practice	Log easy	Log medium	Log difficult	Condition Ms
Neutral	3.4469	3.3124	3.4104	3.4826	2708.048
Non-personal	3.4708	3.3284	3.4374	3.5365	2994.808
Personal	3.4557	3.3691	3.4778	3.5583	3075.211
Total Mean	3.4579	3.3370	3.4423	3.5263	2928.853

The first hypothesis was that suppressing negative experiences would require
more cognitive resources than suppressing a neutral experience. Results show that

suppression of both a non-personal negative experience and a personal negative experience caused a differential slowing on the Silly Sentences task compared to those suppressing a neutral experience $F(2,73) = 3.298$, $p < .05$ which provides support for the first hypothesis. The raw data means show that suppression of a non-personally relevant negative experience caused a slowing on the Silly Sentences task equal to approximately one third of a second. Suppression of a personally relevant negative experience caused a slowing equal to approximately four tenths of a second compared to the suppression of a neutral experience. Overall, these results show that suppressing negative experiences caused a differential slowing of approximately 10% on the sentence verification task compared to the suppression of a neutral experience. Interestingly, fourteen of the twenty-six participants in the non-personal negative experience condition nominated the attacks on September 11, 2001. This will be discussed later.

The second hypothesis was that suppressing a personally relevant negative experience would require more cognitive resources that suppressing a non-personally relevant negative experience. While the means followed the predicted pattern, post hoc analysis revealed that there was no significant difference between the two conditions, which does not provide support for the second hypothesis.

The third hypothesis was that there would be an interaction between stimulus condition and sentence level difficulty. A multivariate statistic showed that there was no interaction $F(4,146) = .659$, $p > .05$. The results do not provide support for the third hypothesis.

The last hypothesis was that intrusiveness levels would be different for each stimulus condition, and that these levels may be related to response times to the Silly Sentences. I analyzed Horowitz's Impact of Events Scale (IES), which was scored for an intrusive sub-scale, an avoidant sub-scale and a total. The intrusion sub-scale showed a significant difference between stimulus conditions, $F(2,74) = 5.227$, $p < .008$. Inspection of the means showed a much lower intrusion score for condition 1, $M=11.56$ (neutral experience) than condition 2, $M=15.42$ (non-personal experience) or condition 3, $M=15.08$ (personal experience). There was no difference between the latter two conditions. The avoidant sub-scale approached significance but showed no significant differences $F(2,74) = 3.001$, $p < .056$. The total IES taken together shows a significant difference that mirrors the results for the intrusion sub-scale $F(2,74) = 5.100$, $p < .008$. The results show that negative experiences were perceived as significantly more intrusive, and moderately more avoidant than the neutral experience. However, there were no differences between the personal and non-personal negative experiences. These findings also provide partial support for my last hypothesis. As will be presented in the discussion, this pattern is similar to that found for response times to the Silly Sentences. Table 3 shows the correlations between the IES scales and the transformed response times to the Silly Sentences. There were no significant relationships between

Table 3
Pearson's Correlations Between Horowitz's (1979) Impact of Events Scale and Mean
Transformed Response Times to the Silly Sentences.

	Avoidant	Total	Log Easy	Log Med	Log Diff	M	SD
Intrusive	.637**	.896**	.080	.042	.053	14.05	4.96

Avoidant	.913**	.132	.151	.165	15.67	5.41
Total		.118	.109	.123	29.72	9.39
Log Easy			.784**	.798**		
Log Med				.785**		
Log Diff						

**. Correlation is significant at the 0.01 level (2-tailed).

Horowitz's (1979) Impact of Events Scale and the mean transformed response times to the Silly Sentences. There was, however, a correlation between scores on the IES and suppression failures during the Silly Sentences.

      Table 4 shows the correlation between Horowitz's (IES) and Suppression Failures by period. The stimulus' intrusiveness was significantly positively correlated with suppression failures during the sentence verification task. These results indicate that experiences that are high in intrusiveness are associated with more suppression failures.

Table 4
Pearson's Correlations Between Horowitz's, (1979) Impact of Events Scale and
Suppression Failures by Period

	Avoidant	Total	Practice	Stimulus	Sentence
Intrusive	.637**	.896**	.051	.144	.230*
Avoidant		.913**	-.034	-.030	.080

36

		.007	.059	.168
Total				
Practice			.729**	.640**
Stimulus				.742**
Sentence				

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Discussion

The results of the present research provide support for the hypothesis that suppression of negative experiences causes a differential impairment on a task involving attentional processing. Most research in the self-regulation domain has concentrated on the process and consequences of suppression. The present research highlights the need for consideration of the content of what is to be suppressed or avoided.

In the present study participants were asked to suppress a neutral, a non-personal negative, or a personal negative experience while completing a sentence verification task. Performance on the task was indexed by the time to respond whether a simple sentence was true or false. While all participants were capable of exerting some amount of successful suppression, nearly all reported some thoughts about the experience they were suppressing during the practice suppression period. The results show that people are able to suppress the different types of memories that I used as stimuli. The similarity of the number of suppression failures in the three conditions suggests that when attention can be directed to a single task, suppression, thoughts of even highly stressful personal experiences can be avoided.

There were also no differences in the rates of suppression failures during the experimental task. Thus the response times to the Silly Sentences were not affected by the additional time used for extra motor movements to signal suppression failures.

All participants reported fewer thought intrusions during the task, compared to the practice suppression period, suggesting that the task itself may have provided distracters that made suppression easier.

There was a difference in response time to the sentences as a function of suppression condition. Response times were slower for those suppressing a negative experience, whether personal or non-personal compared to those suppressing a neutral experience.

Interestingly, I found no differences in response times between those who suppressed a personally relevant negative experience or a non-personally relevant negative experience. Response times to the Silly Sentences for these groups were nearly identical. In the present study, the level of hedonic relevance was not a factor involved with the impairment of attentional processing. This may however, have been caused by the fact that over half of the participants in the non-personal negative experience condition nominated the attacks on September 11, 2001. I am not sure if the large number of these experiences accounted for the lack of differences between the two negative experience conditions. The two negative experience conditions could be distinguished by any number of other factors such as: controllability, valence level, or degree of threat inherent in the experience.

Sub-scores and the total scores on Horowitz's IES revealed that intrusiveness and avoidance were highest for those suppressing negative experiences compared to those suppressing a neutral experience. Neither the sub-scores nor the total scores were related to response times to the Silly Sentences task. However, the intrusiveness score was related to the number of suppression failures during the task, but not during the practice suppression periods. Events that were most intrusive outside the laboratory were the most difficult to suppress in the laboratory.

The findings that suppression failures were minimal during the Silly Sentences task but that response times slowed for people suppressing personal experiences speak strongly to the proposition that although people can suppress unwanted thoughts, such suppression has a cognitive cost. To the extent that the Silly Sentences task requires working memory resources to determine their truthfulness and make the appropriate response, the results suggest that suppression may impair performance on other more complex tasks requiring greater infusions of working memory resources.

Why the personal and non-personal conditions did not differ in terms of either response time or levels of intrusiveness is of some interest. The similarity of response time suggests that the memories produced in response to the instructions did not differ in suppression difficulty. It is possible that both types of memories are equally disturbing and thus equally difficult to suppress. It is also possible that the similarities arise from the way I elicited them from the participants. When one is asked to nominate a non-personal or personally relevant negative experience, one's most intrusive thought is most likely to come to mind. If thoughts that are most intrusive are also the most difficult to suppress,

the present data may reflect the method of asking participants to recall a negative experience. One way to determine whether the instructions are responsible for the lack of any differences would be to ask people to recall more than one memory and rate their intrusiveness on the IES before assignment to condition. Memory intrusiveness could then be crossed with memory type (personal or non-personal). I could then examine differences in response times as a function of differences in intrusiveness and different memory type.

Future research should consider examining and refining the experience conditions. It may also be useful to measure individual differences in people's tendency to use suppression.

Although no predictions were made for gender, gender was analyzed. In opposition to Borton (1998), no gender differences were found.

Another null result that deserves further attention is the absence of any effect of sentence complexity on response times. In pilot research, the easy, moderate, and difficult sentences did differ in response times, suggesting that they differed in their requirements for attentional resources. One reason for the lack of differences in the present data may be that more resources were devoted to the suppression effort during the easier sentences while fewer resources were used for suppression during the more difficult sentences. A second reason may be that the differences observed in the pilot study arose from ambiguities regarding the truth of the more complex sentences, thus increasing response times. The removal of these ambiguous sentences in the present experiment may have accounted for the lack of significant differences observed.

For theoretical reasons, it is important to understand the relationship of the Silly Sentences task used here and more traditional working memory tasks. The slowing during the Silly Sentences implies that suppression of negative experiences may have a detrimental effect on other types of concurrent tasks. It would also be interesting to know if people with better working memory capacity were better able to sustain the costs of suppressing negative experiences.

These findings have broad implications for researchers interested in how suppression of stressful events can affect cognitive processing. They also have implications for clinical treatment for those experiencing unwanted intrusive thoughts. The clinical issue of how people perceive and treat psychological disorders often involves the patient practicing suppressing their intrusive thoughts. Due to the ironic nature of thought suppression, the traditional thought stopping technique may need to be reconsidered.

Finally, the research reported here speaks to the current controversy regarding beneficial effects of suppression. Recent research suggests that suppression in some instances can lead to better mental health following traumatic experiences. Ginzburg, Solomon, & Bleich (2003) studied the effects of a repressive coping style on development of PTSD in heart attack victims. Those with repressive coping styles faired better than their counterparts. Seven months later, only 7% of the repressive copers developed PTSD compared to 19% of those with other coping styles. While this may indeed be the case on the affective level, the cognitive costs identified in this experiment have broad implications in the domain of self-regulation and mental well-being.

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APPENDIX 1

INFORMED CONSENT

North Carolina State University

<p style="text-align:center">INFORMED CONSENT FORM   #2420</p>

Suppression of Negative Thoughts: Cognitive Cost

Kevin M.   Katherine Klein Ph.D.

You are invited to participate in a research study. The purpose of this study is to examine the differences between different types of experiences.

INFORMATION
1. Participants will be asked to verify the truthfulness to a number of sentences. They will then think and write about either a neutral, a non-personal, or a personal negative experience. They will then be asked to try to suppress their target thought. Participants will then asked to complete Horowitz's Impact of Events scale.
2. Participants will complete the tasks in about half an hour.

RISKS
None

BENEFITS
This study will increase the body of knowledge involved with intrusive thoughts.

CONFIDENTIALITY
The information in the study records will be kept strictly confidential. Data will be stored securely and will be made available only to persons conducting the study unless you specifically give permission in writing to do otherwise. No reference will be made in oral or written reports which could link you to the study.

COMPENSATION
For participating in this study you will receive one point research credit. **Other ways to earn the same amount of credit are** available from your instructor. **If you withdraw from the study prior to its completion, you will receive full credit.**

EMERGENCY MEDICAL TREATMENT (if applicable)
None

CONTACT
If you have questions at any time about the study or the procedures, you may contact the researcher, Kevin Bratton**, at** Poe 635**, or** [463-5196]**. If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Dr. Matthew Zingraff, Chair of the NCSU IRB for the Use of Human Subjects in Research Committee, Box 7514, NCSU Campus (919/513-1834) or Mr. Matthew Ronning, Assistant Vice Chancellor, Research Administration, Box 7514, NCSU Campus (919/513-2148)**

PARTICIPATION
Your participation in this study is voluntary; you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at any time without penalty and without loss of benefits to which you are otherwise entitled. If you withdraw from the study before data collection is completed your data will be returned to you or destroyed.

CONSENT
I have read and understand the above information. I have received a copy of this form. I agree to participate in this study.

Subject's signature_____ **Date** _____

Investigator's signature_____ **Date** _____

APPENDIX 2

STIMULUS NOMINATION INSTRUCTIONS

Instructions for nomination of experiences

Neutral experience condition:

Please take a few minutes and think back over your life up till now. In your words, describe below an event that you have experienced but which had very little effect on you. Try to think of an event that did not involve any emotions, either positive or negative. The event may be one that happens regularly or can be one that is unusual. You may write as much or as little as you wish.

Non-personal negative experience condition:

Please take a few minutes and think back over your life up till now. In your words, describe below an event that you have experienced that has had a very NEGATIVE effect on you but has not affected you personally. The event may be one that you witnessed, heard about, or saw on television. You may write as much or as little as you wish.

Personal negative experience condition:

Please take a few minutes and think back over your life up till now. In your words, describe below an event that you have experienced that has had a very NEGATIVE effect on you personally. You may write as much or as little as you wish.

APPENDIX 3

SILLY SENTENCES

Silly Sentences

1) Cats have puppies.
2) Bicycles have wheels.
3) Cantaloupes are melons.
4) The night is lit by the sun.
5) Hospitals are filled with sick people.
6) Running is a type of exercise.
7) People who eat meat are vegetarian.
8) Animals that lay eggs are birds. ***
9) People who live in America are Americans. ***
1) Cotton candy is sour.
2) Soup is eaten with a fork.
3) Rocks are soft.
4) Alligators are friendly.
5) Clouds are heavy.
6) Flowers smell nice.
7) Rats have teeth.
8) Parents have children.
9) Babies drink milk.
10) Lions have manes.
11) Curtains are used to cover wood doors.
12) Most basketball players are short.
13) Sunglasses are used at night.
14) Crayons are used to answer tests.
15) Waterfalls are made of cotton.
16) Caterpillars are found in gardens.
17) Pots and pans are used for cooking.
18) Telephones are used to communicate.
19) Swings are found in parks.
20) Books are composed of pages.
21) Bananas that are green are rotten.
22) Couples who have children are childless.
23) Men who are married are bachelors.
24) Children who wear diapers are potty trained.
25) Women who wear wedding rings are single.
26) People who pay mortgages own homes. ***
27) People who educate children are teachers.
28) Cats who have kittens are females.
29) Trees that have needles are pines.
30) Twins who look the same are identical
*** Altered Sentences for Thesis Study:
"People who live in America are Americans." was changed to "People born in France are French."
"Animals that lay eggs are birds." was changed to "Animals that bear live young are mammals."
"People who pay mortgages own homes." was changed to "People who have jobs are employed."

APPENDIX 4

HOROWITZ'S IMPACT OF EVENTS SCALE

Impact of Events Scale

Below is a list of comments made by people after stressful life events. Using the following scale, please indicate how frequently each of these comments were true for you **DURING THE PAST SEVEN DAYS**.

0 Not at all   1 Rarely   3 Sometimes   5 Often

1. I thought about it when I didn't mean to __

2. I avoided letting myself get upset when I thought about it or was reminded of it __

3. I tried to remove it from memory __

4. I had trouble falling asleep or staying asleep because of pictures or thoughts about it that came into my mind __

5. I had waves of strong feelings about it __

6. I had dreams about it __

7. I stayed away from reminders of it __

8. I felt as if it hadn't happened or wasn't real __

9. I tried not to talk about it __

10. Pictures about it popped into my mind __

11. Other things kept making me think about it __

12. I was aware that I still had a lot of feelings about it, but I didn't deal with them __

13. I tried not to think about it __

14. Any reminder brought back feelings about it __

15. My feelings about it were kind of numb __