Thought Suppression ⓐ

Christine Purdon

Summary and Keywords

The idea that suppressing an unwanted thought results in an ironic increase in its frequency is accepted as psychological fact. Wegner's ironic processes model has been applied to understanding the development and persistence of mood, anxiety, and other difficulties. However, results are highly inconsistent and heavily influenced by experimental artifact. There are a substantial number of methodological considerations and issues that may underlie the inconsistent findings in the literature. These include the internal and external validity of the paradigms used to study thought suppression, conceptual issues such as what constitutes a thought, and consideration of participants' history with and motivation to suppress the target thought. Paradigms that study the products of failed suppression, such as facilitated recall and attentional deployment to thought relevant stimuli may have greater validity. It is argued that a shift from conceptualizing the persistence of unwanted thoughts as products of failed suppression and instead as internal threat stimuli may have merit.

Keywords: thought suppression, ironic processes, intrusive thoughts, rebound effect, thought rebound

Introduction

> Think unsexy thoughts, think unsexy thoughts, think unsexy thoughts . . . D'OH!!!"
>
> —Homer Simpson, The Simpsons

The term "thought suppression" is used in reference to any deliberate attempt to get rid of a thought. Interest in thought suppression accelerated in response to Wegner's ironic processes model, which asserts that suppression is quite vulnerable to disruption under conditions of cognitive load and, when it fails, will produce in an ironic increase in thought occurrences. This model has been applied to understanding mood and anxiety difficulties characterized by the repeated recurrence of unwanted thoughts. However, many studies have failed to find an ironic effect of suppression on thought frequency and effect sizes have been small and vulnerable to experimental artifact. Furthermore, adaptive functioning relies on the capacity to inhibit thoughts that disrupt goal-directed behavior, even under conditions of cognitive load. This article describes Wegner's ironic

processes model, reviews methodological and conceptual issues of importance to designing studies and interpreting findings, revisits our accepted understanding of thought suppression, and proposes new directions for future study.

Wegner's Ironic Processes Model

In observing the difficulty individuals have in avoiding thoughts about a habit they are trying to break, Wegner and his colleagues proposed that suppression of unwanted thoughts is not only difficult and unsuccessful but that it will actually backfire, producing a resurgence of unwanted thoughts. In order to test these propositions, Wegner et al. (1987) randomly assigned participants to one of two conditions: (a) an "initial suppression" condition, in which participants were given strict instructions to suppress thoughts about a white bear for an initial five-minute period; or, (b) an "initial expression" group, in which participants were instructed to actively generate white bear thoughts during the initial period. In a second five-minute period the "initial suppression" participants were instructed to express, and the "initial expression" participants were instructed to suppress. Throughout the two periods, participants reported their stream of consciousness by speaking their thoughts aloud into a tape recorder. In addition, they recorded all occurrences of white bear thoughts by ringing a bell. Thus, the original thought suppression paradigm was a 2 (Order of instructions; suppress/express versus express/suppress) by 2 (Interval; first versus second) Latin square design with number of thought occurrences serving as the dependent measure. Stream of consciousness reports were analyzed by two raters who counted the number of white bear (or "target") thoughts in each interval.

Wegner et al. (1987) found that no participant was able to fully suppress white bear thoughts in the suppression condition, whether it occurred in the first or second period. Thought suppression, then, was observed to be both temporary and vulnerable to disruption. Wegner referred to unsuccessful suppression as an "immediate enhancement" effect of suppression efforts. Second, those who had first suppressed had more white bear thoughts during the expression interval than those who had first expressed. Wegner and his colleagues referred to this as the "rebound" effect of suppression. Furthermore, the number of thought occurrences during the expression period increased over time for the initial suppression group, whereas it decreased for those in the initial expression group, which was interpreted to mean that participants who suppressed developed an accelerating tendency to express, whereas initial thought expression lead to habituation.

Finally, target thought occurrences were always preceded by a chosen replacement thought. This latter finding prompted speculation that the observed paradoxical effect of suppression results from the association of the target thought with distracter thoughts that become cues for the target thought. In order to examine this hypothesis, in a second study participants were given the additional instruction to distract themselves from the target thought by replacing it with thoughts about a Volkswagen. Wegner and colleagues found that when the distracter search was restricted to one thought the rebound effect did not occur.

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Wegner et al. (1991) repeated the original study but manipulated the experimental environment across intervals. For some participants, salient contextual cues were present during both the first and second intervals, whereas for others the contextual cues were removed prior to the second session. They found that participants instructed to suppress in Interval 1 had more white bear thoughts during expression (i.e., showed a greater rebound effect) when the salient contextual cues present during suppression were re-introduced, whereas reintroduction of the cues had no effect on thought frequency of those who had previously expressed. This offered further evidence that thoughts "rebound" because of their association with environmental stimuli.

Mood state also appears to affect the nature and availability of potential distracters. Wenzlaff, Wegner, and Roper (1988) predicted that thought suppression efforts will be impaired by use of distracters that are emotionally related to the target thought. They examined depressed and nondepressed participants who were instructed to suppress or not suppress positive and negative thoughts. In a second interval, all participants were instructed to express their target thought. This design is a 2 (Interval 1 instructions) by 2 (target thought valence) by 2 (Interval, within Ss factor) mixed design. As predicted, participants who were depressed had more frequent target thought occurrences; and after the suppression interval, the depressed group experienced more negative (but not positive) thoughts. A series of studies has since found that participants in a dysphoric mood have more difficulty suppressing negative thoughts than participants in a pleasant mood (Conway, Howell, & Giannopoulus, 1991; Howell & Conway, 1992; Reynolds & Salkovskis, 1991; Sutherland, Newman, & Rachman, 1982).

Wenzlaff, Wegner, and Klein (1991) then examined whether or not the rebound effect would be stronger when mood state during suppression was reinstated. Participants underwent a mood induction and were then required to either suppress or express white bear thoughts. After a fifteen-minute interval, a second mood induction was administered in order to either reinstate the same mood as existed in the suppression/expression exercise, or to induce the opposite mood. All participants were then instructed to express the white bear thoughts. The rebound effect was strongest for those whose mood was congruent with the mood induced during suppression. A second study found that expression of thoughts after suppression resulted in a shift to the mood state that existed during suppression, suggesting that mood state influenced the nature of the thoughts that are chosen as distracters. Taken together, these data suggested to Wegner and colleagues that thought control efforts are influenced by the nature of the "to-be-suppressed" thought (i.e., mood-congruent versus incongruent), by the existence of a negative mood state, and by the number, saliency and range of external stimuli available to assist the individual in the search for distracting thoughts.

Wegner (1992, 1994) proposed that two primary processes are involved in the suppression of a thought. He referred to the first process as the "controlled distracter search." This is a deliberate and conscious process that involves: (a) the search for thoughts that are *not* the target thought, and (b) the maintenance of the chosen replacement thought in consciousness. Wegner also argued that the controlled distracter search is essentially un-

focused and will stop at the first available distracter. Each occurrence of the target thought will prompt a search for a new distracter. Thus, stimuli that are salient are more likely to capture attention and serve as distracters. Due to the association between the target thought and distracter thoughts, the success of the controlled distracter search will be influenced by the availability of potentially distracting external and internal stimuli. The second process involved in thought suppression is the "automatic target search" (Wegner, 1992; Wegner & Erber, 1993), which is a nonconscious process instigated to test for failures of the controlled distracter search. It seeks out both the target thought itself as well as "thought traces" and does not cease until suppression is no longer necessary. Once suppression efforts have been initiated the automatic target search begins "scanning" one's consciousness for material that is relevant to the target thought. As various cues become associated with the thought, more and more stimuli become relevant to it. Through this process, the target search actually comes to evoke the thought itself. In a series of studies Page, Locke, and Trio (2005) demonstrated the hyperaccessibility of "to be suppressed" thoughts and that effective reduction of unwanted thoughts relies on availability of material incongruent with emotional state.

Given that the controlled distracter search requires attentional resources, Wegner and Erber (1992) hypothesized that cognitive load—or any tax on working memory—will thwart it. To test this, participants were instructed to suppress specific words while performing a word association task that included words related to the ones participants were to suppress. When participants had to complete the word association task under strict time pressure (i.e., high-demand condition), they were much more likely to respond with the word they had been instructed to suppress than when they were under relaxed (low-demand) conditions. Wegner and Erber (1992) concluded that the controlled distracter search is vulnerable to disruption once attentional resources are taxed. At the same time, the automatic target search will not be similarly disrupted because it is nonconscious.

In summary, Wegner (1992, 1994) asserted that the controlled distracter search: (a) is assisted by the nature and availability of potentially distracting stimuli; (b) draws on the individual's current concerns and consciously accessible items; (c) is essentially unfocused, stopping at the first potential distracter; (d) is more successful when the selected distracter is semantically or affectively distant from the unwanted thought; and, (e) is likely to depend on the individual's ability to internally generate new distracters that are distant from unwanted thoughts. Wegner (2009) concluded that the controlled distracter search and automatic target search operate synchronously most of the time, and thus thought suppression is successful more often than not. Suppression fails under conditions of cognitive load.

Current Status

Since these initial investigations the ironic effect of suppression (or, the "white bear" effect) has been accepted as psychological fact. However, the ironic effect of suppression has not been reliably observed, particularly with respect to suppression of the repetitive, unwanted thoughts characteristic of mood and anxiety disorders (see Purdon, 1999, 2004;

Rassin, Merckelbach, & Muris, 2000). Abramowitz, Tolin, and Street (2001) conducted a meta-analysis of controlled studies of thought suppression, finding a small-to-moderate rebound effect of thought suppression but no immediate enhancement effect of suppression on frequency. However, the effect sizes were heavily influenced by experimental artifact. Studies that used thought expression instructions (i.e., instructions to actively generate the thought) as opposed to "think anything" instructions (i.e., think anything you like, including the target thought) had a greater rebound effect. Studies in which thought frequency was assessed by overt means (e.g., stream of consciousness reporting, ringing a bell when the thought occurred) exhibited a greater rebound effect than studies that used more covert means (e.g., pressing a key when the thought occurs). The rebound effect was stronger for studies in which participants were suppressing thoughts about an entire story rather than suppressing a specific, discrete thought. Finally, Abramowitz et al. (2001) found no difference in the size of the rebound effect whether the target thought was emotionally relevant or neutral, nor was the effect size different across clinical and nonclinical samples. The latter is consistent with Magee, Harden, and Teachman (2012) who conducted a meta-analysis precisely to determine whether the effect sizes are bigger in samples of people with mood and anxiety difficulties, and found no differences.

Methodological Issues

There are a number of important methodological issues that bear on our understanding of thought suppression and the meaning of the observed effects. Purdon (1999, 2004) provided a review of methodological issues and considerations in studying thought suppression, particularly suppression of emotionally relevant thoughts characteristic of OCD. These include: the experimental design used, the emotional relevance of the target thought studied, motivation to suppress the target thought, defining thought occurrences, the nature of the experimental instructions, long-term versus immediate effects of suppression, validity of thought frequency as an index of mental control/thought intrusiveness, and the strategies people use to suppress.

Experimental Design

Wegner et al.'s (1987) original study used a cross-over, or, Latin Square design, as depicted in Table 1.

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Table 1. Wegner et al.'s (1987) Experimental Design		
	Interval 1 Instructions	**Interval 2 Instructions**
Group		
Suppress First	Suppress	Express
Express First	Express	Suppress

The cross-over design is inappropriate if the interaction of time with the between-participants variable is to be interpreted because the interaction confounds time with experimental instruction. As observed by Clark, Ball, and Pape (1991) practice effects cannot be ruled out as causal factors in any observed rebound effect when a cross-over design has been used, nor can ceiling effects. For example, if people express a thought in the first interval they may produce it less during the second (suppression interval) due to habituation or exhaustion, when their counterparts who had previously suppressed are now expressing. Many studies thus use a mix between and within Ss paradigm, as depicted in Table 2.

Table 2. Mixed Between and Within Ss Design		
	Interval 1 Instructions	**Interval 2 Instructions**
Suppress Group	Suppress	Express or Monitor Only or Think Anything or Do Not Suppress
Control Group	Express or Monitor Only or Think Anything or Do Not Suppress	Express or Monitor Only or Think Anything or Do Not Suppress

Of central importance in the use of such a design is that the within-subjects change in thought occurrences across control and suppression conditions is actually assessed. As Merckelbach et al. (1991); Salkovskis and Reynolds (1994); and Trinder and Salkovskis (1994) observed, if suppression results in an *increase* in thought occurrences, the optimal test is to determine whether participants actually experience a *significant increase across time*.

Thought Suppression

In these studies people instructed to suppress did report more thought occurrences during suppression than those who simply monitored their thoughts. However, there was no within-participants increase in thought occurrences following suppression, nor was frequency during suppression negatively correlated with frequency during the subsequent interval. In fact, Salkovskis and Campbell (1994) found strong positive correlations between frequency in each interval, which indicates carry-over effects, an effect that has since been observed by others (e.g., Ju and Lien, 2016; Muris et al., 1997). Some studies have used a pure within-participants design in which all participants suppress and then monitor with no suppression (e.g., Brewin & Beaton, 2002; Brewin & Smart, 2005), but this design does not allow for control of practice effects, or, in the case where the target thought is an emotional thought, habituation. Baeyens (2006) conducted a meta-analysis examining effect sizes for between- versus within-participant comparisons, and found no effect of suppression on frequency, either during or following suppression.

Emotional Relevance of the Target Thought

Studies of the ironic effect of suppression sometimes have participants suppress an emotionally neutral thought, such as a white bear, as in the original study of Wegner et al. (1987). Many studies, though, examine suppression of emotionally relevant thoughts, such as worries, ruminative thoughts, thoughts about traumatic events, obsessional thoughts, among others. The emotional relevance of the thought is an important consideration. Edwards and Dickerson (1987) argued that personally relevant thoughts are more attentionally engaging and therefore will be more difficult to dismiss. To test this, they examined latency to replace a neutral thought with an obsessional thought and vice versa. Consistent with their prediction, latency to replace was longer when participants were instructed to replace an obsessional thought with a neutral thought. Wegner et al. (1990) found that participants who thought about sex showed a significant increase in skin conductance levels (SCL) from baseline whereas those asked to think about less exciting thoughts did not. Meanwhile, those instructed to suppress sex thoughts reported significantly fewer thoughts than those instructed to express but uniquely showed a greater increase in SCL in response to sex-thought occurrence, and in a subsequent study this effect was observed even 30 minutes later. No SCL increases were observed in those instructed to express their thoughts about sex. This suggests that suppression may interfere with extinction of the emotional response but also that suppressing itself is not emotionally neutral.

Cioffi and Holloway (1993) had participants place their arms in a tank filled with ice and instructed them to either monitor the ensuing physical sensations, suppress all thoughts of the sensations, or to concentrate on their room at home (specific distraction condition). They found that suppression of thoughts about the pain was associated with higher ratings of pain for two minutes after immersion in the ice and with heightened physiological response, as compared to monitoring the sensations or using a specific distracter. Furthermore, participants who had suppressed thoughts about their sensations responded more negatively to the experimenter's (bogus) report that they would have to do the task again and showed a greater increase in physiological reactivity upon hearing this news,

and reported lower self-efficacy for coping with the pain after the second immersion than did participants in the other conditions. Finally, participants in the suppression condition rated a neutral sensation as significantly more unpleasant than did the other participants. However, Harvey and McGuire (2000) found no ironic effect of suppression of thoughts about chronic pain.

Some studies have compared the effects of suppression on neutral versus emotionally relevant thoughts. Muris et al. (1992) examined the immediate and later effects of suppression of thoughts about a neutral story and suppression of thoughts about an emotional story. No ironic effects of suppression were observed on the frequency of thoughts about an emotional story, but suppression of thoughts about the neutral story did result in a rebound effect. Electrodermal activity did not vary according to valence of the target thought or suppress group. On the other hand, Rutledge, Hollenberg, and Hancock (1993) compared suppression of white bear thoughts to thoughts about an upcoming test and found no ironic effect of suppression on either type of thought. In their meta-analysis, Abramowitz et al. (2001) found no difference in the effect of suppressing emotionally relevant versus neutral thoughts.

One factor that the above studies do not address is the individual's history with the target thought. When a thought is emotionally relevant people will have experienced it (or thoughts like it) in the past and are likely to have preexisting strategies for handling it. Although Wegner's model argues that the controlled distracter search is unfocused, there have been no empirical tests of this tenet. It may be that people have a clear strategy for suppressing, particularly thoughts that they have had to suppress in the past. Furthermore, emotionally relevant thoughts are connected to mood and to associative networks of memories and prepotent responses. It may be the case that whereas suppression of neutral thoughts may rely on use of external stimuli as distracters, suppression of emotionally relevant thoughts that are connected to mood state relies on use of internal stimuli (i.e., thoughts, moods, and memories) as distracters. Finally, people may respond quite differently to emotionally relevant thoughts depending on situational context and current internal (e.g., emotional) and external goals. Salkovskis and Campbell (1994) in fact argued that "motivated and intrusion focused monitoring of consciousness may be as important as suppression" (p. 1) in understanding the persistence of unwanted thoughts.

Motivation to Suppress

The term "thought suppression" typically refers to active attempts to get rid of a thought as opposed to simply being aware of a thought and ignoring or deeming it not relevant for further processing (i.e., not engaging it). For example, in the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (*DSM-V*; American Psychiatric Association, 2013) one criterion for obsessions is that the person "attempts to ignore *or* suppress" [emphasis added] them. The assumption implicit in the term is that the thought being suppressed is unwanted in some way. However, that does not mean that the thought is necessarily negative, only that it is unwanted in the moment. A person may well suppress a positive thought that occurs during a solemn occasion.

Thought Suppression

Fear that a thought will produce undesirable action is said to be a central motive for thought suppression (e.g., Wegner, 2009). Interestingly, although these two motives have been assumed, there has been little systematic study of people's motives for suppressing. Purdon, Rowa, and Antony (2007) had people with obsessive-compulsive disorder (OCD) keep a record of their thought suppression attempts over three days using a semi-structured diary. The diary asked participants to report whether the attempt was proactive or reactive, and to record, verbatim, their reasons for suppressing. The majority of attempts were reactive (74%) with 24% proactive. The most common motive for suppressing obsessional thoughts was to get rid of the thought before the compulsion became necessary. The second most common motive was to prevent obsessional thoughts and/or anxiety/distress from escalating; that is, suppression was used to regulate emotion. The other motive listed was to prevent a bad outcome, which may be characteristic of OCD in particular, and reflect the view that thinking something can make it happen, and that thinking something is as wrong, morally, as doing the action (e.g., Rachman, 1997).

In her review, Purdon (1999) observed that people may not be motivated to suppress their unwanted thoughts. For example, Papageorgiou and Wells (2001) argued that people hold positive beliefs about the utility of rumination, and research indicates that people with depression do not attempt to disengage from depressive rumination (e.g., Koster et al., 2011). In fact, it has been argued that rumination is an attempt to resolve problems and is thus viewed as necessary and important to engage in (e.g., Andrews & Thompson, 2009). Meanwhile, people who report that their worry is unwanted also hold positive beliefs about the importance and necessity of engaging that worry (e.g., Borkovec, Hazlett-Stevens, & Diaz, 1999; Papageorgiou & Wells, 2001; Wells, 2005). Attempts to control worry may be initiated when anxiety becomes high, when worry interferes with other important tasks, and/or when it reaches saturation. Research on the suppression of worry or worrylike thoughts has consistently failed to detect a rebound effect (e.g., Behar, Vescio, & Borkovec, 2005; Kelly & Kahn, 1994; McLean & Broomfield, 2007; Rutledge, 1998) and in fact has been associated with a decrease in worry (Roemer & Borkovec, 1994) and an increase in neutral and pleasant thoughts (Mathews & Milroy, 1994).[1] Similarly, replacement of worry with positive thoughts has been found to ameliorate clinically significant worry (Eagleson et al., 2016). Cougle et al. (2005) had participants with social anxiety suppress worries about an undesired social outcome or think anything, and when either anticipating giving a speech or not anticipating giving a speech. Contrary to hypotheses, there was no rebound effect of suppression; and in fact, participants anticipating giving a speech had *fewer* thought occurrences when they suppressed.

At the same time, people are highly motivated to suppress other types of thoughts, such as thoughts about a phobic stimulus, traumatic memories, and obsessional thoughts. Purdon (1999) concluded that suppression of trauma-relevant thoughts and memories has been reliably associated with an ironic increase in frequency in both analogue samples, those exposed to trauma, and those with posttraumatic stress disorder (PTSD). It has been replicated in more recent work (e.g., Beck et al., 2006) although not consistently (e.g., Guthrei & Bryant, 2000; Rosenthal & Follette, 2007). In a large-scale study, thought suppression has been identified as a risk factor for development of posttraumatic stress

disorder in children and adolescents following trauma exposure (e.g., Trickey et al., 2010). However, use of suppression may simply reflect symptom severity in that the unwanted thoughts may be substantially more vivid, disturbing, and frequent, thereby giving rise to greater suppression effort.

Results have been even less consistent across studies of the impact of suppression of obsessional thoughts on frequency. Some studies of nonclinical participants found that suppression was associated with an immediate increase in the frequency of obsessional thoughts during suppression (i.e., immediate enhancement) (Salkovskis & Campbell, 1994; Brewin & Smart, 2005) or a subsequent increase in frequency or rebound (Grisham & Williams, 2009; Trinder & Salkovskis, 1994), whereas others found no ironic effect of suppression either during or after suppression (e.g., Belloch, Morillo, & Giménez, 2004; Purdon, 2001; Purdon & Clark, 2001). Furthermore, Salkovskis and colleagues found a strong carry-over effect of thought frequency across experimental intervals. To date, studies of people diagnosed with OCD have not found an ironic effect of suppression on frequency of obsessional thoughts either during or after suppression (e.g., Janeck & Calamari, 1999; Najmi, Riemann, & Wegner, 2009; Purdon, Rowa, & Antony, 2005). Finally, in his nonclinical sample, Rassin (2001) found that suppression of an induced obsessional thought ("I hope X [loved one] gets into a car accident") was associated with *fewer* thought occurrences.

Motivation to suppress a particular type of thought may vary considerably across people and circumstance. For example, people who are attempting to restrain their eating may be motivated to suppress thoughts about food out of concern that thinking about a tempting food will result in diet violation, or that thinking about food may cause them to actually gain weight (e.g., Coelho et al., 2012). On the other hand, if people are hungry they may be motivated to think about food. Indeed, Xu, Purdon, Rowe, and Smilek (2019) found that 75% of restrained eaters in their sample reported strong motivation to look at pictures of tempting food and low motivation to avoid looking at them. Research on the impact of suppression of food relevant thoughts has yielded mixed findings. Harnden, McNally, and Jimerson (1997) found that suppression versus expression of the thought of being weighed was associated with thought rebound in non-dieters but not in dieters, whereas O'Connell et al. (2005) and Soetens and Braet (2006) did not find an ironic effect of suppression of food relevant thoughts.

Defining Thought Occurrences

Wegner and Zanakos (1994) developed the white bear suppression inventory (WBSI) to assess trait tendency to respond to unwanted thoughts by suppressing them. The WBSI correlates with symptom measures of psychopathology, which has bolstered confidence in the ironic processes model. However, one difficulty with the WBSI is that it confounds the tendency to suppress thoughts with tendency to experience thoughts one wants to suppress. In their factor analysis of the measure, Schmidt et al. (2009) identified two factors, which they labelled "intrusion" (tendency to experience unwanted thoughts) and "suppression" (tendency to suppress thoughts). Consistent with a number of previous

studies, only the "intrusion" factor was correlated with measures of anxiety and depression.

Barnes, Fisak, and Tantleff-Dunn (2010) developed a measure of trait suppression of food-related thoughts. The food thought suppression inventory (FTSI) has been associated with weight outcomes (e.g., Barnes et al., 2010). Barnes, Masheb, and Grilo (2011) found that women (as opposed to men) and people with binge eating disorders (as opposed to those without binge eating disorders) reported greater food suppression. However, as with the WBSI, tendency to suppress thoughts may be confounded with tendency to have unwanted thoughts about food. One further problem with trait measures of suppression is that people may not be especially good at accurately reporting the extent to which they use suppression, particularly as suppression may be quite automatic. Furthermore, if suppression succeeds, the thought may be gone before it has fully commanded attentional resources and awareness. Thus, retrospective self-reports may not reliably account for successful suppression.

In thought suppression experiments, several methods have been used to assess thought occurrences. In some studies, participants signal when the target thought occurs and then signal when it is gone (e.g., Nixon et al., 2009). A difficulty with this method is that signaling a thought's absence primes the thought, artificially inflating thought frequency. In the majority of studies, thought occurrences are assessed using stream of consciousness verbalization or written stream of consciousness, or event marking, in which participants mark each occurrence of the thought by ringing a bell, pressing a computer key, or clicking a counter. Sometimes both are used, such that participants speak their stream of consciousness and mark thought occurrences with a counter or write their stream of consciousness and mark occurrences with a stroke in the margin. Muris, Merckelbach, and de Jong (1993) compared stream of consciousness verbalization to event marking and did not find any difference in results. Stream of consciousness verbalization/writing is the more cumbersome of the two methods as it requires that participants practice, and the verbatim material must be coded. This in turn requires a system that reliably operationalizes and identifies a target thought. For example, does a mention of "bear" or of an object that is white count as a "white bear" thought, and how would the participant classify it? On the other hand, it does allow for examination of thoughts that precede target thought intrusions, which, for example, revealed to Wegner and colleagues that people tended to distract themselves from the target thought with thoughts about stimuli in the room.

Meanwhile, there are three difficulties with event marking. First, Salkovskis and Campbell (1994) observed that signaling that a target thought has occurred cues it, perhaps especially when the signal is quite salient, such as ringing a bell, thinking aloud, or marking its occurrences in the margins of a page where the marks serve as a visual cue for the thought. Second, when people know they are supposed to suppress they may underreport thought occurrences, particularly when the signal is not private, again such as when ringing a bell. It is also possible that people use different standards to determine whether a thought has occurred such that when suppressing they may choose to only report vivid or

complete mental representations of the thought in order to help the researcher by appearing compliant with instructions.

Third, Markowitz and Purdon (2008) observed that thought frequency is confounded with thought duration, such that one participant may experience one thought occurrence that lasts much of the interval, whereas someone else may have several thought occurrences that are readily dismissed. However, in current paradigms that use event marking the former would be interpreted as evidence of good thought control whereas the latter is arguably an indicator of greater thought control. Some studies have thus examined latency to dismiss a thought rather than thought frequency (Edwards & Dickerson, 1987; Purdon et al., 2011). In these studies, participants were instructed to monitor their thoughts, and when the target thought occurred they were to signal by pressing a button and then replace it with another thought, prescribed by the experimenter. Once the replacement thought was in mind, they would signal again by pressing a different button. However, in such paradigms participants are instructed to dismiss using one specific distracter, so it does not allow for examination of natural, or spontaneous, active resistance to the thought, nor for examination of participants' natural suppression strategies.

Markowitz and Purdon (2008) studied natural active resistance to obsessional thoughts in an unselected sample. They first primed participants' most upsetting obsessional thought and then had them monitored for six minutes, during which they wrote their stream of consciousness. After the interval, participants rated how hard they had tried to suppress the thought. A large subset of participants was contacted four hours later and reported on the frequency of and distress caused by the obsessional though since leaving the lab. There was no correlation between suppression effort reported in the lab and self-reported occurrences or distress afterward.

Experimental Instructions

The nature of the control and experimental instructions used in thought suppression paradigms are of central importance to the reliability and validity of results. One concern is priming effects. In some studies using stream of consciousness verbalization, participants in the suppression condition are given explicit instructions to suppress the target thought, which is mentioned by name; whereas those in the control condition are simply asked to think aloud (e.g., Johnston, Bulik, & Anstiss, 1999). Suppression instructions may thus serve as a prime for the target thought, again artificially inflating thought occurrences relative to no priming. Furthermore, Salkovskis and Campbell (1994) noted that marking thought occurrences also appears to prime thoughts, as participants have more target thoughts during the 6 to 12 minutes of monitoring than in the past few months combined. Finally, when participants monitor only without marking occurrences (such as when verbalization is used without marking) those in the suppress condition are likely to be vigilant for target thought occurrences, whereas those in the control condition have no reason to be vigilant for it. A paradigm in which the target thought is mentioned the same number of times in the control condition as in the suppression condition, and in which participants in all conditions mark target thought occurrences, better controls for these

confounds. However, researchers need to assume that any instruction to monitor a specific thought will prime its occurrence.

The reader will also recall that Abramowitz et al. (2001) found that the suppression effect was greater in studies that used thought expression as a control condition for thought suppression, which they interpreted to be an artifact. As previously noted, ceiling effects may result in a decline in thoughts for those who express, and this in turn could account for significant differences between groups during a second interval, especially when the within-participants effects are not examined, which stacks the deck for a rebound effect. Rassin et al. (2005) compared expression versus think anything instructions and found an ironic effect for expression, but not for think anything. On the other hand, Erskine et al. (2012) compared suppression, expression, and think anything instructions on the frequency of thoughts about smoking in participants who smoked. Effects on frequency were marginal, but whereas suppression was associated with greater thought frequency than think anything, expression was not.

Lavy and van den Hout (1990) recommended instead that participants be instructed to "think anything." However, as noted by Salkovskis and Reynolds (1994) one problem with studying thoughts that naturally give rise to active resistance is that both control and suppress groups will engage in suppression. In their study of suppression of thoughts about smoking in smokers they found considerable spontaneous suppression effort in the non-suppress condition, which they controlled for statistically by removing low suppressors in the suppress condition and high suppressors in the control condition. The same pattern of results occurred, though, with higher thought occurrences for those who suppressed in both intervals (i.e., no rebound effect, but an overall enhancement effect). In a pilot study of obsessional thoughts, Purdon and Clark (2001) found that when participants' most upsetting obsessional thought was primed, those instructed to "think anything you like" reported the same effort to suppress the thought as those instructed to suppress. Marcks and Woods (2007) also found that participants given "think anything" instructions reported considerable spontaneous suppression. Similarly, Muris et al. (1997) found that participants with spider phobia, as compared to those without spider phobia, reported greater suppression effort in both suppress and control intervals.

Purdon and Clark (2001) recommended that instructions for the suppression control condition specify that participants should not suppress *any* thoughts, including the obsessional thought. In studies using these instructions, one study found an ironic effect of suppression on the frequency of an experimentally induced blasphemous thought in people high, but not low, in religiosity (Corcoran & Woody, 2009). However, other studies using these instructions have found no effect of suppression on frequency of obsessional thoughts in nonclinical (Belloch, et al., 2004; Hardy & Brewin, 2005; Purdon, 2001; Purdon & Clark, 2001) or clinical samples (Purdon et al., 2005).

The "do not suppress" instructions, too, are problematic when studying thoughts that give rise to natural active resistance. Tolin et al. (2002) observed that for the suppress group, suppression instructions are a non-intervention whereas they are an active inter-

vention for the do not suppress group. To get around this, they examined the effects of suppression of neutral (white bear) thoughts in a sample of people with OCD as compared to anxious and nonanxious control groups. They found that people with OCD had more white bear thoughts overall and had more thought occurrences during suppression compared to baseline (i.e., exhibited an immediate enhancement effect). No immediate enhancement or rebound effect was observed in the other two groups.

To overcome the problem of relying on participants' self-report of target thought occurrences, Tolin et al. (2002) conducted a second study in which they examined sensitivity to thought-related stimuli. Participants were instructed to suppress a white bear thought and then were given a lexical decision task that included words relevant to white bears, words not relevant to white bears, and non-words. They hypothesized that people with OCD would be more vulnerable to target thought primes, as evidenced by lower latency to respond to stimuli relevant to the white bear relative to other stimuli. As predicted, the differential response was observed in the OCD group but not in the other two groups. Tolin and colleagues concluded that individuals with OCD appear to have a general deficit in their ability to control thoughts.

The general deficit model in OCD is difficult to reconcile with the fact that people with OCD function normally outside their obsessive-compulsive cycles; they do not have trouble controlling all unwanted thoughts, only their obsessional thoughts. Other studies have not found high obsessionality to be associated with difficulty controlling other types of thoughts (e.g., Smari, Sigurjonsdottir, & Saemundsdottir, 1994) and in fact some have found high obsessionality to be associated with better thought control, albeit in a nonclinical sample (e.g., Rutledge, Hancock, & Rutledge, 1996). Another explanation for the Tolin et al. findings is that people who experience unwanted thoughts are vigilant for thought-related stimuli, just as someone with a phobia is vigilant for stimuli relevant to the object of their phobia. Indeed, Janeck et al. (2003) found that individuals with OCD showed a greater tendency to be aware of and evaluate negative thinking than people with generalized anxiety disorder (GAD). Clayton, Richards, and Edwards (1999) found that individuals with OCD, as compared to anxious controls, were less well able to selectively ignore competing internal and external stimuli. Thus, when people are highly motivated to prevent a thought from occurring and to dismiss it as quickly as possible when it does occur, they may be especially sensitive to thoughts and thought triggers. This is consistent with the well-accepted idea that anxiety is characterized by attentional capture of threat cues (e.g., Fox et al., 2001).

Long Term Effects of Suppression

Most thought suppression studies examine the impact of a brief (typically three- to six-minute) interval of suppression on thought occurrences during an interval of the same length that immediately follows. As previously discussed, in real life people suppress frequently and perhaps for longer periods. Few studies have examined longer-term effects of suppression. Trinder and Salkovskis (1994) found that suppression in the lab was associated with greater frequency of obsessional thoughts four days later. However, Markowitz and Purdon (2008) did not find that natural active resistance to an obsessional thought

predicted thought occurrences outside the lab four hours later, nor did Rosenthal and Follette (2007) find that suppression of thoughts relevant to a recent sexual assault was associated with more occurrences of those thoughts over the next two days. To improve the ecological validity of in-session experiments, some researchers have introduced multiple suppress/control cycles, which afford examination of the impact of repeated suppression. Hardy and Brewin (2005) examined the impact of two cycles of suppression on the frequency of obsessional thoughts in participants high and low in obsessional symptoms. No rebound effect was observed for either group, although whereas thought frequency decreased during suppression for those low in symptoms, it did not decrease during suppression for those high in symptoms. Similarly, Williams and Moulds (2007) found no effect of multiple cycles of suppression in their study of distressing images in people with dysphoria.

Is Thought Frequency a Valid Index of Thought Control?

As previously noted, some studies have attempted to get around the confound of thought frequency with duration by examining thought duration (Edwards & Dickerson, 1987; Purdon et al., 2011; Williams & Moulds, 2007). Some researchers have examined the impact of suppression on subsequent behavior. For example, Erskine and Georgiou (2010) examined the impact of suppression of thoughts about chocolate on subsequent chocolate consumption in restrained versus non-restrained eaters. Participants either suppressed, expressed, or simply monitored thoughts about chocolate, after which they were asked to sample and rate two brands of chocolate. They found that restrained (but not unrestrained) eaters instructed to suppress thoughts about chocolate subsequently ate more chocolate than those who expressed thoughts about chocolate or those given no instructions. Erskine et al. (2012) examined the impact of suppression on tobacco craving in smokers who had suppressed thoughts about smoking but found no relationship. Similarly, Siep et al. (2012) found that suppression did not lead to greater food cravings. Other studies have examined the impact of suppression on physiological variables. Garland et al. (2012) examined heart rate variability in participants undergoing treatment for alcohol dependence. They found that high trait suppression (WBSI scores) and high suppression of urges to drink when viewing alcohol-related photos was associated with lower heart-rate variability.

Although there has been little systematic research on the reasons for wanting to suppress thoughts, it can reasonably be argued that the thought is suppressed because it is viewed as a threat to current goals. For example, it might lead to undesirable behavior, it represents possibilities/events one wishes to avoid (as in anxiety and phobias), it is disgusting or abhorrent, and/or because thinking about it will have an adverse effect on mood. Some researchers have thus examined the impact of failed suppression attempts on appraisal of the thought itself, one's mental faculties, and mood. In their studies with nonclinical samples and clinical samples of people with OCD Purdon and Clark (2001; Purdon et al., 2005) did not find a paradoxical effect of suppression on the frequency of obsessional thoughts. However, after each interval they administered a measure of concerns over failures in thought control. Controlling for baseline mood, they found that concerns over fail-

ures in thought control predicted suppression effort reported by those in the "do not sup- press any thoughts" group, discomfort over thought occurrences regardless of group, and more negative mood state at the end of the study. Similarly, in their study of thought dis- missability, Purdon et al. (2011) found that in participants with OCD concern over difficul- ties dismissing the obsessional thought, but not thought frequency or dismissability, pre- dicted a decline in mood state.

Belloch et al. (2004) also observed no paradoxical effect of suppression on the frequency of obsessional thoughts, but found that for those who suppressed, subjective success at managing the thought was lower and the intrusiveness of the thought was higher. Marcks and Woods (2005, 2007) found no significant effect of suppression, control, or accep- tance-based instructions on frequency, but Marcks and Woods (2005) found that whereas distress over the thought decreased for participants receiving acceptance instructions, it increased for participants who suppressed (and did not change for those in the control condition), controlling for baseline distress. Marcks and Woods (2007) found that accep- tance was associated with greater willingness to re-experience the thought. Najmi, et al. (2009) found that distress over intrusions was higher in participants with OCD under sup- pression versus acceptance or focused distraction instructions. In their study comparing suppress versus do not suppress blasphemous thoughts Corcoran and Woody (2009) found that suppression was uniquely associated with poorer mood state and greater anxi- ety. Abramowitz et al. (2001) found that people with OCD were more likely to make nega- tive, internal attributions about thought control failures (e.g., "I am weak"). Magee and Teachman (2007) found that participants who reported negative appraisal of the recur- rence of obsessional, other personally relevant thoughts, and white bear thoughts, report- ed greater distress and greater thought frequency than those who did not report this ap- praisal. However, these findings have not been consistent, with some studies finding no impact of suppression on mood (e.g., Rosenthal & Follette, 2007). In her meta-analysis Baeyens (2006) did not find that suppression led to an increase in negative affect, al- though she notes that so few studies have examined this her analysis had low power to detect significant effects.

Thought Suppression Strategies

The term "thought suppression" refers to any attempt to get rid of a thought. As noted above, few thought suppression studies have examined the strategies people use to sup- press their thoughts. Freeston et al. (1995) interviewed an unselected sample about the strategies they used to manage obsessional thoughts, identifying the following: physical action, thought replacement, analyzing the thought, talking to others, thought stopping, reason with self, and doing nothing. Ladouceur et al. (2000) conducted structured inter- views with people with OCD, people with an anxiety disorder, and healthy volunteers about the strategies they used to manage their most troubling thoughts. The strategies ranged from overt compulsions and mental checking (more likely to be used in the OCD sample) to distraction and replacement with a positive thought (less likely to be used by the OCD group), saying "stop," self-questioning, relaxation, distracting conversations, and doing nothing.

Thought Suppression

Purdon and Clark (1993) conducted semi-structured interviews with nonclinical individuals about the content of obsessional thoughts they have experienced (if any) and their cognitive, affective, and behavioral response to them. They found that participants reported using the following strategies: overt distraction (talking to someone, looking at something else), covert distraction (thinking about something else), overt neutralizing (washing hands, checking), covert neutralizing (replacing a "bad" thought with a good one, or mentally undoing the thought in some way), reasoning, seeking reassurance from others, self-reassurance, saying a prayer, saying "stop," and doing nothing.

Wells and Davies (1994) observed that thought suppression is a goal, but the means to that goal is of central importance to understanding the persistence of unwanted thoughts. They developed the Thought Control Questionnaire (TCQ) to assess the strategies people use to control thoughts, based on interviews with 10 people with an anxiety disorder. They identified 59 strategies, which were subjected to factor analysis, yielding six factors: behavioral distraction, cognitive distraction, social/reassurance, reappraisal, worry, and punishment. The latter two scales were most highly associated with psychopathology, which has since been observed in other studies (e.g., Amir, Cashman, & Foa, 1997; Belloch, Morilla, & Gracia-Soriano, 2009; Rassin & Diepstraten, 2003). Similarly, Jacoby et al. (2016) found that use of punishment actually mediated the relationship between appraisal of repugnant obsessional thoughts and the severity of OCD symptoms in a large sample of people with OCD.

However, in much of the thought suppression literature, participants are simply instructed to suppress their thought; how they do so is left up to them and is typically not assessed. Wegner's model predicts that use of a single distracter will result in less rebound than multiple distracters, as the materials used in distraction become cues for the thoughts later on. As observed earlier, Wegner et al. (1987) found that participants instructed to replace the white bear thought with the word "Volkswagen" did not exhibit a rebound effect. In Lavy and van den Hout (1990) participants were instructed not to use a specific distracter, and the rebound effect was observed. However, Ju and Lien (2016) found that participants had more thoughts about a video of white bears during suppression than during a subsequent monitor-only phase whether they used focused breathing or focused on thoughts of a blue car (although earlier those who engaged in focused breathing had fewer instances of mind wandering). Clark, Winton, and Thynn (1993) did not find any differences in nonclinical groups instructed not to rely on a specific distracter to suppress thoughts about a story of a green rabbit and those given general suppression instructions. The latter finding could suggest that, left to their own devices, participants may naturally use a variety of distracters. In their within-subjects comparison, Najmi et al. (2009) found no rebound effect of suppression on obsessional thoughts in people with OCD whether they were instructed to suppress using focused distraction or given no instruction.

Meanwhile, Salkovskis and Campbell (1994) found that suppression with distraction was associated with less discomfort with and greater acceptability of the obsessional thought than suppression with no instructions. Finally, Salkovskis and Reynolds (1994), Salkovskis

and Campbell (1994), and Lin and Wicker (2007) all found that when participants were given an attentionally engaging task while suppressing personally relevant thoughts they had fewer target thought occurrences than did participants who were only instructed to suppress. This would appear to contradict the idea that cognitive load necessarily compromises capacity to suppress unwanted thoughts.

Revisiting the Wegner Model

There is no doubt that our attempts to suppress unwanted thoughts can fail—and sometimes quite miserably. However, the ironic effect of suppression has not been consistently observed, which in part may be due to the limitations of our paradigms for studying it but may also suggest that the model for understanding the impact of suppression may be underspecified.

Cognitive Load

Wegner (2009) stated that we are successful at suppression far more often than not, the mediator being cognitive load. However, our capacity to function adaptively relies on our ability to inhibit thoughts that are not relevant to current goals, and, especially, thoughts that might be actively detrimental to those goals (e.g., Anderson & Green, 2001). We are therefore able to inhibit thoughts that compromise both internal (e.g., mood regulation) and external (e.g., work, interpersonal, family) goals most of the time, even though we live in a complex world in which demands on working memory are the norm rather than the exception. In thought suppression studies, cognitive load is typically introduced via a simultaneous working memory task, a competing attentional task, or time pressure, and this work consistently found that people had more difficulty suppressing. However, several studies found that when participants suppressed personally relevant negative thoughts by engaging in an attentionally demanding task they were very effective at suppression. Wang, Hagger, and Chatzisarantis (2017) presented evidence that concentrating on a "need supportive" event was associated with lower accessibility of a target thought than other forms of focused distraction. This may demonstrate that engaging in an attentionally demanding task does not reliably hinder suppression (i.e., we are able to do both), particularly with practice. It could also mean that we are able to effectively switch our attention away from the task of suppression and on to the pursuit of more important goals (i.e., move from avoidance to approach motivation), or that when we are engaged in meaningful activity we have the capacity to stay focused.

Thought Suppression Goals and Strategies

The discussion above leads to the question of what the goal of suppression actually is. When people suppress, what are they actually attempting to accomplish? Is it to think of something else or to avoid thinking of something? Goals may be distal (feel better, perform better) that are realized by the accomplishment of proximal goals (get rid of disturbing thought, bring to mind a pleasant thought). Although Wegner's model asserts that the controlled distracter search is unfocused and will stop at the first available distracter, we actually know relatively little about how people suppress their thoughts when left to their

own devices; it is possible they are, in fact, quite strategic and know what works best for them.

It is also important to note that whether the suppression goal is framed in approach or avoidance terms could be relatively important; whereas approach goals are associated with behavioral activation, avoidance goals are associated with behavioral inhibition (Gray & McNaughton, 2000). Different factors may influence each. For example, executive functioning deficits may compromise people's capacity to get rid of a thought but may not influence people's capacity to call another thought to mind. Brewin and Beaton (2002) and Brewin and Smart (2005) found that lower working memory capacity was associated with greater difficulty suppressing thoughts (although the actual strategies participants used was not examined).

Bomyea and Amir (2011) randomly assigned participants to either undergo training to improve working memory capacity or not, had them identify a painful memory, and then undergo a suppression task in which they marked occurrences of thoughts about the painful memory using a counter. In the task were three intervals: monitor thoughts, suppress thoughts about the unwanted memory, and then monitor thoughts again. They found that participants who had been trained to improve WMC had significantly fewer thoughts during suppression than did those who did not receive the training. Furthermore, those who received the training showed a decrease in thoughts from the first monitoring interval to the suppression interval, whereas those without the training did not. Thought frequency did not increase in the third interval for either group. Thus, successful suppression may well reflect working memory capacity. Meanwhile, there is evidence that different suppression strategies are associated with different areas of the brain. For example, Benoit and Anderson (2012) found that whereas direct suppression of a memory and its manifestation in thoughts is associated with down-regulation of the hippocampus, thought substitution is associated with activation of the left ventrolateral prefrontal cortex.

Thought suppression itself has been identified as a maladaptive form of experiential avoidance (Hayes, Strohsal, & Wilson, 1999) and as a maladaptive emotion regulation strategy (e.g., Aldao, Nolen-Hoeksema, & Schweizer, 2010). However, according to emotion regulation models, reappraisal qualifies as a healthy, adaptive way of regulating emotion. Participants who are not given instructions as to how to suppress their thoughts may well use reappraisal or acceptance. In fact, Siep et al. (2012) found that suppression was associated with a greater decrease in mesocorticolimbic activity than was cognitive reappraisal. Other strategies, such as focused distraction, could readily be used as a means of experiential avoidance, which although successful in the short term may bespeak poor functioning. On the other hand, focused distraction is a fundamental component of certain forms of mindfulness meditation. Thus, when we do not know the motivation, goals, and strategies behind suppression our understanding of its role in the persistence of unwanted thoughts will be quite limited.

Alternative Ways of Studying Thought Suppression

Thought Suppression

The previous discussion indicates that the current paradigms for studying suppression have limitations that may cloud our understanding of the persistence of unwanted thoughts. There may be merit in adapting paradigms that study memory suppression and attentional bias to bear on understanding thought suppression.

Think/No Think Paradigm

Anderson and colleagues developed a Think/No-Think (TNT) paradigm that assesses capacity to suppress memory. In the TNT paradigm, participants first learn word pairs, after which they are then presented with one word from each pair in succession. On Think trials they are to retrieve the word that goes with the word presented and to think about it; whereas on No Think trials they are not to think of the word that goes with the word presented. Memory for the word pairs is subsequently assessed. Using this paradigm, Anderson and colleagues have systematically demonstrated that people are able to suppress thoughts that interfere with goal-directed activity, exhibiting significantly poorer recall for words on No Think trials, even when given a financial incentive for recalling them accurately (e.g., Anderson & Levy, 2009). The TNT paradigm is an interesting way of studying suppression of memory, and, by extension, suppression of unwanted thoughts. Any visual stimuli can be used (faces, words) and can be varied in terms of emotional valence and personal relevance. The suppression instructions in the No Think trials can be modified to so as to instruct direct suppression ("suppress any effort to retrieve anything at all in response to the cue and to push it away") or thought substitution ("generate substitute memories or thoughts to distract yourself"), thereby controlling for whatever spontaneous strategies participants might use.

The TNT paradigm gets around many of the methodological issues of research reviewed here, including priming effects (as the to be suppressed material is not mentioned by name), problems inherent in identifying thought occurrences, as well as carry-over effects from serial thought monitoring intervals. However, Anderson and colleagues have encountered the same issue of central importance to the thought suppression reviewed in this article, which is motivation; if people are not motivated to suppress, the suppression of retrieval effect is unlikely to be demonstrated. For example, Hertel and Gerstle (2003) found that participants who reported high rumination had better recall of negatively valenced words they had been instructed to suppress than did those low in rumination. Fawcett et al. (2015) observed that this could be a result of inhibition deficits in people who ruminate, or it could reflect the fact that people who ruminate believe that rumination is useful and are less motivated to suppress it. They found that ruminators reported less effort at suppressing on No Think trials and that this accounted for some (but not all) of the lack of suppression-induced forgetting. This once again highlights the fact that we cannot understand the impact of suppression attempts or their meaning unless we know something about the appraisal of the thought's meaning and significance, motivation, and goals.

Attentional Deployment

If we consider that an unwanted thought is an internal threat stimulus then we can draw upon research on attentional bias to threat as a paradigm for understanding the impact of suppression. Since where people look is an excellent indicator of what they are thinking about, thought suppression may be profitably studied by examining deployment of visual attention to thought relevant cues or images. Motivation to look at versus not to look at thought-relevant stimuli can be assessed and its influence on attentional deployment examined. For example, Nelson et al. (2015) had people passively view threat versus neutral images while their eye movements were tracked under anxious and calm mood inductions. At the end of the study participants were shown a random subset of 10 of the threat images and asked to report how motivated they were to attend to the image and how motivated they were to avoid attending to it. Following anxious induction, all participants exhibited an overall pattern of initial engagement with threat followed by disengagement across time. However, motivation to attend to threat and motivation to avoid attending to threat were correlated –.37, indicating considerable ambivalence about where to deploy attention.

Participants were then grouped according to their motivation ratings as avoiders (low in motivation to look, high in motivation to avoid looking), engagers (high motivation to look, low motivation to avoid looking), indifferent (low motivation on both indices), and ambivalent (high motivation to look and avoid looking). Following the anxious mood induction, the engagers showed a clear and consistent bias toward looking at threat, whereas the avoiders showed an equally clear and consistent bias away from threat. Thus, people motivated to avoid looking at threat were successful in doing so, whereas those who showed a bias toward threat were also motivated to do so; that is, they did not have difficulty disengaging, they simply were not motivated to disengage in the first place. In future work, this paradigm could be used to study visual deployment to images under "look" and "don't look" instructions, and, as in the TNT paradigm priming effects can be avoided as the to-be-suppressed target does not have to be named; instead participants can be instructed to look away from "the image that has the yellow border," for example.

Conclusion

In conclusion, research on the impact of thought suppression on the frequency of unwanted thoughts has yielded highly inconsistent findings, which range from evidence of strong rebound or immediate enhancement effects to null effects to evidence that suppression is effective in reducing thought occurrences. However, the task of designing a paradigm in which to study the impact of suppression on the recurrence of thoughts in an ecologically valid way that controls for artifact is challenging. Indeed, even identifying and assessing the key dependent variable (thought occurrences, thought perseverance, mental preoccupation) is difficult. There may be merit in conceptualizing unwanted thoughts as internal threat stimuli, bringing threat theories to bear on our understanding of their persistence, and examining overt indices of attentional preoccupation, such as eye gaze. In sum, we

may want to shift from understanding the persistence of unwanted thoughts as the product of failed suppression efforts and instead consider suppression to be a product of target thought appraisal, whose success may depend heavily on the goal of suppression in the moment and the means used to achieve that goal.

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Notes:

(1.) Note that although Kelly and Kahn (1994) and Rutledge (1998) identified the thoughts of interest as obsessional the content provided suggests that were in fact more representative of worry; see Purdon (1999).

Christine Purdon

University of Waterloo, Department of Psychology