

# Fanning Old Flames: Emotional and Cognitive Effects of Suppressing Thoughts of a Past Relationship

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Cognitive and electrodermal effects of suppressing thoughts of an old flame were examined in 2 experiments. Participants were asked to think aloud about an old flame—a past close relationship that either was or was not still desired—as their skin conductance level (SCL) was measured. Participants continued to think aloud as they were instructed either not to think about their old flame or to perform a comparison task. Participants were then asked to think about the old flame again. Participants who had suppressed thoughts of a no-longer-desired relationship were inclined to think aloud more about it afterward whereas those who suppressed thoughts of a still-desired relationship did not show such a rebound but evidenced increased SCL.

I can't get you off of my mind, when I try I'm just wasting my time.  
Lord I've tried and I've tried, and all night long I've cried—but I  
can't get you off of my mind.—Hank Williams (1947)

Anyone who has experienced the loss of a close relationship will agree with Hank Williams that it is hard to get off of one's mind. Intrusive thoughts and emotions about the absent love can be persistent and are usually met with a deep yearning to forget about it and move on. There is a kind of desperate futility in the desire to put the departed relationship out of mind, however, as the thoughts return again and again, and it sometimes seems that the harder one tries to suppress the thoughts the more one is disturbed by them. This research examined how the suppression of thoughts of an "old flame" (past close relationship) influences subsequent thoughts and emotional reactions.

## Suppression of Thoughts of Old Flames

The occurrence of thought suppression as a response to psychological discomfort is widely documented (e.g., Horowitz, 1976; Janoff-Bulman & Timko, 1987; Pennebaker, 1988; Silver, Boon, & Stones, 1983; Wegner, 1994b; Wegner & Pennebaker, 1993; Wegner & Wenzlaff, in press), and its role as a reaction to the loss of a close relationship is also well-known (e.g., Lehman, Wortman, & Williams, 1987; Lindemann, 1944; Pennebaker &

O'Heeron, 1984; Tait & Silver, 1989). Although the terminology varies (to include *denial*, *blocking*, *avoidance*, and *repression*, among others), the general theme is that the intentional suppression of conscious thought about lost loves is often attempted as a means of escaping the negative emotions that accompany the thought.

There is reason to believe, though, that the suppression of thoughts of a past relationship has unintended and problematic psychological consequences. This idea follows from research on the instructed suppression of neutral thoughts. Participants were asked to suppress the thought of a white bear, for example, in studies by Wegner, Schneider, Carter, and White (1987), and it was found that when they were subsequently asked to think about it, they showed a relative rebound of such thoughts in their stream-of-consciousness reports. This postsuppression increase in thinking (relative to levels found when participants do not first suppress the thought) has been observed in several studies using white bears or other neutral targets, and has been found in measures reflecting the frequency of reported thought occurrences, the length of time spent talking about the thought, and the cognitive accessibility of the thought (Clark, Ball, & Pape, 1991; Clark, Winton, & Thynn, 1993; Kelly & Kahn, 1994; Lavey & van den Hout, 1990; Martin, Tesser, & McIntosh, 1993; Wegner, Schneider, Knutson, & McMahon, 1991; Wenzlaff, Wegner, & Klein, 1991).

Studies of more emotional and involving topics have also shown rebound effects, but less consistently. A rebound was found by Cioffi and Holloway (1993), who asked participants to suppress the sensations of pain they experienced in a cold pressor task. The researchers found that these participants, compared with participants instructed to focus on the sensations or to use a single distracting thought, showed higher pain self-reports after they removed their hands from the ice-water bath. A rebound was also found by Macrae, Bodenhausen, Milne, and Jetten (1994) for participants who were asked to suppress a pejorative stereotype of a person they were judging. Participants' subsequent judgments and actions suggested that the suppressed stereotype had an enhanced influence. However, when Kelly and Kahn (1994) specifically contrasted the sup-

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pression of thoughts of a white bear with suppression of a personally intrusive thought, they found a rebound of reported thoughts about the white bear but no such rebound of thoughts that participants had reported as personally intrusive. Roemer and Borkovec (1994) also did not observe significant rebound effects for sad or anxious thoughts, but neither did they find such effects for neutral thoughts.

The currently available explanations for the rebound suggest some ways of predicting differences between neutral and emotional thoughts. Two such explanations of the rebound have been suggested—what we call an *association hypothesis* and an *accessibility hypothesis*. The rebound was initially explained by Wegner et al. (1987) in terms of the associations formed during suppression. They suggested that suppression of a thought tends to create associative links with the distractors that are used. If these distractors remain in mind or in the environment following suppression, they then tend to function as reminders and so increase the frequency of return of the target thought. This hypothesis has been supported in studies showing that the rebound is stronger when suppression and subsequent expression occur in the same context, either environmental (Wegner et al., 1991) or emotional (Wenzlaff et al., 1991).

The accessibility account of the rebound arises from research examining the accessibility of suppressed thoughts. Wegner and Erber (1992) found that suppressed thoughts were hyperaccessible during suppression, in that they were more susceptible to activation during a cognitive load than even thoughts that participants were intentionally concentrating on (see also Wegner, Erber, & Zanakos, 1993). Macrae et al. (1994; see also Martin et al., 1993) found that high levels of accessibility of suppressed thoughts also occurred during the rebound period, and this observation suggests that even when suppression is intentionally terminated an automatic activating process may continue to return the unwanted thought to consciousness. In short, this explanation holds that thoughts rebound after suppression because a part of the mind continues to search for them (Wegner, 1994a).

### Cognitive and Emotional Rebounds

We suspect that an understanding of the nature of rebound effects, and of the specific character of these effects in the case of emotional thoughts of a lost love, may be advanced by the simultaneous assessment of cognitive and emotional rebound phenomena. For this reason, we designed the present studies to examine postsuppression effects on a measure of thought (time spent talking on the topic) and a measure of emotional arousal (skin conductance level [SCL]). SCL has been found to be responsive to variations in both the expression and suppression of emotional thoughts in past research (e.g., Wegner, Shortt, Blake, & Page, 1990), as well as to differences in interpersonal attraction (Clore & Gormly, 1974), and was used to open a window into the emotional effects that occur following thought suppression. In general, we expected that emotional responding would follow the rebound pattern. Such emotional “dishabituation” following suppression (cf. Wegner, 1992) can be viewed in terms of the two explanations of the rebound to suggest more specifically how a person might respond emotionally to the suppression of an emotional thought. Somewhat different hypothe-

ses about these effects follow, however, from the association and accessibility hypotheses.

According to an emotional association hypothesis, the suppression of emotional thoughts of a lost love is likely to prompt emotional associations that can arise later when the thought rebounds into consciousness. To begin with, during the suppression of an emotional thought, any recurrence of the thought will be accompanied not only by the conscious registration of the thought itself, but perhaps also by bodily sensations, emotional thoughts, and experienced emotion provoked by the thought's emotional character. Wegner et al. (1990) used SCL as an indicator of emotional reactivity among participants who were asked to suppress emotional thoughts, for example, and found that even during suppression there was noteworthy SCL evidence of emotion. Wenzlaff, Wegner, and Roper (1988) found, in the same vein, that the suppression of depressing thoughts prompted sadness. There is also evidence that the emotional associations of a thought may be strengthened by suppression such that they then appear during later instructed expression of the thought. Wenzlaff et al. (1991) found that participants suppressing a neutral thought while they were in a good or bad mood, as compared with participants who were asked to concentrate on that thought, later came to feel that mood again when they were asked to express the thought. The possibility suggested by this hypothesis, then, is that suppression may enhance the connectedness of a thought to emotion such that later, when the thought returns to mind, the associated emotion returns as well.

The results of suppression of emotional thoughts can also be viewed in terms of the effects of emotion accessibility. This idea starts with the observation that the accessibility of thoughts increases the likelihood that they will return to mind, independent of any relevant cues and without intention (Higgins, in press). Because suppression enhances accessibility, this means that the thoughts that return to mind following suppression tend to be intrusive—they return unbidden and without apparent connection to the ongoing train of thought (cf. Wegner, in press). Now, thoughts that pop into mind in this way seem to have a special influence on emotion, creating greater emotional disturbance than thoughts that are purposefully invited to mind or that follow from an intentional train of thought. The essence of this phenomenon was expressed by Marcel Proust as the Law of Intermittence, which states that “emotion-laden stimuli that leave one cold when sought out or turned to in thought may move strongly when stumbled upon” (Frijda, 1986, pp. 427–428). It may be that thought suppression produces a state of mind that is particularly rocky ground for such stumbling. The emotional thoughts that recur following suppression may do so with a special intrusiveness that increases their emotional and psychophysiological impact.

These two theoretical ideas suggest somewhat different courses and degrees of emotional and cognitive rebound following suppression of an emotional thought. The emotion association hypothesis suggests that expression of an emotional thought following suppression should produce greater emotion than would expression following a period of nonsuppression or expression of that emotional thought. Moreover, because this idea depends on the possibility that emotion is produced to the degree that the suppressed thought returns to mind following

suppression, it also suggests that any emotional rebound would be tied to a simultaneous conscious cognitive rebound. Degree of emotion following suppression should be linked to the presence of conscious thoughts of the target in mind during the postsuppression period.

The emotion accessibility hypothesis makes a somewhat different claim. Like the emotion association hypothesis, it suggests that emotion should occur in expression following suppression, as compared with both expression following nonsuppression or expression following expression. It also indicates that emotional responses to the thought should be particularly strong during suppression itself (when the target thought is generally suppressed from consciousness yet is highly accessible). And further, emotional responses following suppression in this view would not depend on a strong relationship between cognitive and emotional rebounds. Because intrusive thoughts during the rebound could be especially powerful, there need not be many of them to produce an emotional response. An emotional rebound could well occur, from this perspective, even in the absence of a cognitive rebound (measured in terms of degree of conscious thought of the target).

The present experiments were designed to provide a context within which these hypotheses could be contrasted. Participants in both studies were asked first to think about an old flame—either one still desired (a *hot flame*, who would thus represent the more emotional and potentially distressing end of the thought spectrum) or one no longer desired (a *cold flame*, who would thus represent the more neutral thought akin to the white bear). Then, participants were either instructed not to think about their old flame or given a comparison task; the comparison task in Experiment 1 was the suppression of a different thought, whereas the comparison task in Experiment 2 was the expression of thoughts of the old flame. In a final expression period, participants were invited again to think about their old flame in the expectation that evidence of postsuppression emotional and cognitive rebound effects could be observed.

### Experiment 1

In this study, the task of thought suppression was shared by all participants, but the target of suppression was varied to test for the special effect of suppressing thoughts of the old flame. Participants were asked first to think about their old flame, then either to suppress thoughts of the flame or to suppress thoughts of the Statue of Liberty, and then again to think about the old flame.

### Method

**Participants and design.** University of Virginia undergraduates (59 men and 60 women) participated in return for extra credit in their introductory psychology classes. On the basis of an initial questionnaire assessing participants' feelings about an old flame, participants who indicated that they still desired the relationships were assigned to a hot-flame condition and participants who indicated that they no longer desired the relationship were assigned to a cold-flame condition. Participants in the hot-flame and cold-flame groups were randomly assigned to the different manipulation period instructions—to suppress thoughts either of the old flame or of the Statue of Liberty. There were three 8-

min task periods (initial expression period, manipulation period, and final expression period).

**Procedure.** Participants were tested individually, and they began by reading instructions that asked them to think about an old flame—a “significant past romantic relationship”—and to jot down the initials of this person. Participants completed a questionnaire that asked how long the relationship lasted and how long ago it ended, and included eight items addressing current feelings for the relationship. Participants rated these on 5-point scales from 1 (*strongly disagree*) to 5 (*strongly agree*). The eight items were correlated with each other (interitem  $r_s > .43$ ,  $p < .01$  in each case) and formed a reliable scale (Cronbach's  $\alpha = .91$ ). For male participants (or with pronouns switched for female participants), the items included “I still think about her a lot,” “The thought of her still pops into my head for no reason at all,” “If she could come back into my life, I would immediately leave my other relationships,” “I have to try at times not to think of her,” “Sometimes I still get sort of an aching feeling in my heart when I think about her,” “I am still in love with her,” “I continue to have vivid daydreams about her,” and “Losing her was the worst thing that ever happened to me.” Participants were split into the hot-flame and cold-flame groups at the median of the averaged item rating (2.00).

Of the 119 participants who participated, 31 were in the hot-flame/suppress-flame condition, 29 were in the hot-flame/suppress-Statue condition, 29 were in the cold-flame/suppress-flame condition, and 30 were in the cold-flame/suppress-Statue condition. A pair of  $2 \times 2$  analyses of variance (ANOVAs) were conducted to examine relationship duration and recency as a function of old flame and instruction conditions. The relationships with the hot and cold flames differed in duration ( $M = 12.65$  vs.  $7.63$  months),  $F(1, 115) = 7.76$ ,  $p < .01$ . In addition, the relationships also differed significantly in how long ago they ended. Hot relationships ended more recently than cold relationships ( $M = 13.85$  vs.  $25.81$  months),  $F(1, 115) = 19.71$ ,  $p < .001$ . No other effects were significant.

Participants sat in an easy chair while sensors were attached for physiological measurement. The experimenter explained the function of the equipment and answered any questions regarding its use. The experimenter described the study as an experiment on the stream of consciousness and informed participants that their task was to verbalize thoughts as they occurred during several different periods. The experimenter gave instructions for reporting the stream of consciousness (see Pope, 1978) and then moved to an adjacent room and gave further instructions by intercom.

The session consisted of three experimental tasks lasting 8 min each (initial expression period, manipulation period, and final expression period), separated by several buffer periods. It began with a 5-min think-aloud period in which participants were instructed to “think about anything at all.” This was included to allow psychophysiological levels to stabilize and to familiarize participants with the basic task. The initial expression period followed, beginning with a 1-min instruction period in which participants were asked to think aloud “of the person whose initials you gave earlier” and continuing for 8 min. This was followed by a 1-min transition period and a 2-min period in which participants were encouraged to think aloud “about anything at all.” For the manipulation period, participants assigned to suppress thoughts of their past relationship were asked to “try not to think of the person whose initials you gave earlier, but mention it if you do.” Participants assigned to the suppression comparison condition were asked to “try not to think of the Statue of Liberty, but mention it if you do.” The manipulation period instructions lasted 1 min, the period itself lasted 8 min, and this was followed by a 1-min transition period and a 2-min period in which participants were asked to think aloud “about anything at all.” Then, for the final expression period, participants were given the instruction in a 1-min period to think aloud “of the person whose initials you gave earlier” and were allotted 8 min for this task.

Following this session, the physiological sensors were detached, and participants filled out the questionnaire about the relationship once again. Participants were told that some people's feelings change during the experiment, while others remain the same, and that the experimenter again wanted to see how they felt. On finishing this questionnaire, participants were debriefed in detail and dismissed.

**SCL measurement.** Measurement of SCL was accomplished as recommended by Fowles et al. (1981) for finger electrode placement. Ag/AgCl electrodes were attached with Velcro fasteners to the second phalanges of the first and third fingers of the participants' right hands. These electrodes were attached to a J & J Enterprises I-330 PC Interface System, which continuously monitored and recorded the results during the experiment. Six averages per minute were taken, and the overall average for each 8-min period was computed from these. For the analysis, a measure of SCL elevation was derived for each of the 8-min periods as the difference between mean SCL for that period and the mean for the last minute of the "think about anything at all" segment preceding that task period.

**Results and Discussion**

Analyses were conducted for SCL, for the amount of time participants talked about their old flame, for correlations between talk and SCL, and for the postexperimental readministration of the questionnaire about the participant's feelings for the old flame. No significant effects of participant gender were found for any dependent variable, so gender was not included in the analyses. Preliminary analyses of covariance (ANCOVAs) were also conducted to see whether relationship duration or relationship recency might qualify our observed findings, and effects observed in these analyses did not depart from those reported in the main analyses.

**SCL deviation.** Mean SCL deviations for the three periods (initial expression, manipulation, and final expression) in the conditions of the 2 (Flame: hot vs. cold) × 2 (Instruction: suppress flame vs. suppress Statue of Liberty) design are shown in Table 1. An ANOVA indicated a significant overall reduction in

SCL deviation over time in all groups,  $F(2, 230) = 13.79, p < .001$ . To assess the key postsuppression effects, we thus conducted a 2 (Flame) × 2 (Instruction) ANCOVA on final expression SCL deviations with initial expression SCL deviations as the covariate. (Separate ANOVAs on initial expression period and manipulation period SCL deviations indicated no significant effects.) Adjusted SCL deviations for the final period are shown in Figure 1.

The ANCOVA indicated a significant interaction of flame and instruction,  $F(1, 114) = 5.87, p < .02$ . Analysis of simple main effects revealed that hot-flame participants who had suppressed thoughts of the flame had greater subsequent SCL deviation during the final expression period (adjusted  $M = .27$ ) than did hot-flame participants who had suppressed thoughts of the Statue of Liberty (adjusted  $M = -.44$ ). SCL deviation for hot-flame participants who suppressed thoughts of the flame (adjusted  $M = .27$ ) was also greater than that for cold-flame participants who had suppressed thoughts of the flame (adjusted  $M = -.40$ ). Other simple main effects were not significant. The interpretation suggested by these results is that the hot-flame participants in this study experienced an emotional rebound following suppression of the thoughts of their old flame. Hot-flame participants who suppressed thoughts of the flame showed higher SCL following suppression as compared with hot-flame/suppress-Statue participants and with cold-flame/suppress-flame participants.

**Talking time.** The tape-recorded protocols of the stream-of-consciousness reports were coded for the number of seconds per minute that participants talked about the old flame. Two coders reached acceptable levels of effective reliability for each of the three task periods: .95 for the initial expression period, .74 for the manipulation, and .90 for the final expression period. Talking time means for the three periods (initial expression, manipulation, and final expression) in the conditions of the 2 (Flame: hot vs. cold) × 2 (Instruction: suppress flame vs. sup-

Table 1  
*Skin Conductance Level (SCL) Deviation and Talking Time in Experiment 1*

Group	Initial expression	Manipulation	Final expression
SCL <sup>a</sup>			
Hot flame			
Suppress flame	.84	.27	.31
Suppress statue	.48	.23	-.46
Cold flame			
Suppress flame	.34	.04	-.44
Suppress statue	.79	.35	-.14
Talking time <sup>b</sup>			
Hot flame			
Suppress flame	39.7	2.4	26.1
Suppress statue	44.0	3.6	34.8
Cold flame			
Suppress flame	37.2	4.4	30.0
Suppress statue	35.8	3.2	18.0

<sup>a</sup> SCL is deviation from baseline (in  $\mu$ Siemens). <sup>b</sup> Measure is seconds of talk on topic per minute.

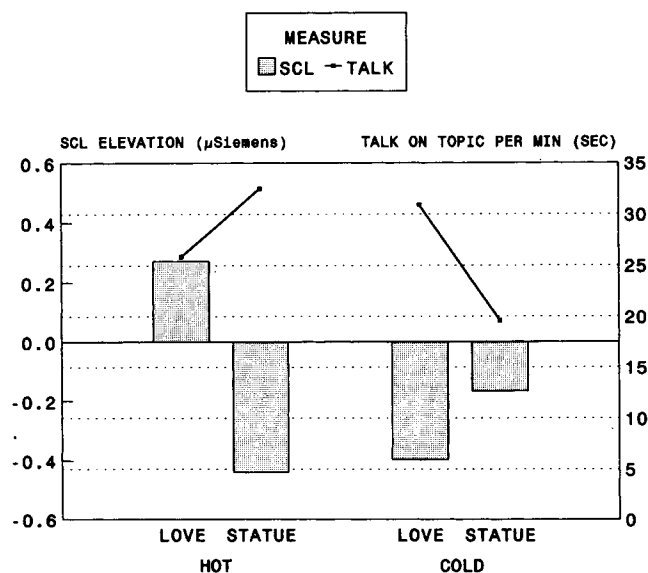


Figure 1. Adjusted means for skin conductance level (SCL) elevation and talk on topic in the final expression period for Experiment 1.

press Statue of Liberty) design are shown in Table 1. An ANOVA on these means indicated a main effect of period, with participants talking about their flames far more in the initial expression period ( $M = 39.2$ ) and final expression period ( $M = 27.2$ ) than in the manipulation period ( $M = 3.4$ ),  $F(2, 230) = 228.00, p < .001$ .

To examine postsuppression effects in detail, we conducted a  $2$  (Flame)  $\times$   $2$  (Instruction) ANCOVA on final expression talking times with initial expression times as the covariate. (Separate ANOVAs on initial expression and manipulation talking times indicated no significant effects.) Adjusted talking times for the final period are shown in Figure 1.

This analysis revealed a significant interaction of flame and instruction,  $F(1, 114) = 8.64, p < .005$ . Simple main effects analysis indicated that participants who had suppressed thoughts of the cold flame talked about the flame more (adjusted  $M = 30.9$ ) than did cold-flame participants who had suppressed thoughts of the Statue (adjusted  $M = 19.6$ ),  $F(1, 114) = 6.92, p < .02$ . Also, hot-flame participants who had suppressed thoughts of the Statue talked more about the flame in the final period (adjusted  $M = 34.8$ ) than did cold-flame participants who had suppressed thoughts of the Statue (adjusted  $M = 18.0$ ),  $F(1, 115) = 12.32, p < .005$ . This pattern in the final expression period suggests that hot-flame participants talked at length about their hot flames no matter what prior suppression had occurred, but that participants only continued to talk extensively about their cold flames when they had just previously suppressed thoughts of the cold flame. This effect indicates a relative rebound of conscious thoughts of the suppressed thought following suppression among participants who suppressed thoughts of a cold flame. Relative to cold-flame participants who suppressed thoughts of the Statue, in other words, cold-flame participants suppressing thoughts of the flame maintained a level of talk in the final period indicating continued preoccupation with the topic. This conscious preoccupation was not observed among the hot-flame participants following suppression of thoughts of the flame, even though it was among the hot-flame participants that the SCL deviations indicated greater emotionality following suppression of the flame.

*Correlations of talk and SCL.* Given the apparently different patterns of talk and SCL following suppression in the hot-flame and cold-flame conditions, it is worth considering how these variables are related. We did this in two ways. First, we examined the within-cell correlations between SCL deviation and talking time across participants in the final expression period. The correlations in this analysis were nonsignificant.

Another way to examine such covariation is to compute the correlation between SCL and talk on topic over time within each participant (cf. Pennebaker, 1982; Wegner et al., 1990). This was done by minute across the 8 min in each period for each participant. These  $r$  values were then converted to Fisher's  $Z$  scores and submitted to a  $2 \times 2 \times 3$  ANOVA. No significant effects were found. The correlations were generally low, with the highest (mean  $r = .09$ ) occurring among hot-flame participants suppressing in the manipulation period. This is consistent with the positive correlation between talk and SCL over time during suppression of exciting thoughts found by Wegner et al. (1990).

These correlational analyses, in sum, indicate no strong connection between the cognitive and emotional rebound

measures during the final expression period. Covariation of these measures within and across conditions, and covariation of the measures over time within participants also assessed within and across conditions, revealed little to suggest a link between electrodermal activation and the degree of conscious thought of the old flame during the final period when the rebounds were observed.

*Postexperimental questionnaire.* The readministration of the relationship questionnaire following the experimental sessions revealed no noteworthy changes in participants' reports of their desire for the old flame. An ANOVA treating the overall index of desire for the old flame as a pre-post repeated measure showed no significant main effect for the repeated measure or interactions of the other variables with the repeated measure.

*Summary.* The results of this study suggest that the suppression of thoughts of an old flame may promote the persistent psychological presence of the old flame in the person's mind—but in two quite different senses. For individuals who were not particularly desirous of their old flame, suppression created a later tendency to dwell on thoughts of the old flame when expression of these thoughts was invited. This echoes the suppression-induced rebound effect observed by Wegner et al. (1987). A different effect was observed for individuals who still desired a relationship with their lost love. For these people, suppression did not induce a preoccupation with the old flame measurable as an increased tendency to talk about the person later on, but rather created an elevated electrodermal response during the later opportunity to talk. This protracted psychophysiological reaction was not observed among participants who merely suppressed thoughts of the Statue of Liberty, nor was it present among participants for whom the old flame was no longer attractive.

These findings suggest that the association hypothesis may not account for emotional rebound effects as well as the accessibility hypothesis does. After all, if the cognitive and emotional rebounds occur in different groups of participants, the role of conscious cognition in fueling the emotional rebound certainly is cast into doubt. The absence of correlations between the talk and SCL measures similarly undermines the association account of the emotional rebound, and we are left with the inference that accessibility or some other process may be responsible for the observed SCL effects. The further complication, however, is that neither of these accounts offers an immediate explanation for an additional surprising effect encountered in this study—the absence of any cognitive rebound in the hot-flame conditions. Participants in these conditions appeared simply to talk a lot about their old flame in the final expression period, independent of whether they had previously suppressed these thoughts, and it was not obvious why they might have showed no conscious preoccupation in this last period even while their SCL deviations following suppression of the hot flame were notably elevated.

## Experiment 2

This study was designed to determine whether the results of the prior study could be replicated and to learn how suppression of thoughts of the old flame might compare in its effects with expression of those thoughts. The instruction to suppress

thoughts of the Statue of Liberty in Experiment 1, after all, might be understood not merely as a control condition to which suppression of old flame thoughts might be compared, but also as a distraction condition that could have its own influence. It might be argued that participants suppressing thoughts of the old flame in that experiment were sensitized to such thoughts by virtue of the continued contact with them afforded by suppression—in contrast to the compelling distraction allowed by the Statue-suppression instruction—and that their apparent rebounds might be better understood as an effect of continued thought about the old flame. To examine this, we designed this study to include the same instructions for suppression of the old flame used in the prior study, but now to be compared with the influence of direct instructions to think about the old flame in the manipulation period. Given the findings of the prior study, we expected suppression to yield a cognitive rebound among cold-flame participants and an emotional rebound among hot-flame participants—in both cases as compared with participants who were directed to think about their old flame during the manipulation period.

### Method

**Participants and design.** University of Virginia undergraduates (47 men and 52 women) participated in return for extra credit in their introductory psychology classes. Participants completed the same sequence of tasks as in the first experiment, with the exception that the comparison group instruction was changed for the manipulation period. Comparison participants in this study were instructed to think about their old flame. The instruction variable, therefore, included suppression and expression conditions.

**Procedure.** Participants were again tested individually and began by being instructed to think of an old flame and to identify this person by jotting down his or her initials. Again, participants were divided into hot-flame and cold-flame groups on the basis of their responses to a questionnaire on their current desire for this relationship. The sample

was split at the median (2.37) into hot-flame and cold-flame groups. Reliability of this measure was again high (Cronbach's  $\alpha = .90$ ; inter-item  $r_s > .29$ ,  $p < .01$  in each case).

Of the 99 participants, 26 were in the hot-flame/suppression condition, 24 were in the hot-flame/expression condition, 23 were in the cold-flame/suppression condition, and 26 were in the cold-flame/expression condition. ANOVAs were conducted to examine the duration and recency of hot versus cold relationships (one participant did not answer these questions). Both differed significantly between the hot- and cold-flame groups; relationships with hot flames lasted longer than relationships with cold flames ( $M = 16.71$  vs. 6.80 months),  $F(1, 94) = 20.27$ ,  $p < .001$ , and also ended more recently ( $M = 12.96$  vs. 23.67 months),  $F(1, 94) = 8.96$ ,  $p < .005$ .

As in the prior study, participants in the suppression condition were asked in the manipulation period to "try not to think of the person whose initials you gave earlier, but mention it if you do." Participants in the expression condition were asked during the manipulation period to "continue thinking of the person whose initials you gave earlier." SCL and talk were monitored as before.

### Results and Discussion

As in the prior study, no significant effects of participant gender were found for any dependent variable, so gender was not included in the analyses. And again, duration and recency of the relationship were entered as covariates in preliminary analyses and showed no significant effects qualifying those reported below.

**SCL deviations.** A  $2 \times 2 \times 3$  ANOVA on SCL elevation showed a significant main effect for period,  $F(2, 190) = 28.73$ ,  $p < .001$ , indicating an overall trend for SCL to decline over time (see Table 2). As in the prior study, then, to examine specific effects in the final expression period we conducted a  $2 \times 2$  ANCOVA in which SCL deviations in the initial expression period were the covariate. (Individual ANOVAs for each earlier period revealed no significant effects.) Adjusted SCL deviations for the final period are shown in Figure 2.

The ANCOVA indicated a significant interaction of flame and instruction,  $F(1, 94) = 5.51$ ,  $p < .03$ . Analysis of simple main effects revealed that hot-flame participants who had suppressed in the manipulation period had greater subsequent SCL deviation during the final expression period (adjusted  $M = .33$ ) than did hot-flame participants who had expressed in the manipulation period (adjusted  $M = -.11$ ). SCL deviation for hot-flame participants who suppressed (adjusted  $M = .33$ ) was also greater than that for cold-flame participants who had suppressed (adjusted  $M = -.49$ ). Other simple main effects were not significant. The interpretation suggested by these results is that the hot-flame participants experienced an emotional rebound following suppression of the thoughts of their old flame. This pattern replicates Experiment 1 quite precisely, in showing that hot-flame participants who suppressed thoughts of the flame showed higher SCL following suppression than cold-flame participants who had suppressed thoughts of the flame. In addition, this study added the finding that hot-flame participants who had suppressed had higher subsequent SCL deviations than did hot-flame participants who had previously expressed thoughts of the flame. These results rule out the possibility left open by the first study, then, that hot-flame participants who suppressed the flame had merely experienced greater exposure to the unwanted thoughts and had become

Table 2  
Skin Conductance Level (SCL) Deviation and  
Talking Time in Experiment 2

Group	Initial expression	Manipulation	Final expression
SCL <sup>a</sup>			
Hot flame			
Suppress flame	.91	.47	.33
Express flame	.65	-.06	-.12
Cold flame			
Suppress flame	1.03	.14	-.49
Express flame	.59	-.03	-.16
Talking time <sup>b</sup>			
Hot flame			
Suppress flame	31.3	5.8	20.2
Express flame	36.8	28.3	26.6
Cold flame			
Suppress flame	26.3	2.5	19.2
Express flame	29.9	18.9	12.0

<sup>a</sup> SCL is deviation from baseline (in  $\mu$ Siemens). <sup>b</sup> Measure is seconds of talk on topic per minute.

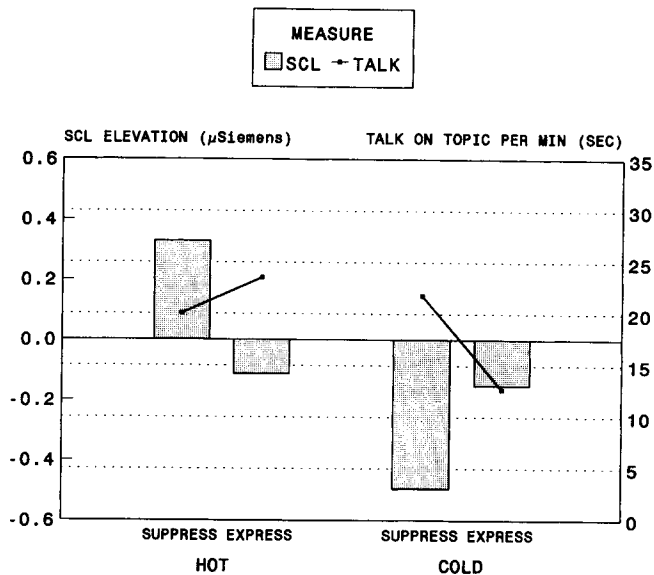


Figure 2. Adjusted means for skin conductance level (SCL) elevation and talk on topic in the final expression period for Experiment 2.

more emotional than comparison participants as a result. Here, participants who suppressed the hot flame showed greater electrodermal response to those thoughts than participants who had just previously had maximal exposure, in that they had expressed hot-flame thoughts.

**Talking time.** The tape-recorded protocols of the stream-of-consciousness reports were coded for the number of seconds per minute that the participant talked about the old flame. Two coders reached acceptable levels of effective reliability for each of the three task periods: .99 for the initial expression period, .98 for the manipulation, and .98 for the final expression period. Mean talk times are shown in Table 2. As would be expected, the overall pattern of means shows that participants talked more on topic when under expression instructions than when under suppression instructions.

The pattern of means in the final expression period was again examined in a  $2 \times 2$  ANCOVA in which talking times in the initial expression period served as the covariate (see Figure 2). This analysis showed a significant interaction of flame and instruction,  $F(1, 94) = 7.37, p < .01$ . Simple main effects tests revealed that participants who had suppressed the cold flame talked about the flame more (adjusted  $M = 21.8$ ) than did cold-flame participants who had previously expressed (adjusted  $M = 12.7$ ),  $F(1, 94) = 8.08, p < .005$ . Also, hot-flame participants who had previously expressed talked more about the flame in the final period (adjusted  $M = 23.5$ ) than did cold-flame participants who had previously expressed (adjusted  $M = 12.7$ ),  $F(1, 94) = 11.13, p < .001$ . As in this prior study, this pattern in the final expression period suggests that hot-flame participants talked at length about their hot flames no matter what prior manipulation had occurred, but that participants only continued to talk extensively about their cold flames when they had just previously suppressed thoughts of the cold flame. Cold-flame participants who had just expressed thoughts of their flame talked less of this person when asked to do so again, whereas participants in all the other conditions retained their en-

thusiasm for the topic. This effect indicates a rebound of conscious thoughts of the suppressed thought following suppression among participants who suppressed thoughts of a cold flame, in the sense that participants in this condition compared with others discussing the cold flame remained on this topic. This sort of conscious preoccupation was not observed among the hot-flame participants following suppression of the flame, even though it was among these participants that greater SCL deviations were found.

**Correlation of talk and SCL.** Correlations were again calculated between SCL and talk times both across participants within condition and by minute within participants for each of the periods. As in the prior study, no significant correlations were observed across participants in the different conditions. And as in the prior study, a Flame  $\times$  Instruction  $\times$  Period ANOVA conducted on Fisher's Z-transformed within-subject correlations revealed no reliable effects. Also as in that study, however, the highest mean correlation (mean  $r = .21$ ) occurred among hot-flame participants suppressing in the manipulation period. This is again consistent with the positive correlation between talk and SCL over time during suppression of exciting thoughts found by Wegner et al. (1990). In sum, these results resembled the prior results in uncovering no significant linkage between SCL deviation and talking time in the final expression period for any experimental condition.

**Postexperimental questionnaire.** As in Experiment 1, the readministration of the relationship questionnaire following the experimental sessions revealed no noteworthy changes in participants' reports of their desire for the old flame.

**Summary.** The results of this experiment substantiate the conclusions drawn from the prior study in several respects. We again found different kinds of rebound effects following suppression of the relationships that were no longer desired and those still desired. Suppression of thoughts of the cold flame, as compared with expression of those thoughts, yielded greater time spent talking of those thoughts when participants were subsequently invited to express them. As in the prior study, this effect appears to be attributable to a drop in interest among cold-flame participants who did not suppress, paired with the relative maintenance of interest among cold-flame suppression participants (that resembled the overall maintained interest in the hot-flame participants). Suppression of thoughts of the hot flame, in turn, produced no such differential conscious preoccupation, but instead introduced an elevated electrodermal response during the subsequent period of expression. Correlations between talk and SCL in the final expression period showed no clear connection between these measures of thought and emotion in any condition.

The use of expression instructions during the manipulation period in this study allows a further conclusion. Apparently, the results for SCL observed in Experiment 1 cannot be ascribed to a decrement in emotional responding that might result from distraction in the comparison group. Participants in the comparison groups in this study were given no distraction from their old flame at all, as they were asked specifically to talk about the old flame. Yet the suppression of thoughts of the hot flame showed increments in SCL in comparison with this condition.

### General Discussion

These findings shed some new light on the processes that arouse obsessive romantic thoughts and emotions. Thought

suppression, it seems, might play a role in the recurrence of both thought and emotion—but under quite different initial conditions. Participants in these studies were asked to suppress thoughts of a lost love, and influences of this suppression were found afterwards when the participants were invited to return to these thoughts. When the suppression was directed toward an old flame for whom they were still yearning, the result of encouraging suppression was that participants subsequently became more emotionally reactive—as measured by SCL—when they were directed to think of their love again. In the first experiment, this emotional rebound was found to occur following suppression of the emotional thought of a desired old flame, in that SCL was greater for participants who had suppressed this thought than for participants who had suppressed the thought of the Statue of Liberty. In the second experiment, the emotional rebound was found to follow suppression again, this time among participants who had suppressed the thought of a desired old flame in comparison with those who had been asked to express this thought.

Postsuppression rebound effects were also observed for participants who performed these tasks while focused on an old flame whom they no longer desired. However, the rebound in these cases took the more familiar form of a relative elevation of talking about the topic observed in prior research (Wegner, 1992). In the first experiment, participants who had suppressed thoughts of an old flame that they no longer desired later expressed thoughts of this person at greater length than participants who had suppressed thoughts of the Statue of Liberty. The second experiment again found this effect following suppression of a no-longer-desired relationship, but now in comparison to the prior expression of such thoughts. The emotional and cognitive rebound effects thus appear to follow consistently from specifiable conditions. The cognitive rebound occurred for a thought topic that participants seemed unlikely to suppress in daily life, whereas the emotional rebound (and no cognitive rebound) occurred for a thought topic that seemed more likely to be the target of natural suppression.

Before we go on to suggest interpretations for these results, it is worth noting two caveats that may limit their generality. First, we selected participants who reported a strong continued longing for an old flame and distinguished them from those who reported a weaker desire. Thus, it is possible that other individual differences that are correlated with the tendency to report strong versus weak attachments to lost loves could be causes of the observed effects. These were unmeasured and are not obvious, of course, but it is important to recognize that the hot versus cold flame variable was not manipulated experimentally in these studies. The second concern we should voice at this point regards the generalizability of electrodermal findings to other measures of emotion. The SCL findings observed in these studies indicate only that the suppression of emotional thoughts can influence one psychophysiological indicator of an emotional response and should not be interpreted to suggest that general sympathetic activation has occurred.

Now, to sort out what these findings mean, it is useful to return to our initial concerns. These studies were undertaken to examine how the cognitive rebound discovered for the suppression of neutral thoughts might manifest itself in the domain of emotionally charged thoughts of past relationships. The studies

we have conducted point to the possibility that there may be quite different effects of thought suppression for the “cool” thoughts of a no-longer-desired relationship and the “hot” thoughts of a still-desired old flame. The key question, then, is just why such different effects might occur. This question can be divided into three parts: (a) Why is there a cognitive rebound for cold flames? (b) Why is there an emotional rebound for hot flames? and (c) Why is there not a cognitive rebound for hot flames?

#### *Why the Cognitive Rebound for Cold Flames?*

The cognitive rebound for cold flames, to begin with, seems to resemble the rebound effects observed in prior research using measures of conscious thought reporting (e.g., Wegner et al., 1987). Cold-flame participants who suppressed thoughts of the flame later expressed these thoughts at greater length in both studies than did cold-flame participants who did not suppress thoughts of the flame. The level of conscious thought recurrence in this rebound was not dramatic, in that it did not exceed levels of thinking in the initial expression period. And these cold-flame participants who showed a relative rebound following suppression did not think about the flame more than did hot-flame participants following suppression. Rather, the cold-flame participants in both studies who did not suppress in the manipulation period seemed to become particularly uninterested in the flame later on as compared with all other groups. It is primarily within the cold-flame conditions, then, that this relative rebound is manifested. The question of why this cognitive rebound occurred is not addressed by our data, and the issue of whether accessibility, association, or some further process is responsible cannot be decided given this evidence alone.

#### *Why the Emotional Rebound for Hot Flames?*

The question of why there is an emotional rebound for hot flames is more complicated, but our findings do have more pointed implications for an answer. Clearly, emotional rebound does not occur because of the cognitive rebound, as these effects appeared under different conditions. Moreover, the SCL and talking time variables were generally uncorrelated across participants and within participants over time in the final expression period in all conditions, indicating a fundamental disjunction between these effects. These observations weigh in favor of the emotion accessibility hypothesis of the emotional rebound and weigh against the emotion association hypothesis. According to the emotion accessibility hypothesis, emotional reactivity may be produced following the suppression of an emotional thought because that thought is made more accessible. The thought might not appear in consciousness very often or at length, and so might not register at all in our measures of talking time, but its accessibility would tend to produce intrusive and intermittent recurrences of the thought during subsequent expression (see Wegner et al., 1993). Such intermittence, in turn, could prompt emotional and electrodermal reactions. This hypothesis is consistent with the observed independence of the emotional and cognitive rebounds in both studies.

The emotion association hypothesis holds that the emotional rebound occurs as the result of conscious recurrences of the



suppressed thought, and this idea was not supported by our findings. Although there was a hint of an associative connection during suppression of the hot flame—a nonsignificant inflation of the correlation of SCL and talking time—this connection was no longer present in the final expression period. The data thus indicate that a simple model linking conscious thought occurrence with associated emotional arousal cannot account for the emotional rebound.

A decision for the accessibility hypothesis over the association hypothesis does not rule out other hypotheses for the emotional rebound, of course, and it is worth reviewing some of these as well. One possible account of this effect would be to say that the suppression of the thoughts of the hot flame prevented participants from habituating to those thoughts, and so prolonged their emotional reaction into the postsuppression period. This blocked-habituation explanation is especially apropos to Experiment 2, in that participants who suppressed the hot flame showed a stronger subsequent emotional response than did participants who had expressed thoughts of the hot flame in their manipulation period. It is not very useful, however, in accounting for the results of Experiment 1. In that study, participants who were suppressing the hot flame showed about the same level of talk of this person during the manipulation period as did participants who were suppressing the thought of the Statue of Liberty. Thus, they had no less contact with hot flame thoughts during suppression than did participants in the comparison condition. Yet the participants who suppressed the hot flame had a stronger postsuppression emotional rebound than did the comparison participants. An explanation of the electrodermal rebound effect based on blocked habituation alone, then, does not allow the full interpretation of these results.

A different account of the emotional rebound involves interpreting SCL as a specific psychophysiological indicator of inhibition. Pennebaker, Hughes, and O'Heeron (1987) argued, in an extension of the work of Gray (1975) and Fowles (1980), that the elevation of SCL often occurs as a response to cognitive inhibition (rather than as an indicator of general sympathetic nervous system arousal). By this account, it could be that what we called an emotional rebound following the suppression of thoughts of a hot flame is really the psychophysiological result of participants' attempts to inhibit thoughts of this topic even as they have been instructed to think about it. The finding that SCL effects do not occur for the cold flame topic, however, suggests that it is a mistake to equate SCL elevation with inhibition generally (cf. Wegner et al., 1990). So this explanation also does not fully encompass our findings.

Our preferred explanation of the emotional rebound at this time is the emotion accessibility hypothesis—that emotional thoughts are accessible following suppression, and that they may thus return to mind intrusively and disturbingly. Drawing on Proust's Law of Intermittence mentioned earlier, we suggest that the way emotional thoughts pop into mind during the rebound period may amplify their emotion-producing power. Although the person may not think of the hot flame at very great length after suppression, it still may be that when these thoughts do return, they occur with such unexpected force and immediacy that they generate a stronger emotional reaction than thoughts that are encountered intentionally. This explanation would predict the emotional rebound we found, it would ac-

count for the lack of an SCL difference between hot and cold flames in the initial expression period (when these thought targets were being entertained on purpose and so were not popping into mind intrusively), and would also handle the observation that the duration of talk about the hot flame in the expression period following suppression of hot flame thoughts was not correlated with SCL in either of our studies. A few intrusions would be all that is needed, perhaps, to fuel the emotional reaction. Direct measures of the accessibility of the suppressed emotional thoughts were not taken in these studies, however, so it remains for future research to assess the link between such accessibility and the electrodermal evidence of an emotional rebound.

### *Why No Cognitive Rebound for Hot Flames?*

The third question about these results is why the cognitive rebound is not observed following the suppression of the still-desired relationship. One possibility for this is a ceiling effect. The hot-flame participants in this study were talking about their flame in the final period just about as much as were the cold-flame participants who had just suppressed the thought. Perhaps all the hot-flame participants had levels of thinking about their flame that were so high that no further thinking could be gauged in this paradigm. An inspection of the talking time means for hot flames reveals that these participants were talking on topic only about half the time, however, so this ceiling interpretation seems untenable.

Kelly and Kahn (1994) offered a different suggestion in interpretation of the similar effect they observed. They proposed that the natural suppression history for a thought that is truly unwanted (such as a hot flame) might involve the formation of many connections to contextual distractors outside the laboratory, and hence lead to less reminding during the rebound period. Yet another possibility is that people become somewhat expert at suppressing their truly unwanted thoughts, and that this ability helps them to overcome cognitive rebounds (cf. Wegner, 1994a). We believe a still different possibility may account for this effect. Perhaps the absence of the cognitive rebound for hot topics reflects defensive suppression. In this account, the cognitive rebound is itself suppressed by participants in this setting in the hope of avoiding their own ongoing emotional reaction.

In essence, this defensive suppression hypothesis is simply the realization that thought suppression is more likely to occur for emotional thoughts in the first place. That is, although people (outside the Arctic circle) are unlikely to have a good reason to avoid the thought of a white bear unless they are asked to do so in an experiment, thoughts like those of still-desired lost loves are ones that would naturally be suppressed—both in daily life and in the confines of the experiment. An experimental instruction to suppress such a thought would thus be added to the person's chronic level of suppression of that thought, and an experimental instruction to go ahead and think about it, in turn, might be counteracted by the person's tendency chronically to suppress that thought. At the extreme, it might even be that any rebound of an emotional thought would be met by a defensive recoil from the experienced emotion. The person might renew attempts to suppress the thought even under instructions to ex-

press it. This suggests, then, that whereas the suppression of an emotional thought produces subsequent emotion, it also produces a desire to continue suppressing the conscious thought.

We found some incidental evidence for defensive suppression in the think-aloud protocols in the hot-flame conditions. During the expression period, for example, one participant said, “[He] is just popping through my mind every five minutes, but I’m not saying anything about him because I don’t really feel like crying and if I keep talking about him I might shed a tear or two.” Another remarked, “I’m thinking about her right now. I haven’t thought about her for a week or so. . . I don’t want to be thinking about her. . . I don’t like this feeling.” It may be, then, that the absence of the cognitive rebound among participants experiencing the emotional rebound is the result of a choice to suppress thoughts of the old flame in subtle defiance of the experimenter’s instructions. Mistaking the voluntary expression of thoughts about the hot flame for the cause of their suppression-induced emotional discomfort, participants might actively avoid the cognitive rebound even while experiencing the rebounding emotion. Future research might examine the possibility that defensive processes are aroused by the suppression of emotional thoughts.

### Conclusions

Based on the findings of this research, it seems that suppression-oriented advice may not be effective for a person mourning the loss of a past relationship. Although not thinking about painful thoughts may seem like a reasonable coping strategy to adopt, trying to forget might not only prolong the misery, but make it worse. Suppressing thoughts of a no-longer-desired relationship may increase the frequency of these thoughts, and suppressing thoughts of a still-desired relationship may heighten emotional reactions once suppression is no longer applied. If one tries to get a past love off one’s mind, one may find like Hank Williams that “all night long I’ve cried.”

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