Busy Perceivers and Ineffective Suppression Goals: A Critical Role for Distracter Thoughts

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Pers Soc Psychol Bull 2008; 34; 706 originally published online Mar 4, 2008;
DOI: 10.1177/0146167207313732

Busy Perceivers and Ineffective Suppression Goals: A Critical Role for Distracter Thoughts

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With limited cognitive resources, suppressing thoughts can be ineffective. The detrimental effects of cognitive load on suppression have typically been attributed to increased accessibility of avoided thoughts. However, little research has examined distracter thoughts and their contribution to these effects. In three studies, participants pursued suppression goals related to social judgments (e.g., avoid negative thoughts about a target's performance) with sufficient or diminished cognitive resources. Compared to suppressors not under cognitive load, suppressors under load drew more negative social inferences when pursuing a negative suppression goal and more positive inferences under a positive suppression goal; load did not similarly disrupt a concentration goal (i.e., focus on positive thoughts). Across studies, load reduced high-quality oppositely valenced distracter thoughts, and these distracter thoughts mediated the detrimental effects of load on social inferences. The discussion focuses on mechanisms underlying the effects of load on suppression, implications, and future directions for research on ironic processes.

Keywords: *thought suppression; social inferences; goal pursuit; ironic process theory; self-regulation*

As conscientious social perceivers, people may try to suppress certain thoughts about others, such as thoughts that are stereotypical or negative (e.g., Monteith, Sherman, & Devine, 1998). However, despite their good intentions, these individuals ultimately may make social judgments that are congruent with those avoided thoughts, especially when they lack sufficient resources to devote to the task of social perception. Thus, suppression attempts may be relatively ineffective when cognitive resources are limited. To explain this ineffectiveness, previous research has demonstrated that suppressed thoughts flood into consciousness when cognitively busy people pursue suppression goals; these accessible thoughts may then influence relevant judgments.

In the current studies, we took a different approach to examine the process underlying the detrimental effects of cognitive load on the pursuit of suppression goals related to social inferences. Instead of focusing on the accessibility of suppressed thoughts, we focused on the quality of the thoughts people consciously generate to distract themselves from the undesired thoughts. Specifically, we examined how such distracter thoughts might themselves contribute to the effects of load on relevant social inferences when people pursue suppression goals. We expected this research to contribute to our understanding of suppression strategies and ironic processes by providing initial evidence for an alternative mechanism through which suppressors' judgments and behaviors may come to appear more congruent with avoided thoughts under load.

SUPPRESSION AND IRONIC PROCESS THEORY

Suppression techniques often work well to reduce the frequency of undesired thoughts (for a review, see Wegner, 1994). But when individuals confront substantial cognitive demands while engaging in suppression, such as distractions or time pressure (e.g., Wegner &

Authors' Note: Robert D. Mather is now at the University of Central Oklahoma. This research was supported by a Texas Tech University Research Enhancement Fund grant awarded to Darcy Reich. We thank Mario Casa de Calvo, Jeff Larsen, Monica Munoz, Brandon Randolph-Seng, and Leigh Ann Vaughn for their helpful comments on previous drafts. Partial reports of these data were presented at the 2004 and 2005 meetings of the Society for Personality and Social Psychology. Correspondence may be addressed to Darcy A. Reich, Department of Psychology, MS 2051, Texas Tech University, Lubbock, TX 79409; e-mail: darcy.reich@ttu.edu.

PSPB, Vol. 34 No. 5, May 2008 706-718
DOI: 10.1177/0146167207313732

Erber, 1992; Wegner, Erber, & Zanakos, 1993), or when active attempts to avoid certain thoughts are terminated (e.g., Macrae, Bodenhausen, Milne, & Jetten, 1994; Monteith, Spicer, & Tooman, 1998), suppression strategies can lead unwanted thoughts to come to mind with increased frequency. These unwanted thoughts may influence subsequent judgments and behavior, and therefore may have important interpersonal consequences. For example, individuals who attempt to suppress stereotypes show increased accessibility of the stereotypes, greater use of stereotypes in describing a target person, and stereotype-consistent behavior toward a stereotyped group member after suppression (Macrae et al., 1994).

The ironic process theory of mental control (Wegner, 1994, 1997) is central to understanding why suppression strategies can be difficult to pursue successfully. This theory contends that any act of mental control involves two simultaneous processes. The conscious, effortful *operating process* searches for distracters or allowed thoughts that will promote the preferred state of mind. Whenever an avoided thought intrudes upon consciousness, the operating process is mobilized to recruit distracter thoughts to keep the avoided thought at bay. The more efficient *monitoring process* constantly checks for any indication of the avoided thoughts and typically remains outside of awareness. When the monitoring process identifies an avoided thought, it brings that thought into awareness, which triggers further efforts by the operating process. During the suppression of negative thoughts, for example, the effortful operating process searches for any thoughts (e.g., positive, neutral, irrelevant) reflecting the absence of negative thoughts, whereas the monitoring process searches exclusively for negative thoughts.

The most common explanations for the ironic effects of suppression are based on principles of accessibility (for other explanations, see Förster & Liberman, 2001; Gordijn, Hindriks, Koomen, Dijksterhuis, & van Knippenberg, 2004; Liberman & Förster, 2000). Specifically, if the effortful operating process is terminated or disrupted, the contents of the monitoring process may more easily and frequently rise into awareness and the avoided thought may become highly accessible, either because it is repeatedly activated by the monitor during suppression (Wegner, 1992; for empirical evidence, see Macrae et al., 1994; Wyer, Sherman, & Stroessner, 1998) or because it becomes associated with available distracter thoughts (Wegner, 1992; for empirical evidence, see Wegner, Schneider, Carter, & White, 1987; Wegner, Schneider, Knutson, & McMahon, 1991). Indeed, several studies using measures of cognitive accessibility have shown that when the operating process is terminated or severely disabled, suppressed or goal-inconsistent thoughts can come to mind more frequently and become hyperaccessible (e.g., Macrae et al., 1994; Monteith, Spicer, et al., 1998; Page, Locke, & Trio, 2005; Wegner & Erber, 1992; Wegner et al., 1993; Wyer et al., 1998).

However, ironic process theory also suggests another mechanism through which the detrimental effects of load on suppression may occur. If the capacity to engage in controlled processing is reduced, rather than eliminated, the diminished operating process still may keep unwanted thoughts at bay by generating appropriate distracters. However, because the process of choosing the best distracters requires ample resources (Wegner & Erber, 1992), distracters chosen under cognitive load may be lower in quality than distracters chosen under optimal processing conditions. Based on associative network theory (e.g., Anderson, 1976; Anderson & Bower, 1973), the best way for people to distract themselves from specific thoughts is to think about something emotionally and semantically unrelated to these thoughts. For example, if people are trying to avoid stereotype-related or negative thoughts, the best distracters might be counterstereotypical thoughts and positive thoughts, respectively. Theoretically, the operating process may be qualitatively more or less effective depending on the nature of the distracters it generates (Page et al., 2005; Renaud & McConnell, 2002; Wegner et al., 1987; Wenzlaff, Wegner, & Roper, 1988). Indeed, providing people with a specific, effective distracter to use during suppression reduces the frequency with which they mention the suppressed thought following suppression (Wegner et al., 1987). However, few studies have closely examined the nature and quality of the distracters that are spontaneously chosen. One notable exception is a set of studies by Wenzlaff et al. (1988), in which individuals who were depressed spontaneously selected negative distacters during suppression and correspondingly experienced hyperaccessibility of specific, unwanted negative thoughts after suppression. These findings suggest that poor distracter choice may be associated with less successful suppression.

Most research in the tradition of ironic process theory has focused on the effects of cognitive load on the accessibility of avoided thoughts, rather than on its effects on the output of the operating process. However, if cognitive load disrupts the operating process, which in turn frees up the monitoring process, then the disruptive effects of load on suppression attempts should be associated with fewer consciously generated high-quality distracter thoughts, in addition to greater accessibility of avoided thoughts. In fact, if suitable, but low-quality, distracters are recruited by the operating process each time an avoided thought intrudes upon

consciousness, then the monitoring process may still be operating under considerable constraints. The low-quality distracters could account for the poor outcomes associated with suppression strategies under load, regardless of whether the avoided thought becomes more accessible. For example, when trying to suppress stereotypes, perceivers under cognitive load may be relatively less likely to recruit strong counterstereotypical thoughts as distracters, compared to perceivers with ample cognitive resources. Perceivers who generate less compelling distracters should have judgments that appear more congruent with the stereotype than should those who generate potent counterstereotypical thoughts. As a first step in examining this alternative, the current studies focused on the nature of the conscious distracter thoughts that are generated under load and no load and on the degree to which social inferences are consistent with the suppression goal as a function of those distracters.

OVERVIEW OF CURRENT RESEARCH

Our primary aims were to show that the detrimental effects of cognitive load on the pursuit of suppression goals would extend to socially relevant goals in the domain of interpersonal judgments and to examine the process associated with these effects. Numerous studies have provided evidence that load disrupts suppression because the monitoring process is less constrained and brings avoided thoughts into awareness with increased frequency, making them highly accessible. We suggest that, alternatively or simultaneously, load may disrupt pursuit of suppression goals because the relatively effortful operating process is compromised and fails to generate good distracter thoughts. If so, then participants who pursue a suppression goal under load should generate fewer high-quality distracter thoughts than should those who do so without a cognitive load. To our knowledge, the current studies are the first to explicitly examine the contribution of the operating process in explaining the ineffectiveness of suppression under cognitive load conditions.

To examine this idea, we exposed participants to a complex social stimulus that should elicit a variety of neutral, negative, and positive thoughts, and examined both thought reports and social inferences. Participants attempted to suppress valenced thoughts about another person's performance and ability while forming an impression of that person's performance and ability, then reported their impressions and thoughts.[1] We manipulated cognitive load and induced goals of suppressing negative thoughts (Study 1) or suppressing positive thoughts (Study 2) about the target's behavior. In Study 3, we further explored the process of disruption under load by comparing the negative suppression goal to a concentration goal of focusing on acceptable positive thoughts, which, theoretically, should be less susceptible to disruption (Wegner, 1994).

Whereas most studies have assessed intrusions by the monitoring process and have used these intrusions to infer that the operating process had been compromised or disrupted (e.g., Wegner & Erber, 1992), we attempted to define and examine the effectiveness of the operating process more directly by examining the nature of the distracter thoughts generated by participants. Based on associative network theory (e.g., Anderson, 1976; Anderson & Bower, 1973), the best distracters for negative thoughts should be positive ones (Wegner, 1992; Wenzlaff et al., 1988; Wenzlaff & Wegner, 2000). When trying to suppress negative thoughts about the target person in the current studies, perceivers who generate very positive thoughts ("he completed the puzzles so quickly!") should be more successful and ultimately form more positive impressions of the target than should those who merely generate neutral thoughts ("he moved the puzzle pieces around"). For this reason, we considered reported thoughts that were opposite in valence to the avoided thoughts (for the suppression goals) and congruent in valence with the desired thoughts (for the concentration goal in Study 3) to be "high-quality" distracters, indicative of a more effective operating process than neutral thoughts.

When participants pursued suppression goals, we expected that, in comparison to no-load conditions, (a) cognitive load would disrupt goal pursuit and lead social inferences to appear more congruent with avoided content; (b) cognitive load would diminish the quality, but not the overall quantity, of distracter thoughts generated by the operating process; and (c) high-quality, oppositely valenced distracter thoughts would be associated with social inferences that were less congruent with avoided content and, therefore, more consistent with the suppression goal. Such findings would demonstrate that the nature of spontaneously generated distracter thoughts may play an important, though often overlooked, role in the successful pursuit of thought suppression.

STUDY 1

In Study 1, we examined whether and how a social judgment goal of avoiding negative thoughts about a target's ability and performance when evaluating that person's ability and success might differ in effectiveness under load and no-load conditions. We expected that participants under cognitive load would draw more negative target inferences than would those not under

load. Participants under load should report fewer positive thoughts (and perhaps more neutral thoughts) than those not under load, providing evidence that the operating process was less able to generate high-quality distracters under load.

Method

Participants

Forty-one undergraduates (21 women, 20 men) who were enrolled in general psychology participated in exchange for course credit. Each session consisted of 1 to 4 participants, and each participant was assigned to an individual cubicle.

Materials

The study was conducted on computers, using MediaLab software (Jarvis, 2000) to administer all instructions, video clips, and dependent measures. The 5-minute video consisted of four clips of an 11-year-old Caucasian male performing spatial ability tasks from the block design subtest of the Stanford-Binet intelligence test, and was identical to that used by Reich and Weary (1998). To increase ambiguity, the sound was omitted, and the examiner's picture key solution to the puzzle often obscured participants' view of the child's performance.

Procedure

An experimenter greeted participants and explained that they would be completing a study on the computer. Each participant was led to a cubicle and began the experiment after signing a consent form. The instructions delivered via computer informed participants that the study concerned the "impressions people form when viewing a test performance." They were also told that they would be watching a video of a child completing tasks designed to assess spatial ability, which is an important component of overall intellectual functioning. To ensure that participants would not think that the video was selected for its unique characteristics, they were told that they were randomly assigned to view one of four possible videos of different children. However, all participants actually viewed the same video. All participants were asked to assess the performance and intelligence level of the child in the video. Within the context of forming this evaluation, participants were further asked to "make a special effort to AVOID FOCUSING ON THE NEGATIVE ASPECTS of the child's performance. Try to avoid thinking about the child's weaknesses and the things he or she does especially poorly." To ensure that participants understood their primary tasks, the goals of forming an assessment of the child and of avoiding negative aspects were reviewed a second time.

Cognitive load manipulation. To manipulate the attentional resources available, half of the participants were randomly assigned to engage in a secondary task designed to deplete their cognitive resources. Specifically, they were asked to rehearse an eight-digit number while watching the video and completing their ratings of the child's intelligence. This number appeared on the screen for 20 seconds prior to the video clips. Participants in the no-load conditions did not receive any information about the "additional task" and did not see the number.

Dependent measures. After watching the video, participants completed two items to assess their dispositional inferences about the child ("How would you rate the spatial ability of the child in the video?"—1 = *very low*, 9 = *very high*; "How would you rate the intelligence of the child in the video?"—1 = *very low*, 9 = *very high*) and two items to assess behavioral categorizations ("How well did the child you observed in the videotape perform on the spatial ability task?"—1 = *very poorly*, 9 = *very well*; "How do you think the child in the video would perform on other similar tasks?"—1 = *very poorly*, 9 = *very well*). Participants in the cognitive load condition were subsequently asked to report the eight-digit number they had been rehearsing. All participants then were asked to write an open-ended description of the things they thought about while watching the video. This retrospective measure was completed 1 to 2 minutes after watching the video to assess conscious thoughts generated during the video. For two reasons, we did not use an online thought streaming measure. First, we believed that it would interfere with the integrity of the load manipulation (rehearsal task), which was central to this study. Second, although an online measure would have been well suited for assessing suppressed thoughts produced by the automatic monitoring process, such thoughts were of less interest in this study. To assess attention, participants went on to complete five multiple-choice recall items regarding the details of the video. Specifically, participants indicated how many test items the child had attempted to complete, the color of the test administrator's hair, what object was in the background, the color of the child's shirt, and the color of the blocks. Finally, participants were debriefed, thanked, and dismissed.

Results

Preliminary Analyses

Digit recall. The number of digits correctly recalled and positioned by participants in the cognitive load condition should show a small number of errors, indicating engagement in the memory task and adequate difficulty of the task (Bargh & Chartrand, 2000; Gilbert

& Hixon, 1991). Participants in the current study showed an average recall rate of 81.3%, which was comparable to the rate found in other studies (Tobin & Weary, 2003; Weary & Reich, 2001; Weary, Reich, & Tobin, 2001; Weary, Tobin, & Reich, 2001). Because major errors may indicate that participants were not engaged in the task and not experiencing resource depletion, researchers generally suggest that participants who show extremely poor recall should be excluded from analyses. Therefore, we employed a common procedure whereby participants (n = 3) who did not recall at least half of the eight digits correctly were excluded from further analyses (Bargh & Chartrand, 2000; Gilbert & Hixon, 1991; Tobin & Weary, 2003; Weary & Reich, 2001; Weary, Reich, et al., 2001; Weary, Tobin, et al., 2001).

Surprise video recall. Correct responses on the five multiple choice questions assessing recall of the video details were summed. These items appeared to be moderately difficult, as most participants (73%) answered at least one item incorrectly and wrong answers were spread across several items. A one-way ANOVA showed that the number of items answered correctly did not differ as a function of load, $F < 1$ ($M = 3.92$, $SD = 0.88$). This is desirable because any differences in judgments as a function of load cannot be attributed to differences in participants' basic encoding of video details. Consistent with the exclusion rule used for the digits recalled, as well as with previous research (Tobin & Weary, 2003), we also excluded the 3 participants who correctly recalled fewer than half (i.e., only one or two) of the video details from further analyses due to inattention. The final data set included 35 participants (16 women, 19 men; 19 no load, 16 load).

Social Inferences

Because both the dispositional inference items and the behavioral categorization items showed the same pattern of effects, all four items were averaged to form a target judgment index ($\alpha = .85$). A one-way ANOVA was conducted to examine whether cognitive load had a detrimental effect on the positivity of participants' target judgments. A significant effect of load was found, $F(1, 33) = 4.89$, $\eta^2 = .129$, $p = .034$. As predicted, when attempting to suppress negative thoughts, participants under a cognitive load judged the child as less capable and successful ($M = 6.42$, $SD = 1.29$) than did those not under load ($M = 7.21$, $SD = 0.80$), replicating previous studies showing that load disrupts the effective pursuit of suppression goals.

Thought Descriptions

To examine participants' reported thoughts, two coders who were blind to conditions split each participant's description into separate thoughts. The content of each thought was then coded as positive (e.g., "the child seemed smart for his age"), negative (e.g., "it took him a long time to finish"), or neutral (e.g., "the child looked at the picture often"). Reasonable interrater agreement emerged for the number of overall thoughts ($r = .93$), positive thoughts ($r = .95$), negative thoughts ($r = .92$), and neutral thoughts ($r = .90$), ps < .001. The coders' totals were averaged for each category. Because the number of thoughts varied substantially between participants (range = 2-14), we controlled for each participant's total number of thoughts in subsequent analyses. The total number of thoughts reported did not vary as a function of load, $F < 1$ ($M = 6.36$, $SD = 3.24$), nor did the total number of positive and neutral distracter thoughts combined, $F(1, 33) = 1.08$, $\eta^2 = .032$, $p = .307$ ($M = 4.80$, $SD = 2.88$). Thus, load did not affect the quantity of distracters generated by participants.

ANCOVAs were conducted on the number of positive and neutral thoughts reported to investigate whether participants under cognitive load generated fewer positive and more neutral distracter thoughts, controlling for total number of thoughts. Negative thoughts were also examined. The covariate was significant in all analyses, Fs > 9.26, η^2s > .224, ps < .005. No significant load effect was found for negative thoughts, $F < 1$ ($M = 1.56$, $SD = 1.26$). Thus, no significant difference was found in the number of negative thoughts reported by participants pursuing a negative suppression goal under cognitive load and no load.

For positive thoughts, which should be particularly effective distracters, the predicted load effect was significant, $F(1, 32) = 5.38$, $\eta^2 = .144$, $p = .027$. Participants trying to avoid negative thoughts under cognitive load reported fewer positive distracter thoughts ($M = 1.97$, $SD = 1.64$) than did those not under load ($M = 3.53$, $SD = 2.60$). For neutral thoughts, which should be relatively weaker distracters, the effect of load was marginally significant, $F(1, 32) = 3.72$, $\eta^2 = .104$, $p = .063$. The mean difference was in the opposite direction to that found for positive distracters, such that participants trying to avoid negative thoughts under cognitive load reported a marginally higher number of neutral thoughts ($M = 2.28$, $SD = 1.52$) than did those not under load ($M = 1.74$, $SD = 1.38$). In sum, cognitive load disrupted the pursuit of high-quality positive distracter thoughts and enhanced the tendency to generate lower quality neutral distracters.

Discussion

As predicted, cognitive load diminished participants' ability to successfully pursue the negative suppression goal in Study 1. Participants who attempted to avoid

negative thoughts about the child's performance provided more negative assessments of the child's ability and level of success when their cognitive resources were limited. Using a complex social stimulus and a social inference measure, these results replicate previous studies that showed detrimental effects of cognitive load on suppression strategies.

Although participants under load drew more negative inferences than did those not under load, there was no significant difference in the number of negative thoughts reported by participants as a function of cognitive load. Although this finding appears to be inconsistent with previous research, no conclusions can be drawn regarding the accessibility of the avoided thoughts under load, given that the current study was not designed or intended to examine the output of the automatic monitoring process. The study did not include a no-suppression comparison condition, which would be required to make claims regarding hyperaccessibility; nor did it include accessibility measures, such as lexical decision speed or word-fragment completion measures. Furthermore, experimental demand may have reduced participants' tendency to report goal-inconsistent negative thoughts in this study.

However, as predicted, there was evidence that the quality of the distracters generated by participants differed as a function of load condition. Specifically, cognitive load reduced participants' ability to generate high-quality positive distracter thoughts and marginally enhanced their tendency to generate lower quality neutral distracter thoughts, suggesting that the operating process was crippled, but not eliminated, under cognitive load.

STUDY 2

To examine whether the basic findings of Study 1 would extend beyond the relatively familiar and socially appropriate goal of avoiding negative thoughts, we asked participants in Study 2 to avoid positive thoughts about the child's performance. The efficient monitoring process for this positive suppression goal should search solely for positive thoughts, whereas the effortful operating process should search for negative, neutral, or irrelevant distracter thoughts. If this suppression goal is disrupted under load, then participants should draw more positive social inferences under cognitive load than under no load. Participants under load also should report fewer high-quality negative distracter thoughts (and perhaps more low-quality neutral distracters), and participants who generate more negative distracters should make more negative inferences about the target's ability and success. Furthermore, these negative distracters should mediate the effects of load on social inferences.

Method

Participants

Forty-four undergraduates (27 women, 17 men) participated in Study 2 in exchange for course credit in general psychology.

Procedure

The procedure and materials were identical to those of Study 1, except that the negative suppression goal was replaced by a positive suppression goal. Participants were asked to "make a special effort to AVOID FOCUSING ON THE POSITIVE ASPECTS of the child's performance. Try to avoid thinking about the child's strengths and the things he or she does especially well."

Results

Preliminary Analyses

Digit and video recall. Participants under load showed an average number recall rate of 88.6%. Video recall did not differ as a function of load, $F < 1$ ($M = 3.95$, $SD = 0.96$). The data for 3 participants who recalled four or fewer digits and 5 participants who correctly answered just one or two of the video recall items were omitted from further analyses. The final data set included 36 participants (23 women, 13 men; 19 no load, 17 load).

Social Inferences

As in Study 1, the two dispositional inference items and the two behavioral categorization items were averaged to create a target judgment index ($\alpha = .93$). A one-way ANOVA revealed a significant effect of load, $F(1, 34) = 4.66$, $\eta^2 = .121$, $p = .038$. As predicted, participants under a cognitive load judged the child's ability level and success to be higher ($M = 7.31$, $SD = 1.04$) than did those not under load ($M = 6.43$, $SD = 1.35$), thus showing the reduced effectiveness of this positive suppression goal under load.

Thought Descriptions

Thoughts were coded and averaged across coders as in Study 1. Reasonable interrater agreement was found regarding the number of overall thoughts ($r = .94$), positive thoughts ($r = .92$), negative thoughts ($r = .94$), and neutral thoughts ($r = .91$), $ps < .001$. The overall number of thoughts did not differ across conditions, $F < 1$ ($M = 6.22$, $SD = 3.33$); nor did the total number of negative and neutral distracter thoughts combined, $F < 1$ ($M = 4.06$, $SD = 2.70$). Thus, load did not affect the quantity of distracters generated by participants.

ANCOVAs were conducted on the number of negative, positive, and neutral thoughts, controlling for total thoughts; the covariate was a significant predictor in all three analyses, Fs > 23, η^2s > .41, ps < .001. No significant effect of load emerged for positive thoughts, $F < 1$ (M = 2.22, SD = 1.38). For negative thoughts, the predicted effect of load was marginally significant, $F(1, 33) = 3.88$, $\eta^2 = .105$, $p = .057$. Participants attempting to avoid positive thoughts under load reported marginally fewer high-quality negative distracter thoughts (M = 1.50, SD = 1.90) than did those not under load (M = 2.18, SD = 1.86). For neutral thoughts, the effect of load did not reach significance, $F(1, 33) = 2.30$, $\eta^2 = .065$, $p = .139$. However, the means were in the same direction as found in Study 1, such that participants under load tended to report a greater number of neutral thoughts (M = 2.68, SD = 2.14) than did those not under load (M = 1.76, SD = 1.54).

Mediational Analyses for Studies 1 and 2 Combined

Theoretically, cognitive load should have reduced participants' ability to generate thoughts that were opposite in valence to the suppressed thoughts, which in turn should have led participants to make social inferences that were more congruent with the suppressed thoughts. Given the small sample sizes in Studies 1 and 2, this mediational hypothesis was examined by combining the data from both studies to enhance power. The mediator variable was the number of thoughts opposite in valence to the suppressed thoughts (i.e., positive thoughts for Study 1 and negative thoughts for Study 2). For each study, scores on the social inference measure were standardized. Then the sign of the z scores was reversed for the Study 2 data. Thus, higher numbers on the social inference measure for this analysis reflect inferences that were more incongruent with the suppressed thought content (i.e., more positive inferences for Study 1 and more negative inferences for Study 2). The total number of thoughts was controlled in all analyses.

First, the social inference measure was regressed on load, revealing a significant effect, $\beta = -.353$, $t = -3.11$, $sr^2 = .125$, $p = .003$. Thus, social inferences were more congruent with the valence of suppressed thoughts under load than under no load. Next, the number of thoughts that were opposite in valence to suppressed thoughts was regressed on load, and a significant effect emerged, $\beta = -.241$, $t = -3.11$, $sr^2 = .058$, $p = .003$, showing that participants reported fewer distracter thoughts opposite in valence to the suppressed thoughts when they were under load than under no load. Finally, social inferences were regressed on both load and the proposed mediator. This analysis revealed that when participants generated a greater number of thoughts that were opposite in valence to the suppressed thoughts, their social inferences were significantly less congruent with suppressed thoughts, $\beta = .468$, $t = 2.77$, $sr^2 = .090$, $p = .007$, even when the effects of load were included in the analysis. Moreover, the effect of load on social inferences was reduced in magnitude when oppositely valenced thoughts were included in the model, $\beta = -.241$, $t = -2.078$, $sr^2 = .050$, $p = .042$. Based on Baron and Kenny's (1986) modification of the Sobel test, the reduction in the path from cognitive load to social inferences was significant ($z = -2.07$, $p = .039$). Thus, across both negative and positive suppression goals, oppositely valenced thoughts partially mediated the effects of load on social inferences.

Discussion

Study 2 demonstrated that participants who pursued the goal of avoiding positive thoughts about the target's performance drew more positive inferences and reported a smaller number of high-quality negative distracter thoughts when they were under a cognitive load. Thus, the effects found in Study 1 were conceptually replicated and were found to be independent of the valence of the suppression goal. In addition, a mediational analysis conducted on the data from Studies 1 and 2 supported the notion that the number of thoughts participants generated that were opposite in valence to the thoughts they were attempting to suppress mediated the effects of cognitive load on social inferences. Thus, cognitive load led to fewer oppositely valenced thoughts, which in turn contributed to social inferences that were more congruent with the valence of suppressed thoughts.

STUDY 3

Compared to the positive suppression goal used in Study 2, the negative suppression goal used in Study 1 may represent a more common and familiar goal in everyday life, particularly because people may see negative biases in social judgments as more egregious than positive ones. If people seek to be more positive in their judgments about others, they may do so either by avoiding negative thoughts or by seeking positive ones, because both goals should facilitate more positive social judgments. For Study 3, we therefore chose to compare the negative suppression goal to a positive concentration goal. We expected to replicate the finding from Study 1 that cognitive load impairs the successful pursuit of a negative suppression goal and reduces the number of positive distracter thoughts generated. However, we also expected that these effects would be relatively unique to suppression goals and would not occur if perceivers pursued the goal of concentrating on positive aspects of the child's performance.

Concentration strategies involve creating a desired state of mind by seeking out or focusing on desired thoughts (e.g., counterstereotypical or positive thoughts). Wegner's (1994) ironic process theory suggests that the strategy of concentrating on acceptable thoughts should be more effective and less prone to disruption than should the strategy of suppressing unacceptable thoughts. When concentrating on positive thoughts, the operating process performs a focused search for the presence of positive thoughts (i.e., a feature-positive search), whereas the relatively automatic monitoring process seeks a range of negative, neutral, and irrelevant thoughts. During the suppression of negative thoughts, the operating process must perform a less well-defined search for any thoughts (e.g., positive, neutral, irrelevant) that reflect the absence of the avoided thoughts (i.e., a feature-negative search), whereas the monitoring process searches exclusively for negative thoughts. Because feature-positive searches can be performed more easily than feature-negative searches (J. P. Newman, Wolff, & Hearst, 1980), suppression strategies have two strikes against them in comparison to concentration strategies. First, the effortful feature-negative operating process may be harder to maintain under conditions of mental load and may generate weaker distracters. Second, the relatively efficient feature-positive monitoring process should be more effective in identifying avoided thoughts and bringing them to awareness.

Studies by Wenzlaff and Bates (2000) and by Page et al. (2005) have supported the prediction that concentration strategies are less prone to disruption. In Wenzlaff and Bates's first experiment, for example, participants unscrambled words that could be ordered to form either a negative or a positive statement. Participants were asked to unscramble the words so that they either conveyed positive statements (a positive concentration goal) or did *not* express negative statements (a negative suppression goal). Under sufficient processing conditions, both goals reduced the percentage of negative statements participants formed, compared to a control condition. When cognitive resources were taxed, however, those engaging in suppression experienced an increase in the percentage of negative statements, whereas those pursuing a concentration goal did not.

Although it clearly showed the relative benefits of a concentration strategy, Wenzlaff and Bates's (2000) procedure did not allow an examination of precisely *why* the suppression goal was less effective under load than the concentration goal. Although this finding was attributed to an increase in intrusions by the monitoring process for the suppression goal, the measure of intrusions (percentage of negative statements) was indirect. Furthermore, the results were equally consistent with a complimentary prediction of ironic process theory and with our findings from Studies 1 and 2. Specifically, the suppression goal may have resulted in a less effective pursuit of positive distracters (a compromised operating process) than did the concentration goal; the increase in the percentage of negative sentence completions under load for negative suppression goal participants may have been due to the compromised operating process failing to quickly identify the positive options. Because only positive or negative statements could be formed and no neutral options were available, the frequency of naturally occurring valenced thoughts elicited by each goal could not be examined. Therefore, the role of the operating process in contributing to the relative ineffectiveness of a suppression strategy could not be assessed.

Study 3 was conducted to further explore the process that occurs under load conditions when perceivers pursue the alternative goals of suppressing negative thoughts and of concentrating on positive thoughts about a target. Although both goals should facilitate more positive social inferences, only the suppression goal was expected to show disruption under cognitive load. Therefore, only for the suppression goal should there be a reduction in the positivity of social inferences and the quality of distracter thoughts generated under load, compared to the no-load condition. Furthermore, the number of positive distracter thoughts should mediate the effect of load on social inferences when the suppression goal is pursued.

Method

Participants

One hundred nineteen undergraduates (78 women, 41 men) participated in Study 3 in exchange for credit in their general psychology course.

Procedure

Study 3 consisted of a 2 (load: cognitive load, no load) × 2 (goal: negative suppression, positive concentration) between-subjects factorial design. The procedure and materials were identical to those of Study 1, with two exceptions. Participants were randomly assigned to either the negative suppression goal used in Study 1 or to a new positive concentration goal, and a goal manipulation check was added. Participants in the positive concentration goal condition were asked to "make a special effort to FOCUS ON THE MOST POSITIVE ASPECTS of the child's performance. Be alert to the child's strengths and the things he or she does especially well."

Results

Preliminary Analyses

Digit and video recall. Participants under load showed an average recall rate of 88.8%. A Goal × Load ANOVA showed no significant effects on the number of video recall items answered correctly, Fs < 1, but goal effect $F(1, 112) = 3.09$, $p = .082$ ($M = 4.02$, $SD = 0.96$). The data for 3 participants who correctly recalled four or fewer digits and 7 additional participants who correctly answered only one or two video recall items were omitted from further analyses due to inattention. For the remaining load participants, the number of digits recalled did not differ as a function of goal, $F < 1$. The final data set included 109 participants (72 women, 37 men).[2]

Social Inferences

The two dispositional inference items and the two behavioral categorization items again were averaged to form a target judgment index ($\alpha = .82$). To examine whether effects of cognitive load emerged for the suppression goal but not for the concentration goal, a Goal × Load ANOVA was conducted. This analysis yielded only the predicted interaction effect, $F(1, 105) = 8.69$, $\eta^2 = .076$, $p = .004$, with all other Fs < 1. Participants instructed to suppress the negative aspects of the target's performance judged the child as less capable and successful when under a cognitive load ($M = 7.17$, $SD = 0.92$) than when not under load ($M = 7.78$, $SD = 0.82$), $t(54) = -3.05$, $p < .05$, replicating the findings of Study 1. However, participants instructed to focus on positive aspects of the target's performance showed no difference between the load ($M = 7.63$, $SD = 0.98$) and no-load ($M = 7.28$, $SD = 0.66$) conditions, $t(55) = 1.55$, $p > .12$. The specific (nonorthogonal) comparison between the two goals under load also was significant, $t(56) = 2.04$, $p < .05$; under load, participants with a positive concentration goal judged the child's ability and success to be higher than did participants with a negative suppression goal. In sum, these results support and extend the findings of Wenzlaff and Bates (2000) by showing that, in the domain of social inferences, suppression goals are less effective under load than are concentration goals.

Thought Descriptions

Thought descriptions were coded and averaged across coders as in Studies 1 and 2. Reasonable interrater agreement emerged for the number of overall thoughts ($r = .94$), positive thoughts ($r = .89$), negative thoughts ($r = .68$), and neutral thoughts ($r = .72$), ps < .001. An initial Goal × Load ANOVA revealed that the total number of thoughts reported did not vary by condition, Fs < 1.54, η^2s < .02, ps > .21 ($M = 4.74$, $SD = 1.94$).

Goal × Load ANCOVAs were conducted on the number of positive, negative, and neutral thoughts (see Table 1), with total thoughts as a covariate. The covariate was significant across all analyses, Fs > 17.68, η^2s > .145, ps < .001. For negative thoughts, no significant main effects or interaction were found, Fs < 1.70, η^2s < .02, ps > .19. Thus, no significant differences were found in the number of negative thoughts reported by participants pursuing negative suppression or concentration goals while under cognitive load or no load.

For positive thoughts, no main effect of goal emerged, $F < 1$, but participants under cognitive load reported fewer positive thoughts than did those not under load, $F(1, 104) = 10.26$, $\eta^2 = .090$, $p = .002$. This main effect of load was qualified by a significant interaction, $F(1, 104) = 4.61$, $\eta^2 = .042$, $p = .034$. In the negative suppression condition, participants under load reported fewer positive thoughts than did those not under load, $t(53) = -3.57$, $p < .05$. However, for participants pursuing a concentration goal, no difference between the load and no-load conditions was found, $t(54) = 0.44$. The specific comparison between the two goals under cognitive load also was significant, $t(55) = 2.02$, $p < .05$; under cognitive load, participants with a concentration goal generated a greater number of positive thoughts than did those with a suppression goal. Thus, negative suppression participants generated fewer positive distracter thoughts when their resources were reduced, and they generated fewer positive distracters under load than did those pursuing a concentration goal under load.

For neutral thoughts, a main effect of cognitive load was found, $F(1, 104) = 18.95$, $\eta^2 = .154$, $p < .001$. Participants under load reported a greater number of neutral thoughts ($M = 1.98$, $SD = 1.49$) than did those not under load ($M = 1.03$, $SD = 0.92$). Neither the goal main effect, $F < 1$, nor the interaction, $F(1, 104) = 2.85$, $\eta^2 = .024$, $p = .121$, was significant. Thus, cognitive load enhanced the tendency to generate lower quality neutral distracter thoughts; this finding is consistent with the pattern found in Studies 1 and 2, although the mean differences did not reach significance in those studies. Importantly, this increase in neutral thoughts under load occurred across both goal conditions, so it did not appear to be uniquely associated with suppression strategies.

Mediational analyses. Theoretically, participants not under cognitive load should generate a greater number of positive thoughts and, in turn, draw more positive inferences. Mediational analyses were conducted for the negative suppression condition, controlling for total thoughts. First, the social inference measure was regressed on load, revealing a significant effect, $\beta = -.336$, $t = -2.55$, $sr^2 = .113$, $p = .014$. Next, the number of positive thoughts was regressed on load, and a significant

TABLE 1: Number of Positive, Neutral, and Negative Thoughts as a Function of Cognitive Load and Social Judgment Goal for Study 3

	Social Judgment Goal Condition		
Measure	*Negative Suppression*	*Positive Concentration*	*Both*
Positive thoughts			
Load condition	2.07 (1.43)	2.55 (1.58)	2.31 (1.51)
No-load condition	3.29 (1.30)	2.70 (2.03)	2.99 (1.72)
Both load conditions	2.66 (1.49)	2.63 (1.80)	2.64 (1.64)
Neutral thoughts			
Load condition	2.29 (1.57)	1.68 (1.37)	1.98 (1.49)
No-load condition	1.02 (1.01)	1.04 (0.84)	1.03 (0.92)
Both load conditions	1.68 (1.47)	1.36 (1.18)	1.52 (1.33)
Negative thoughts			
Load condition	0.68 (0.88)	0.38 (0.69)	0.53 (0.80)
No-load condition	0.60 (0.95)	0.67 (0.78)	0.63 (0.86)
Both conditions	0.64 (0.91)	0.52 (0.75)	0.58 (0.83)

NOTE: The value outside the parentheses reflects the mean number of thoughts, and the value within the parentheses reflects the standard deviation.

effect emerged, $\beta = -.430$, $t = -4.03$, $sr^2 = .185$, $p < .001$. Finally, social inferences were regressed on both load and the proposed mediator. This analysis revealed that when participants generated a greater number of positive thoughts, their social inferences were more positive, even when cognitive load was included in the analysis, $\beta = .368$, $t = 2.20$, $sr^2 = .078$, $p = .032$. Moreover, the effect of load on social inferences was no longer significant when positive thoughts were included in the model, $\beta = -.178$, $t = -1.22$, $sr^2 = .024$, $p = .228$. The reduction in the path from load to social inferences was significant ($z = -2.01$, $p = .045$), indicating that positive thoughts mediated the effect of load on social inferences.

Discussion

As predicted, cognitive load diminished participants' ability to successfully pursue a suppression goal but did not affect their success in pursuing a concentration goal. Participants who attempted to avoid negative thoughts about the child provided more negative assessments of the child's ability and success when their cognitive resources were diminished, replicating the findings of Study 1. However, those who focused on positive thoughts showed no differences as a function of cognitive load. Furthermore, judgments under load were more negative for those who pursued the suppression goal than for those with the concentration goal. These results replicate Wenzlaff and Bates's (2000) findings regarding the relative effectiveness of concentration over suppression strategies, using a more complex stimulus and a more subtle dependent variable with interpersonal implications.

Cognitive load reduced participants' ability to generate high-quality positive distracter thoughts when they pursued a goal of suppressing negative thoughts. Importantly, there was no significant effect of load on participants' ability to generate positive thoughts when they pursued a goal of concentrating on positive thoughts. In addition, participants under load generated a greater number of positive thoughts when they pursued the positive concentration goal, compared to the negative suppression goal. These findings suggest that the suppression goal was particularly vulnerable to a reduction in positive distracter thoughts under conditions of resource depletion and that the concentration goal was less susceptible to this reduction. Theoretically, this finding makes a strong contribution to understanding the mechanisms that may underlie the relative effectiveness of concentration goals compared to suppression goals. Specifically, it implicates the role of the operating process, unlike previous research that focused on the role of the monitoring process (e.g., Wenzlaff & Bates, 2000).

GENERAL DISCUSSION

Using a complex social stimulus, a social inference measure, and a closer examination of both valenced and neutral thought content, the current studies replicated and extended previous studies showing the detrimental effects of cognitive load on suppression attempts (e.g., Wegner & Erber, 1992; Wegner et al., 1993; Wenzlaff & Bates, 2000). They also shed light on the processes underlying these detrimental effects by focusing on the contributions of the operating process.

In Studies 1 and 3, participants who pursued the goal of avoiding negative thoughts about the target's performance drew more negative inferences when they were

under a cognitive load. In Study 2, the mirror image of this effect was found with an oppositely valenced suppression goal; participants who pursued the goal of avoiding positive thoughts about the target's performance drew more positive inferences when under a cognitive load. Thus, participants under load made social inferences that appeared more congruent with avoided thought content in all three studies.

A novel finding across all three studies was that when participants attempted to suppress valenced thoughts about the target's performance, cognitive load reduced the number of oppositely valenced distracter thoughts generated by the operating process; such thoughts should be most conducive to effective goal pursuit (Wegner, 1992; Wenzlaff & Bates, 1998; Wenzlaff et al., 1988). This finding is consistent with ironic process theory, but has not been the focus of previous research. Evidence for a compromised operating process under cognitive load has typically been assumed based on greater intrusions by the monitoring process but has not, to our knowledge, been demonstrated as explicitly as in the current research. It is important to note that the thought measure used in this study was retrospective, contained substantial error variance, and was probably low in sensitivity. These effects will need to be replicated in the future with a different thought measure, such as a think-aloud protocol that would not interfere with a load manipulation. However, despite the weaknesses inherent in this measure, the thought listing results were remarkably consistent across the three studies, lending confidence in the findings. No significant effects of cognitive load on the number of suppressed thoughts emerged in the current studies. However, these studies did not include accessibility measures or no-suppression comparison conditions and were not designed to examine the accessibility of avoided thoughts, which has been the focus of numerous prior studies.

Importantly, the current studies also showed that the generation of high-quality oppositely valenced distracter thoughts was associated with more successful goal pursuit. Across studies, mediational analyses revealed that the effects of cognitive load on social inferences could be accounted for by the number of thoughts participants generated that were opposite in valence to the suppressed thoughts. Thus, the results were consistent with the notion that under cognitive load, participants reported fewer oppositely valenced thoughts, which in turn led them to draw social inferences that were more congruent with the valence of suppressed thoughts. However, the nature and timing of the thought-listing measure does leave open the possibility that participants' reported thoughts might have been affected by their inferences; for example, participants may have reported certain thoughts in an attempt to justify or appear consistent with those inferences.

Finally, Study 3 replicated previous findings on the relative advantage of concentration over suppression strategies (Page et al., 2005; Wenzlaff & Bates, 2000) and extended them to the domain of social inferences. Cognitive load disrupted the effective pursuit of a negative suppression goal, but did not similarly disrupt pursuit of a positive concentration goal. Although Wenzlaff and Bates (2000) concluded that the difference between suppression and concentration strategies lay in their differential susceptibility to intrusive thoughts under cognitive load, the current findings suggest an important role for the operating process and the quality of distracters generated. The findings indicate that the negative suppression goal was particularly vulnerable to a reduction in high-quality positive distracter thoughts under conditions of resource depletion and that the concentration goal was less susceptible to this reduction.

IMPLICATIONS FOR THE MECHANISMS UNDERLYING THE DETRIMENTAL EFFECTS OF LOAD ON SUPPRESSION

One implication of the current research for ironic process theory is that the detrimental effects of load on the quality of distracter thoughts and relevant judgments may not always be accompanied by the hyperaccessibility of avoided thoughts. If the theory is correct, hyperaccessibility should occur only if the operating process is sufficiently compromised. If the operating process is only moderately compromised, it may keep avoided thoughts at bay, but the weak distracters that are generated may contribute to what appear to be "ironic effects" on relevant judgments and behaviors. If so, the ironic tendency for judgments and behaviors to be consistent with suppressed thoughts for suppressors under a cognitive load in previous research may have been due, in part, to the inability of suppressors to generate thoughts that run counter to the suppressed thoughts, rather than solely to the (often assumed) heightened accessibility of avoided thoughts. There may be a threshold for the degree of cognitive load that must be reached before the monitoring process is sufficiently "set free" to create hyperaccessibility of avoided thoughts. To more closely examine this possibility in future research, the degree of cognitive load could be manipulated, and measures of the accessibility of valenced thoughts (e.g., lexical decision speed, online measures) could be used.

Another implication of the current findings is that successful avoidance of specific thought content may not indicate that suppression has been an effective strategy. Specifically, even if people manage to avoid specific thoughts, it is possible that the act of suppressing

those thoughts with limited cognitive resources may result in subsequent behaviors and judgments that appear more congruent with those avoided thoughts than if sufficient resources had been available, due to the low quality of the distracter thoughts generated. Therefore, the success of a suppression strategy should be evaluated not only in terms of outcomes regarding the frequency with which avoided thoughts occur, but also in terms of outcomes regarding the overall content of an individual's thoughts and subtle effects on that individual's judgments and behaviors. For example, perceivers may succeed in suppressing stereotype-related thoughts even with reduced cognitive resources. But if they generate mediocre distracters that are associated with the stereotype itself instead of generating excellent counterstereotypical thoughts, their overall thought content and their subsequent judgments may be more congruent with the stereotype than if they had suppressed the stereotype with sufficient cognitive resources. Further research is needed to assess the relative contributions of the operating and monitoring processes to the detrimental effects of load on the outcomes of suppression.

In sum, the role played by the operating process when thought suppression is attempted under conditions of cognitive load typically has been overlooked. Instead, researchers have explored the more enticing and insidious role of the monitoring process in making avoided thoughts hyperaccessible. Distracter thoughts have been assumed to play a minor role by preventing unwanted thoughts from influencing judgments, rather than a major role by contributing directly to those judgments. However, the current studies suggest that when people pursue suppression goals with diminished cognitive resources, the quality of the distracters generated by the operating process may be reduced and may contribute to other detrimental effects of cognitive load on suppression attempts.

NOTES

1. Although several studies have examined the effects of suppression goals in the domain of interpersonal judgments (e.g., Geeraert, Yzerbyt, Corneille, & Wigboldus, 2004; Kulik, Perry, & Bourhis, 2000; Macrae, Bodenhausen, Milne, & Jetten, 1994; L. S. Newman, Duff, & Baumeister, 1997; Wyer, Sherman, & Stroessner 1998, 2000; Yzerbyt, Corneille, Dumont, & Hahn, 2001), most have focused on rebound effects on judgments made in a second task. In the current studies, cognitive load was induced during a single social judgment task.

2. Fourteen participants incorrectly identified whether they were instructed to focus on positive thoughts or to avoid negative thoughts. It was expected that some participants might mentally transform the induced goal to fit their personal strategies. Indeed, 13 participants in the negative suppression goal misidentified their goal as a positive concentration goal. Because the number of participants who did this was fairly small and was differentially distributed across the two load conditions, we included these participants in subsequent analyses. The pattern of results was identical and slightly stronger when participants who misidentified their goals were omitted.

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Received April 13, 2006
Revision accepted November 16, 2007