Available online at www.sciencedirect.com
ScienceDirect
Journal of Experimental Social Psychology 43 (2007) 365–378
Journal of Experimental Social Psychology
www.elsevier.com/locate/jesp

The deautomatization of accessible attitudes ☆

David M. Sanbonmatsu [a,*], Steven S. Posavac [b], Sam Vanous [a], Edward A. Ho [a], Russell H. Fazio [c]

[a] Department of Psychology, University of Utah, UT 84112-0251, USA
[b] Simon Graduate School of Business, Rochester University, USA
[c] Department of Psychology, Ohio State University, USA

Received 9 September 2005; revised 29 March 2006
Available online 7 July 2006

Abstract

The attitudinal effects of repeatedly encountering an object in a setting where an attitude was unneeded were investigated. In three experiments, participants repeatedly recognized words with strong evaluative connotations. A priming task was subsequently performed in which the repeatedly recognized words or control words served as primes. As expected, the attitudinal priming effects of the attitudes toward the repeated words were attenuated relative to the control words. This reduction in automatic attitude activation was observed even a day after the repeated recognition task, suggesting that attitudinal deautomatization is a relatively enduring effect that is not limited to the immediate context. The likelihood of automatic attitude activation was not diminished by the repeated evaluation of an object, indicating that the effect was not due to semantic satiation or fatigue of the attitude-object connection. A number of additional potential mediators of the deautomatization of attitudes were ruled out by the results. The findings highlight the functional nature of attitudes. Attitudes facilitate the appraisal of objects and the making of decisions. However, when the need to evaluate an object in a context decreases, the automatic activation of attitudes diminishes.

Keywords: Deautomatization; Automatic attitude activation; Attitude functions

Attitudes are functional (Katz, 1960; Kelman, 1958; Maio & Olson, 2000; Pratkanis, Breckler, & Greenwald, 1989; Shavitt, 1990; Smith, Bruner, & White, 1956). They guide appraisals of the objects and persons that are encountered in social situations. Moreover, they facilitate the assessment of choice alternatives and the making of decisions (Fazio, 1986; Katz, 1960; Sanbonmatsu & Fazio, 1990). In order for an attitude to guide judgment and decision making, it must be activated in memory. The likelihood that an attitude is activated often depends on the strength of the object-evaluation association. Studies indicate that when this association is strong, the attitude is accessed or retrieved automatically upon recognition of the attitude object (Bargh, Chaiken, Govender, & Pratto, 1992; Bargh, Chaiken, Raymond, & Hymes, 1996; Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Greenwald, Klinger, & Liu, 1989; Hermans, DeHouwer, & Eelen, 1994; Kemp-Wheeler & Hill, 1992; Klauer, Robnagel, & Musch, 1997; Wentura, 1999; Wittenbrink, Judd, & Park, 1997). That is, the attitude is activated spontaneously with little deliberate reflection or effort. Automatic attitude activation is very functional, of course, because it increases the likelihood that people will notice affectively relevant objects in the visual field, and construe them in hedonically relevant ways, as well as easing decision making (see Fazio, 2000, for a review).

The functionality of an attitude, though, is not invariant over time. Often, the need for an attitude diminishes as

☆ This research was supported by Grant MH61364 to the first author, and was conducted while the last author was supported by Senior Scientist Award MH10646, both from the National Institute of Mental Health. We are very grateful to Rachel Barnes, Sachiyo Ozawa, and Stephanie Teran for their assistance in data collection and coding.
* Corresponding author.
E-mail address: sanbonmatsu@psych.utah.edu (D.M. Sanbonmatsu).

0022-1031/$ - see front matter © 2006 Elsevier Inc. All rights reserved.
doi:10.1016/j.jesp.2006.04.008

motivation and the social environment change. For example, attitudes toward various brands of dishwashers are useful when consumers are shopping for a new dishwasher. However, the utility of these attitudes diminishes at some point after the purchase is made. The consumer may experience a few days, or maybe even weeks, of taking delight in the quiet of the new dishwasher and its sparkling results. After that, however, the dishwasher is unlikely to evoke such thoughts of satisfaction. Indeed, evaluative judgments of its attributes, or those of the competing brands, are unlikely to occur with any regularity, as no decision situation is pending. Hence, attitudes sometimes lose their usefulness because individuals no longer need to appraise and make decisions about the attitude objects. In fact, in many circumstances, the activation of an attitude may be distracting or disruptive. In some tasks, for example, a strong evaluative or affective response may hamper ongoing performance by diminishing the attention given to the most task relevant cues (see Roskos-Ewoldsen & Fazio, 1992, for relevant evidence).

Fortunately, mechanisms may operate that diminish the likelihood of the automatic activation of attitudes that lose their evaluative utility. We suggest that when an attitude object is repeatedly encountered in contexts where an evaluation is unneeded, the likelihood of attitude activation is reduced. The repeated nonevaluation of an object may "deautomatize" an attitude, such that it is no longer activated spontaneously and effortlessly. Instead, the attitude object may begin to be processed in a relatively nonevaluative manner when encountered.

Theoretical background

The deautomatizing effects of repeated nonevaluation on attitude activation are suggested by research on "semantic satiation." Studies dating back to the earlier 1900s (e.g., Severance & Washburn, 1907) showed that the verbal repetition, prolonged inspection, or repeated writing of a stimulus word may contribute to a momentary loss of the meaning of the word. A review of this literature by Esposito and Pelton (1971) questioned the reliability of the measures used to assess semantic satiation in earlier research, thereby raising doubts about the phenomena. However, subsequent studies (Pynte, 1991; Smith, 1984; Smith & Klein, 1990) revived the semantic satiation concept by using more current reaction time paradigms. In one study by Smith (1984), for example, participants were asked to repeatedly state the name of a category (e.g., fruit) for either 3 or 30 trials. Afterwards they were given the task of deciding whether a target exemplar (e.g., apple) was a member of the repeated category. As expected, decision time increased when the category word was repeated 30 times but not when the category word was repeated three times.

The phenomenon was labeled "semantic satiation" on the basis of presumptions about the processes underlying the momentary loss of meaning. According to theorists (e.g., Smith, 1984; Smith & Klein, 1990), the repeated verbalization or inspection of a word continuously activates the semantic representations that are most closely associated with it. This leads to a satiation or fatigue of the relevant nodes or pathways. As a consequence, the capacity to activate the semantic representations is momentarily diminished.

The research on semantic satiation has demonstrated that repeated inspection may diminish the accessibility of the semantic meaning or associates of words. We surmised that the feelings or evaluations associated with an object may be similarly affected by repeated processing. Specifically, the continuous observation of an object may contribute to a momentary loss of attitudinal meaning. Repeatedly inspecting an object with strong attitudinal associations leads to repeated automatic attitudinal responding. The theorizing on semantic satiation suggests that this repeated firing would induce fatigue in the associated nodes and pathways, thereby lowering the capacity for subsequent activation of the attitude. An alternative process that may operate is learning. Initially, observation of the attitude object will produce the usual automatic attitude activation. However, the repeated nonuse of this evaluative information (i.e., its repeated irrelevance to current contextual concerns) may weaken the association between the object and the attitude relative to other linkages. The weakened attitude-object association, in turn, may diminish the likelihood of attitude activation when the object is later encountered.

The repeated nonuse of attitudes may contribute to additional forms of learning that attenuate the likelihood of subsequent attitude activation. First, repeated nonutilization may lead to the acquisition of specific, nonevaluative processing procedures. The procedure can be conceived as practice in processing a particular attitude object in a specific nonevaluative manner, that is, learning to attend to the specific nonevaluative features or meanings of an attitude object that are relevant to the task. During repeated recognition, for example, participants may learn to identify and state particular attitudinal words. The association with these specific nonevaluative features or responses may be strengthened, thus decreasing the subsequent likelihood of the activation of the attitude. The repeated nonuse of attitudes may also lead to the acquisition of a general procedure or set (see Smith, 1989; Smith, Branscombe, & Bormann, 1988) to encode stimuli in some nonevaluative manner. This, would suggest, of course, that the repeated recognition of an object may have not only the specific effect of reducing the likelihood of the activation of the attitude associated with the repeatedly recognized object, but also the more general effect of reducing the likelihood of evaluation of other attitude objects. In sum, there appear to be many theoretical bases for expecting attitude activation to be attenuated by repeated nonevaluation. The semantic satiation literature suggests that the capacity to activate attitudinal pathways and nodes may be diminished by continuous firing. Alternatively, various forms of learning may occur that diminish the likelihood of attitudinal processing.

The present research

Three experiments were conducted to examine the attitudinal effects of repeatedly recognizing an object in a setting where an attitude is unneeded. The experiments attempted to demonstrate that the repeated nonuse of an attitude attenuates the likelihood of the subsequent automatic activation of the associated attitude when the object is later encountered. In addition, the experiments explored possible boundary conditions and underlying processes of this effect. Specifically, the experiments examined the impact of different forms of repeated processing on subsequent attitude activation and tested the viability of the semantic satiation account of the phenomena. Finally, Experiment 3 examined the enduringness of the effect of repeated recognition by examining the level of automatic attitude activation following a one day delay after the repeated nonevaluation procedure.

Experiment 1

The first experiment examined the effect of the repeated nonuse of an attitude on the likelihood of subsequent automatic attitude activation. The experiment consisted of two phases—a training phase and a measurement phase. In the training phase, participants repeatedly processed words referring to various attitude objects of both positive and negative valence (e.g., "holiday," "garbage") in a nonevaluative manner. Neither the context nor the task requirements involved any functional utility to having had one's attitude activated automatically upon presentation of the attitude object. In the second phase, the attitudinal priming procedure featured in the Fazio et al. (1986) study was used to assess the degree to which attitudes were automatically activated by the words. In this task, the presentation of an attitudinal prime word was followed by the presentation of an adjective that had either a strong positive or negative connotation. Participants were required to indicate as quickly as possible whether the target adjective had a "good" or "bad" connotation.

Prior research has shown that an attitudinal prime with strong evaluative associations facilitates the recognition or evaluation of similarly valenced adjectives and may inhibit the recognition or evaluation of dissimilarly valenced adjectives (for reviews, see Fazio, 2001; Klauer, 1998). Presumably, the prime automatically activates an attitude in memory that heightens the accessibility and evaluation of similarly valenced representations through a process of spreading activation. In addition, the presentation of the prime may automatically activate or make "ready" a particular evaluative response (Hermans et al., 1994; Klauer et al., 1997; Klinger, Burton, & Pitts, 2000; Wentura, 1999). If the prime and the target adjective are evaluatively congruent, the correct evaluative response to the target adjective is facilitated. However, if responses to the prime and the target adjective are incongruent and interfere or compete, responding to the target adjective is slowed.

Following previous research, we anticipated that strong attitudinal priming effects would be observed for control attitudinal primes, that is, attitudinal words that were not repeatedly recognized during the initial phase of the experiment. However, we predicted that automatic attitudinal priming effects would be attenuated for the words that were associated with repeated nonuse of the automatically activated attitude. Thus, the words repeatedly presented during the training phase were not expected to facilitate the evaluation of similarly valenced adjectives in the priming task.

Experiment 1

Method

Participants

Thirty-two students enrolled in an introductory psychology course at the University of Utah participated in the experiment in order to receive extra course credit. Participation was limited to native English speakers.

Procedure

Arriving participants were seated before a computer monitor and informed of the alleged aims of the study. The experiment was described as a study of word processing that examined performance on both simple and complex word processing tasks. The experimental procedure consisted of two major tasks, the first involving repeated word recognition and the second involving a priming procedure.

In the first and simplest word processing task, a word masked by a block of dots appeared on the computer monitor and slowly faded into view. The word took 4 s to unmask completely. Participants pressed a designated key upon recognition of the word. The word disappeared following the keypress and participants recited the word to ensure that recognition occurred. A tape player was present to record word identification. A 3 s interval passed before presentation of the next word. Participants were instructed to maximize both the speed and accuracy of their responses. Two sets of two positive (e.g., holiday, baby) and two negative words (e.g., disease, bombs) were selected for use in the experiment. Normative data indicated these words to involve strong evaluative associations (Bargh et al., 1992). The four words from one of these two sets were repeatedly presented during the recognition task. Presentation was randomly determined, with each word appearing 40 times. The word sets were counterbalanced such that one set was repeatedly presented to half of the participants and the other set was repeatedly presented to the remaining participants. Thus, participants repeatedly recognized words belonging to one of the two sets, but did not express their attitudes toward the words. The size of the block masking a word was held constant to ensure that participants could not identify a word on the basis of the block length. After completing the initial word recognition task, participants were given about a short break during which the computer was reprogrammed.

The second phase of the experiment featured the attitudinal priming procedure first used in the Fazio et al. (1986) experiments. In this more complex word processing task, a prime word appeared for 200 ms and was followed 100 ms later by a target adjective that had either a strong positive (e.g., "wonderful") or negative connotation (e.g., "horrible"). Thus, the stimulus onset asynchrony was 300 ms. Participants indicated as quickly as possible the evaluative connotation of the target adjective. That is, they indicated the connotation of the adjective by pressing a key labeled "good" or a key labeled "bad." The key labeled "good" and "bad" were varied, such that for half the participants the "good" key was on the right whereas for the remaining participants the "good" key was on the left. Following the keypress, participants recited the prime word. A 3 s interval passed before presentation of the next prime.

Participants were given 10 practice trials to familiarize them with the procedure. After completing the practice trials, they were given another brief break before beginning the experimental trials. In the actual trials, 4 sets of words served as primes in a within-subjects design: (1) words repeatedly recognized in the first task ("repeated words"); (2) words not repeatedly recognized in the first task ("control words"); (3) baseline 3 letter string nonwords. (4) filler words (e.g., grain, floor). The filler words were distracters to prevent participants from focusing on the repeated words. Ten adjectives with positive connotations and 10 adjectives with negative connotations served as targets in the priming phase of the experiment. A total of five blocks, each consisting of 20 trials, were presented. Eight of the trials in each block featured a filler prime word and four of the trials in each block featured a three letter string nonword. The eight remaining repeated and control primes appeared once in each block. Half of the primes from each of the categories were paired with a positive target adjective in each block while the remaining half of the primes from each of the categories were paired with a negative target adjective in each block. The different combinations of primes and adjectives were randomly presented. After the 100 trials were completed, the participant was debriefed, thanked, and excused.

Results and discussion

The analyses focused on the response latencies in the second task, where a target adjective was evaluated following the presentation of a prime word. Trials on which participants responded prematurely (defined as a response latency less than 200 ms), failed to respond (within 4 s), or incorrectly identified the evaluative connotation of the target adjective were defined as errors. Two participants who each made more than 20 errors were excluded from the analysis. The average error rate of the remaining participants was 3.1%. The response latencies for trials on which an error was made were excluded from the analysis. Our primary concern was the extent to which the evaluation of the target adjectives was affected by the control and repeated word primes. For each participant, the mean latency in each of the 10 cells of the design (five prime categories × positive vs negative targets) was computed. Trials in which a filler word appeared were ignored in the analysis. The response latencies on the trials in which the target adjectives were preceded by a three letter string nonword served as a nonprime baseline. The mean positive baseline time was 1018 ms whereas the mean negative baseline time was 1060 ms. Facilitation scores were calculated by subtracting the mean positive baseline time from the mean response latency for the positive targets in each prime condition and by subtracting the mean negative baseline time from the mean response latency for the negative targets in each prime condition. The resulting facilitation scores in the repeated and control prime conditions are depicted in Fig. 1. Preliminary analyses indicated that the specific stimulus set of attitude words that was repeatedly recognized did not moderate the interaction between repetition, prime valence, and target valence on the identification of the evaluative connotation of the adjectives. The relation between

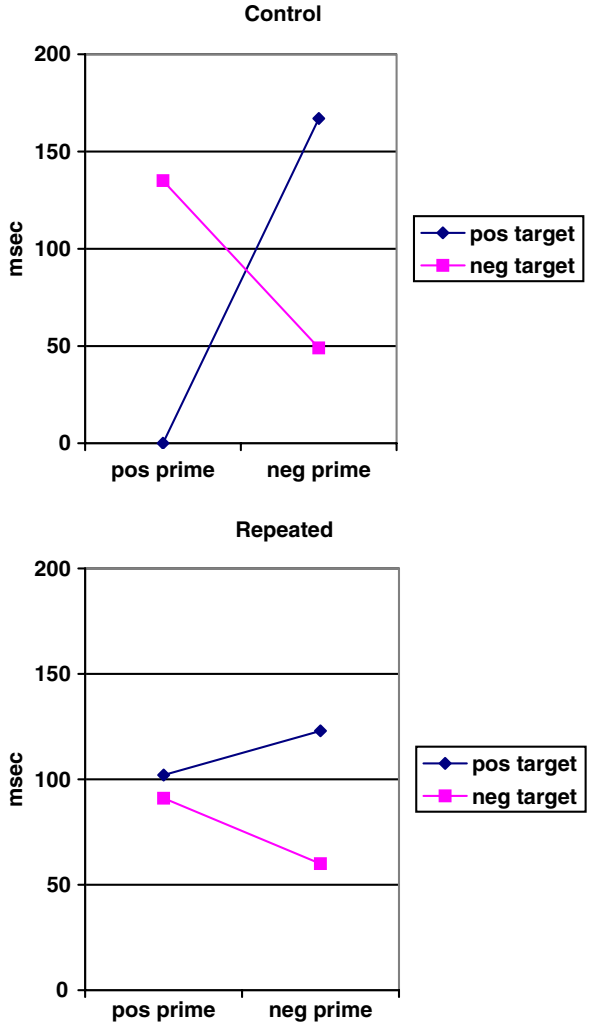

Fig. 1. Adjusted target evaluation times (subtracted from baseline times) as a function of the repeated vs control presentation of the prime, the valence of the prime, and the valence of the target adjective (Experiment 1). Note: lower numbers reflect greater facilitation.

repetition, prime valence, and target valence was similarly found to be unaffected by the block in which a trial occurred. Stimulus set and block subsequently were ignored in the primary analyses.

The analyses focused on the extent to which the evaluation of the target adjectives was affected by the presentation of the repeated word and control word primes. A 2 (repetition) × 2 (prime valence) × 2 (target valence) analysis of variance of the facilitation scores revealed a significant prime valence × target valence interaction, $F(1,29) = 6.91$, $p = .01$. As expected, this was qualified by a three-way repetition × prime valence by target valence interaction, $F(1,29) = 4.83$, $p = .04$, indicating that the impact of the primes on target adjective evaluation was affected by whether or not the primes had been repeatedly recognized. Subsequent analyses focused on the effects of prime valence and target valence on response latency in the control prime and repeated prime conditions. For the control primes, the interaction between prime valence and target valence was highly significant, $F(1,29) = 13.82$, $p < .001$. Here, responses to the adjectives were much faster when the valence of the primes and targets were congruent as opposed to incongruent. That is, the evaluation of positive adjectives was faster when the attitudinal prime was positively as opposed to negatively valenced whereas the evaluation of negative adjectives was faster when the attitudinal prime was negatively as opposed to positively valenced. These evaluative priming effects indicate that attitudes were automatically activated upon presentation of the primes in the control word conditions. However, when the primes were repeatedly recognized prior to the priming task, the interaction between prime valence and target valence was not significant, $F < 1$. Hence, automatic attitude activation was not observed in the repeated recognition conditions. All other effects were nonsignificant (all Fs < 1.3).

The pattern of response latencies in the control word condition replicates earlier work on attitudinal priming (e.g., Bargh et al., 1992; Fazio et al., 1986). Although participants were not instructed to evaluate the primes during any phase of the experiment, the presentation of the primes nevertheless affected the latency with which they could indicate the connotation of the target adjectives. The primes automatically activated an attitude in memory which, in turn, facilitated responding to similarly valenced adjectives. As expected, though, these attitudinal priming effects were not observed in the repeated word conditions where the primes had been repeatedly recognized but the automatically activated attitude not used. Thus, when an object is repeatedly encountered in a setting where an attitude is unneeded, the likelihood of subsequent attitude activation is attenuated.

The only finding that was somewhat unexpected was the generally faster response times on the baseline trials. On average, responses were significantly faster when the target was preceded by a nonword such as "GGG." However, problems in identifying a suitable baseline are common in reaction time experiments (see Fazio, 1990). In our study, nonwords may not have been appropriate baseline primes because they differed in the ease with which they could be encoded and remembered from the other primes. Nevertheless, the baseline was useful in that it permitted statistical adjustment for differential response latencies to the negative and positive target adjectives.

The findings are particularly compelling because they were obtained in a within-subjects design. During the measurement phase both control and repeated words were presented to each participant, with attitudinal priming effects being observed only for the control items. The pattern of findings could not have resulted from the induction of a general processing set to not evaluate during the initial phase of the experiment, because a set of this sort would have diminished attitude activation for both types of words. The attenuation of attitude accessibility was specific to the repeated words.

Experiment 2

The second experiment explored the conditions under which repeated processing diminishes attitude activation, as well as the processes underlying this effect. The study also attempted to replicate the effect using a slightly different dependent measure. Participants once again performed a training task followed by a priming task designed to measure attitude activation. In the measurement phase of the experiment, the attitudinal priming effects of the repeated words vs control words were once again compared. However, rather than indicating the evaluative connotation of the adjective, participants recognized the adjectives as quickly as possible in a perceptual fluency task. Prior research using this measure has shown that attitudinal primes with strong evaluative associations facilitate the recognition of similarly valenced adjectives and may inhibit the recognition of dissimilarly valenced adjectives (Sanbonmatsu, Osborne, & Fazio, 1986). Consequently, although the measure was changed, we expected once again to observe attitudinal priming effects for control words and an attenuation of attitudinal priming for repeatedly nonevaluated words.

Complicating the predictions was a variation of the repetition task of the first phase in a between subjects design. Half of the participants repeatedly recognized words as before, whereas the remaining participants repeatedly evaluated words. Thus, the study compared the effects of different initial processing tasks (recognition vs evaluation) on automatic attitude activation. Our aim was to examine the viability of the semantic satiation explanation for the deautomatization of attitudes. According to this account, repeated activation contributes to fatigue that reduces the ability to activate the nodes and pathways associated with a word. This suggests that the repeated evaluation of a word should satiate the attitudinal representations, thereby diminishing the capacity for subsequent automatic attitudinal responding. In contrast, a learning account suggests that, if anything, repeated evaluation should strengthen the

object-attitude association and increase the likelihood of subsequent automatic attitude activation. Previous research has indeed observed such consequences to repeated attitude rehearsal (e.g., Fazio et al., 1986, Experiment 3), but this work involved only five trials of repeated attitude expression—far fewer repetitions than is typical of the semantic satiation research.

The new dependent measure enabled us to explore the viability of yet an additional explanation for the deautomatization effect. In the adjective connotation task used in Experiment 1, the processes by which primed attitude objects influence responding to the target words may include response competition (see, e.g., Klauer, 1998; Wentura, 1999; see Fazio, 2001, for a review of mechanisms underlying the affective priming effect). According to this process account, both the prime and the target "ready" a particular evaluative response. For example, the prime "baby" may automatically activate positivity and ready the participant to respond "good." However, the target adjective "terrible" activates negativity and requires the response "bad." When the activated responses are incongruent with one another, the evaluation activated by the prime interferes or competes with the evaluative response to the target. When they are congruent, on the other hand, the evaluative response to the target is facilitated by the presentation of the prime. This explanation suggests that our repeated nonevaluation procedure may lower the likelihood of automatic attitude activation and, as a result, diminish the "readying" of a particular evaluative response by the prime. That is, earlier, repeated nonutilization of the attitude associated with an object may reduce the response facilitation or competition generated by that object when it is presented as a prime. The task of Experiment 2, though, required only recognition of the target word, not evaluation. As such, attitudinal priming effects in the task are not mediated by a readying of a congruent or incongruent evaluative response, but by an encoding advantage for evaluatively congruent targets. Consequently, any observed changes in automatic attitude activation resulting from repeated nonevaluation could not be the result of a reduction in response facilitation or competition by the prime. Thus, a final purpose of Experiment 2 was to examine the viability of the response competition account of attitudinal deautomatization.

Method

Participants

Sixty-two students enrolled in an introductory psychology course at the University of Utah participated in the experiment in order to receive extra course credit. Participation was limited to native English speakers. Participants were randomly assigned to either the repeated recognition or repeated evaluation condition.

Procedure

The procedures were patterned after those of the first experiment. The study was ostensibly an investigation of word assessment that compared performance on a simple word assessment task with that on a more complex word assessment task. The experimental procedure consisted of two major tasks, the first involving repeated word recognition or evaluation and the second involving the priming procedure.

In the first and simplest task, a word masked by a block of dots appeared on the computer monitor and slowly faded into view. Participants in the recognition only conditions pressed a designated key upon recognition of the word. Participants in the evaluation conditions indicated their personal evaluation of the word, once they recognized it, by pressing a key labeled "good" or a key labeled "bad." The word disappeared following the keypress and participants recited the word to ensure that recognition occurred. A tape player was present to record word identification. A 3 s interval passed before presentation of the next word. As before, participants were instructed to maximize both the speed and accuracy of their responses. The experiment utilized the same two sets of two positive and two negative words that were presented in the first experiment. The four words from one of these two sets were repeatedly presented during the initial task. Presentation was randomly determined, with each word appearing 40 times. The word sets again were counterbalanced such that one set was repeatedly presented to half of the participants and the other set was repeatedly presented to the remaining participants.

The second phase of the experiment featured the priming procedure used in the Sanbonmatsu et al. (1986) study. In this more complex word recognition task, a prime word appeared for 200 ms and was followed 100 ms later by a positive or negative target adjective. The adjective was initially masked but slowly faded into view. Once again, the word took 4 s to unmask completely. Participants pressed a key upon recognition of the word, then recited both the adjective and the prime word. A 3 s interval passed before presentation of the next prime. Again, both speed and accuracy of performance were emphasized.

Ten practice trials were performed prior to the experimental trials. The prime words and adjectives presented in the main task and the pairings were identical to those of the first experiment. Again, four sets of words served as primes: (1) words repeatedly recognized in the first task; (2) words not repeatedly recognized in the first task; (3) three letter string nonwords; (4) filler words. Ten adjectives with positive connotations and 10 adjectives with negative connotations served as targets in the priming phase of the experiment. A total of five blocks, each consisting of 20 trials, were presented with each of the primes appearing once in each block.

Results and discussion

The analyses once again focused on the response latencies in the second (priming) task. The response latencies on the filler trials were ignored. Errors were defined as instances where participants failed to respond or responded before tar-

get recognition was possible (a response latency less than 2 s). One participant was excluded for making an excessive number of errors (more than 20). The average error rate of the remaining participants for the nonfiller trials was 0.61%. The response latencies on trials in which an error was made were excluded from the analysis. The mean time on the positive baseline trials was 3769 ms, whereas the mean time on the negative baseline trials was 3947 ms. The facilitation scores in the repeated recognition and repeated evaluation conditions are depicted in Figs. 2 and 3. Preliminary analyses indicated that the set of attitude words that was repeatedly processed during the training phase of the experiment did not moderate the interactions between repetition, prime valence, target valence, and the repeated recognition task on the priming task. The relations between repetition, prime valence, target valence, and processing task were similarly found to be unaffected by the block in which a trial occurred. These variables subsequently were ignored in the primary analyses.

The analyses focused on the effects of repeated and control word primes on target adjective recognition in the

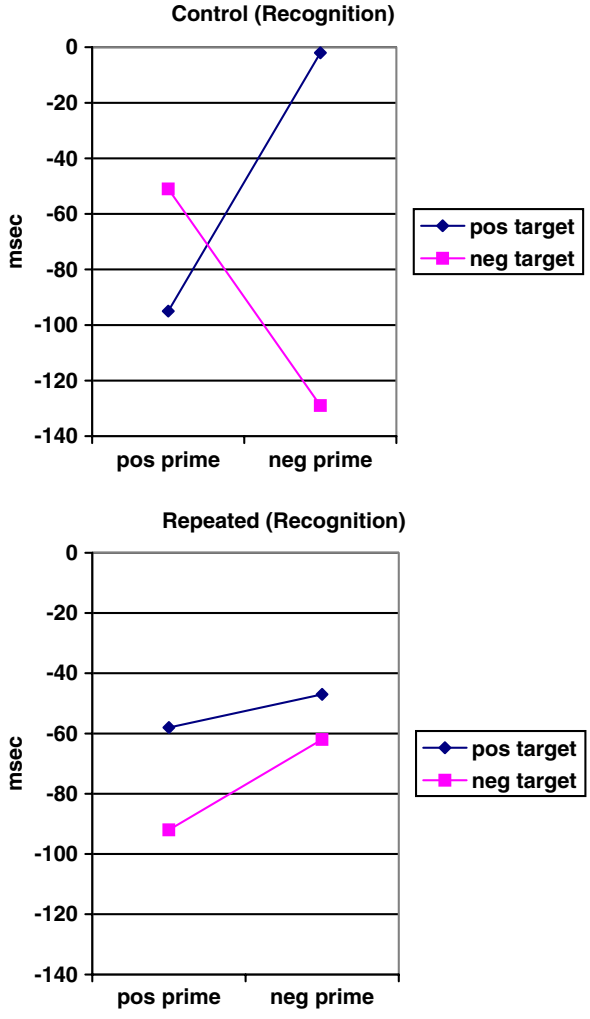

Fig. 2. Adjusted target recognition times as a function of the repeated vs control presentation of the prime, the valence of the prime, and the valence of the target adjective in the *repeated recognition* conditions (Experiment 2).

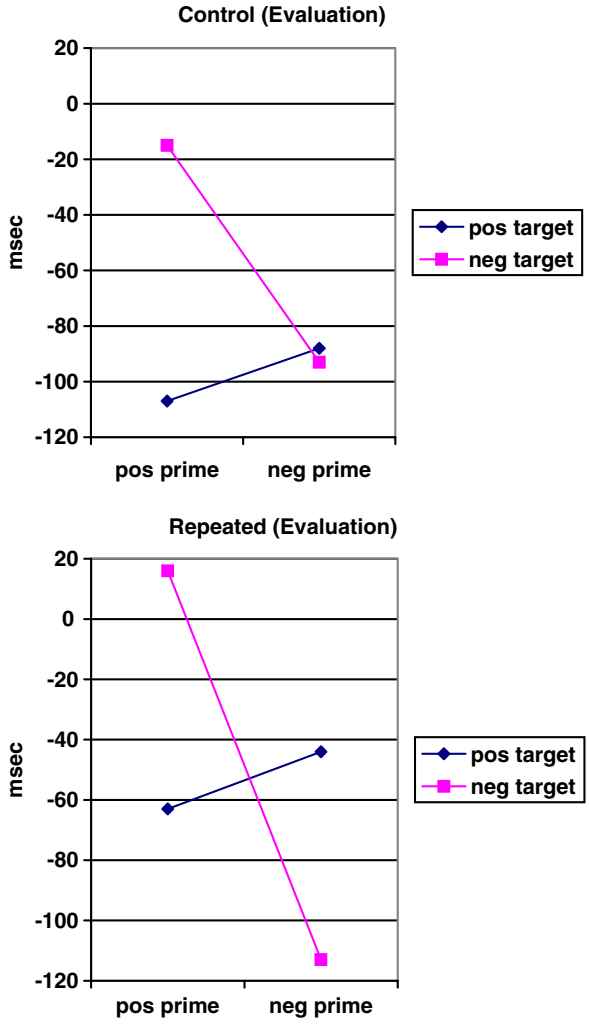

Fig. 3. Adjusted target recognition times as a function of the repeated vs control presentation of the prime, the valence of the prime, and the valence of the target adjective in the *repeated evaluation* conditions (Experiment 2).

repeated evaluation and repeated recognition conditions. A 2 (prime valence) × 2 (target valence) × 2 (processing task) × 2 (repetition) analysis of variance of the facilitation scores revealed a significant two-way prime valence by target valence interaction, $F(1,60) = 19.08$, $p < .001$. This pattern was qualified by a four-way prime valence by target valence by repetition by processing interaction, $F(1,60) = 5.02$, $p = .03$. Thus, the interacting effects of prime valence and target valence on recognition time were moderated by repeated processing and the type of repeated processing task. The processing task by target valence interaction was also significant, $F(1,60) = 6.09$, $p < .02$. No other main effects or interactions were significant, all Fs < 2.6.

A planned analysis of the response latencies in the repeated recognition conditions revealed the expected three-way prime valence by target valence by repetition interaction, $F(1,37) = 6.85$, $p = .01$, thus replicating the findings of the first experiment (see Fig. 2). An examination of the effects of prime valence and target valence on response

time in the control prime condition revealed a significant interaction, $F(1,37) = 9.56$, $p < .01$, as recognition times were much faster when the valence of the primes and targets were congruent as opposed to incongruent. Thus, attitudes were automatically activated for the control words. However, when the primes were repeatedly recognized prior to the priming task, the interaction between prime valence and target valence was not significant, $F < 1$. Thus, as in the previous study, automatic attitude activation was attenuated by the repeated nonevaluation of the prime words.

An identical analysis of the response latencies in the repeated evaluation conditions failed to show a significant three-way prime valence by target valence by repetition interaction, $F < 1$ (see Fig. 3). Instead, the prime valence by target valence interaction was highly significant $F(1,23) = 14.72$, $p < .001$, as in both the control prime and repeated evaluation prime conditions recognition times tended to be faster when the valence of the primes and targets were congruent. The pattern of attitudinal priming indicates that attitudes were automatically activated in both the control prime condition and the repeated evaluation condition.

In sum, Experiment 2 replicated Experiment 1 using a different measure of attitude activation. In the control word conditions, strong patterns of attitude activation were observed. However, when the words were repeatedly recognized, attitudinal priming effects were attenuated. Thus, repeatedly encountering an object in a setting where an attitude was unneeded diminished the likelihood of the subsequent activation of the attitude. More importantly, the findings indicate that the effects of repeated processing are highly dependent on the initial processing that occurs. When the words were repeatedly evaluated, attitudinal priming effects were observed for both the control and repeated words. Thus, only when objects were encountered in a task where attitudes were unneeded was the accessibility of the attitudes reduced. These findings raise questions about the semantic satiation explanation for the effects of repeated nonutilization of the attitude. According to this account, the capacity for activation of the pathways and nodes associated with a word is diminished by repeated firing. However, in Experiment 2 the activation of attitudes was not attenuated at all by the repeated evaluation of words.

We anticipated that attitudinal priming might be even stronger following repeated attitude expression. However, no differences were observed in the attitudinal priming effects of the repeatedly expressed words and of the control words. This is not altogether surprising because attitude objects were preselected that had strong preexisting attitudinal associations. That is, the attitudes associated with the presented words were already strong to the point that they were automatically activated.

The findings converge with those of Experiment 1 to suggest that repeated nonuse of an attitude attenuates the subsequent likelihood of automatic attitude activation. Participants were not instructed to evaluate the primes during the priming task of Experiment 2. Nevertheless, strong attitudinal priming effects were observed for the control primes as well as the repeatedly evaluated primes, suggesting that the attitudes associated with these primes were spontaneously activated. Thus, it appears that automatic attitude activation occurred for all but the primes that had earlier served as the stimuli in the repeated recognition procedure.

It is important to note that in the procedure employed as the dependent measure, the target adjectives took a relatively long time to unmask fully (4 s). In some paradigms, such long SOAs would provide reason to question the automaticity of any presumed priming effect, because the longer time interval has the potential to permit participants to activate attitudes in a more controlled and effortful fashion. However, there are a number of reasons to question the appropriateness of any such hesitations regarding the present unmasking procedure. First, the effectiveness of various SOAs is likely to depend markedly on the specific nature of the task. Effects of priming on the construal of subsequently presented ambiguous information are typically observed many minutes after the priming episode (see Higgins, 1996, for a review). In the adjective connotation task employed in Experiment 1 and in much of the research concerning SOAs (e.g., Fazio et al., 1986), the participant's task is to evaluate the target adjectives. Thus, rapid dissipation or active suppression of any evaluation activated by the prime helps avoid response competition. In the present case, there is no such utility provided by a longer SOA. Second, the task itself provided participants with no cues that might encourage controlled and effortful activation of attitudes toward the primed objects. The primes were described as stimuli intended to make the recognition task more complex and difficult. Each prime was merely an additional word that needed to be recited along with the target word. Thus, there was little reason to actively consider one's attitudes toward the primes. Third, past research (Fazio, Williams, & Powell, 2000) has employed this same priming and unmasking procedure very effectively to assess the strength of associations between a category and its exemplars (e.g., aspirin–Bayer). Exemplars that are strongly associated with the category enjoy an encoding advantage when primed by the category label. In the present case, evaluations that are strongly associated with the prime benefit from a similar encoding advantage.

Finally, and most importantly, the present results are difficult to explain in terms of effortful and strategic attitude activation. Why would participants have deliberately activated their attitudes toward the control and repeatedly evaluated primes but not toward the repeatedly recognized primes—the words that had been employed in the first phase of the experiment? A much more plausible interpretation, and one that is parsimonious with the findings of Experiment 1, is that attitudes toward the repeatedly evaluated and control primes, but not those employed in the repeated recognition procedure were automatically activated. Indeed, we regard the present unmasking procedure

as a multiple-trial analog to priming experiments in which the judgment of relatively ambiguous information constitutes the dependent measure (e.g., Higgins, Rholes, & Jones, 1977). Consistent with Bruner's (1957) arguments regarding perceptual readiness, and general principles of accessibility (Higgins, 1996), less sensory input was required to identify target adjectives that were preceded by a prime whose associated evaluation was capable of automatic activation—provided that the automatically activated attitude was evaluatively congruent with the target adjective.

Experiment 3

Early research on attention suggested that automatic responding is strategy independent and free of contextual influence. However, subsequent findings indicated that automatic processing is, in fact, conditional (for discussions, see Bargh, 1989; Logan, 1989). Automatic attitude activation can be affected by such temporary motivational states as thirst and cigarette deprivation (e.g., Ferguson & Bargh, 2004; Sherman, Presson, Chassin, Rose, & Koch, 2003). Cognitive studies have demonstrated that semantic priming depends on the manner in which the prime word is attended (e.g., Friedrich, Henik, & Tzelgov, 1991; Smith, 1979; Smith, Theodor, & Franklin, 1983; Strayer & Kramer, 1994). For example, Henik, Friedrich, Tzelgov, and Tramer (1994) showed that instructions to search for a specific letter within a word were found to suspend the semantic priming effects of a word. Social cognitive work has demonstrated that stereotype priming is influenced by perceiver intentions and self-interest (e.g., Blair & Banaji, 1996; Banaji & Hardin, 1996; Sinclair & Kunda, 1999) and that spontaneous trait inference is dependent on the manner in which information is initially processed (e.g., Uleman & Moskowitz, 1994). Both sets of research have shown that stimuli may be processed in ways that diminish momentarily the elicitation of an automatic response. Because of the differential processing of the prime that is induced, the conditions necessary for automatic responding are no longer present.

The first two experiments demonstrated that repeated recognition diminishes momentarily the likelihood of automatic attitude activation. However, the effects of repeatedly encountering an object when an attitude is unneeded may extend well beyond the immediate context. We suggest that repeated nonevaluation is a procedure through which automatic response patterns may be established, or more correctly, eliminated. In particular, through repeated practice or training, the automatic evaluation of an object may be diminished and perhaps supplanted or replaced with some other form of chronic processing.

Experiment 3 examined whether repeated nonevaluation leads to changes in automatic attitude activation that extend beyond the immediate context. Participants again began the experiment by repeatedly recognizing attitude objects. The nonevaluative training was strengthened by increasing the number of repetitions from 40 to 60 per word. The automatic activation of attitudes toward the repeatedly recognized words and toward the control words was assessed using the perceptual fluency priming procedure either immediately or the following day. We anticipated that in both the delay and no delay conditions the repeatedly recognized attitude words would show less attitudinal priming than the control words.

Method

Participants

Thirty-seven students enrolled in an introductory psychology course at the University of Utah participated in the experiment in order to receive extra course credit. Participation was again limited to native English speakers. Participants were randomly assigned to either the delay or no delay condition. The data from one participant who reported not sleeping for two days was omitted from the analyses.

Procedure

The procedures were similar to those of the first two experiments. The study was presented as an investigation of performance on a simple and a more complex word processing task. Participants once again began by repeatedly recognizing words that were initially masked and that slowly faded into view. The presented words were from one of the two sets of two positive and two negative words that were utilized in the previous experiments. Presentation was randomly determined, with each word appearing 60 times. The word sets again were counterbalanced such that one set was repeatedly presented to half of the participants and the other set was repeatedly presented to the remaining participants.

The second phase of the experiment featured the priming procedure used in the second experiment. In this task, a prime word appeared for 200 ms and was followed 100 ms later by a positive or negative target adjective that was initially masked. The adjective completely unmasked after 3 s. Participants pressed a key upon recognition of the word, then recited both the adjective and the prime word. As before, both the speed and accuracy of performance were emphasized.

Ten practice trials were performed prior to the experimental trials. The prime words and adjectives presented in the main task and the pairings were similar to those in the earlier experiments. Four sets of words again served as primes: (1) words repeatedly recognized in the first task; (2) words not repeatedly recognized in the first task; (3) three letter string nonwords; (4) filler words. Eight adjectives with positive connotations and eight adjectives with negative connotations served as targets. A total of two blocks, each consisting of 32 trials, were presented. In each block, each prime appeared twice—once with a negative adjective and once with a positive adjective. The negative and positive adjectives that were paired with a prime were varied across the two blocks.

Participants in the no delay conditions performed the priming procedure immediately after completing the repeated word recognition task. Delay condition participants performed the priming procedure the following day. These participants were informed of the delay and scheduled for a return prior to engagement in the repeated recognition task.

Results and discussion

The analyses once again focused on the response latencies in the second (priming) task. The response latencies on the filler trials were ignored. Errors were defined as instances where participants failed to respond or responded before target recognition was possible (a response latency less than 500 ms). The average error rate on the nonfiller trials was 0.36%. The response latencies on trials in which an error was made were excluded from the analysis. Overall the responses were faster than in the previous experiment utilizing a perceptual fluency measure (Experiment 2) because the target word unmasked more quickly. The mean time on the positive baseline trials was 2555 ms, whereas the mean time on the negative baseline trials was 2791 ms.The facilitation scores in the no delay and delay conditions are depicted in Figs. 4 and 5. Preliminary analyses indicated that the set of attitude words that was repeatedly processed during the training phase of the experiment did not moderate the interaction between repetition, prime valence, target valence, and the amount of delay on the priming task. The word set subsequently was ignored in the primary analyses.

The analyses focused on the effects of repeated and control word primes on target adjective recognition in the delay and no delay conditions. A 2 (prime valence) × 2 (target valence) × 2 (delay) × 2 (repetition) analysis of variance of the facilitation scores revealed a significant two-way prime valence by target valence interaction, $F(1,34) = 15.57$, $p < .001$. This pattern was qualified by a three-way prime valence by target valence by repetition interaction, $F(1,34) = 5.72$, $p = .02$. As expected, the recognition of congruent targets was facilitated more by the control primes than by the repeatedly recognized primes. The four-way prime valence by target valence by repetition by delay interaction was not significant, $F < 1$. Thus, the amount of time between the initial training task and the priming task did not moderate the effects of repeated recognition on the automatic activation of attitudes. Additional analyses revealed that recognition times were generally faster relative to the baseline when the primes were negative as opposed to positive ($M = -113.5$ vs $M = -18.1$), $F(1,34) = 10.07$, $p = .003$. No other main effects or interactions were significant, all Fs < 2.

The absence of the four-way interaction indicates that the impact of repeated recognition was unaffected by the delay. Nevertheless, further analyses were performed to explore the effects of repeated recognition on attitude activation in the delay vs no delay conditions. An examination of the response latencies in the no delay condition revealed a significant prime valence by target interaction, $F(1,19) = 10.77$, $p = .004$, as recognition times were much faster when the valence of the primes and targets were congruent as opposed to incongruent. Although in the predicted direction, the three-way prime valence by target valence by repetition interaction was not significant, $F(1,19) = 1.95$, $p = .18$ (see Fig. 4), presumably reflecting a simple lack of statistical power. Experiment 3 involved a relatively small number of participants ($n = 20$ vs an average n of 31 in Experiment 2 when a similar priming measure was used). However, within the delay condition, the three-way prime valence by target valence by repetition interaction was statistically significant, $F(1,15) = 4.40$, $p = .05$ (see Fig. 5). As expected, the recognition of target adjectives that were evaluatively congruent with the primes in the delay condition was facilitated more by the control primes than by the repeatedly recognized primes.

Experiment 3 demonstrates that the effects of repeated nonevaluation on automatic attitude activation are not lim-

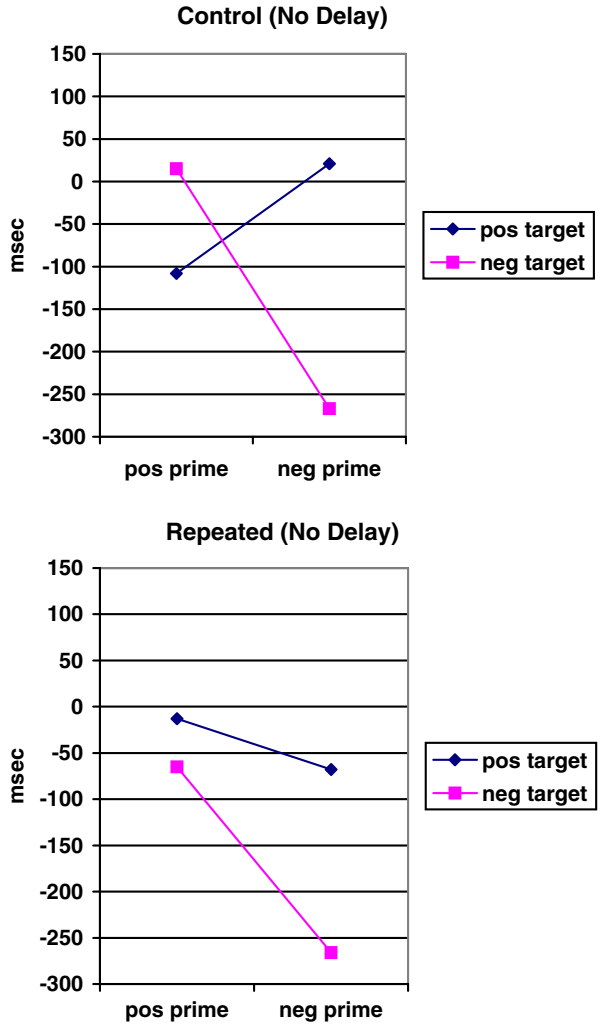

Fig. 4. Adjusted target recognition times as a function of the repeated vs control presentation of the prime, the valence of the prime, and the valence of the target adjective in the *no delay* conditions (Experiment 3).

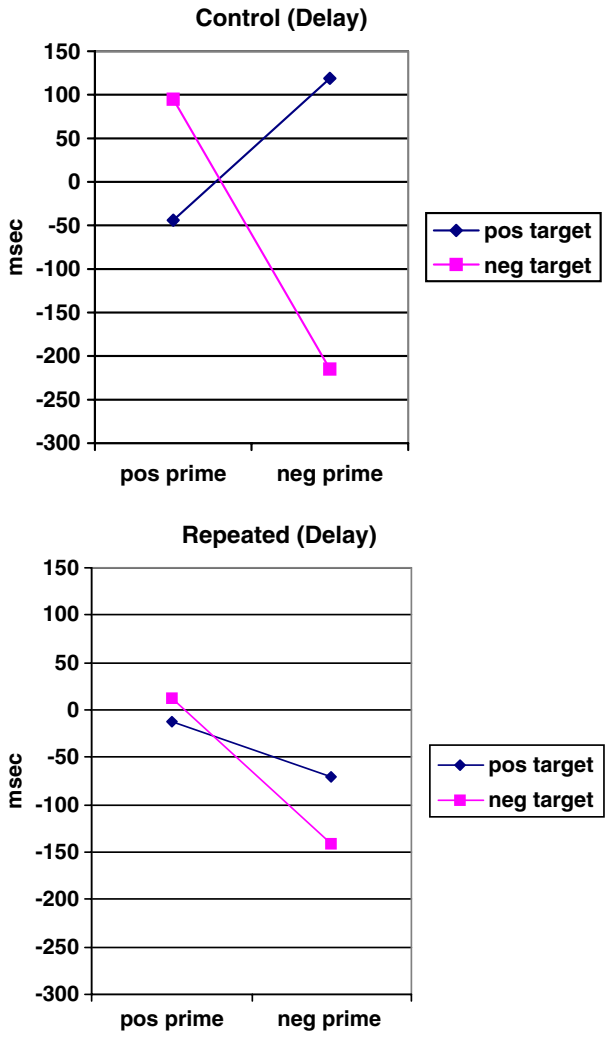

Fig. 5. Adjusted target recognition times as a function of the repeated vs control presentation of the prime, the valence of the prime, and the valence of the target adjective in the *delay* conditions (Experiment 3).

ited to the immediate temporal context. Even after the delay of a full day, the repeatedly recognized attitude words exhibited diminished attitudinal priming. Thus, the repeated nonevaluation of an object appears to lead to enduring changes in the automatic activation of the associated attitude.

Although there were no significant differences in attitudinal priming across the delay and no delay conditions, the pattern of means suggests that if anything, the tendency for repeated recognition to diminish attitude activation was stronger in the delay condition than in the no delay condition. This odd finding may have resulted from unavoidable subject selection. Because participants in the delay condition were required to return the following day, there naturally was some attrition (three participants). We speculate that individuals who were interested and involved in the experiment were those who were most likely to return. These participants are more likely to have attended closely to the repeated recognition task and thus, more likely to have been influenced by the training.

General discussion

The utility of an attitude varies across context and time. Attitudes that played an important role in judgment, communication, and decision making in one setting may have little functional value in another. Our findings demonstrate that when the need for an attitude in a setting diminishes, the likelihood of the subsequent automatic activation of the attitude is attenuated. In three experiments, repeatedly encountering an attitude object in a context where an evaluation was unneeded diminished subsequent attitude activation. This was observed using both an evaluative measure of attitudinal priming (Experiment 1) and a perceptual fluency measure of attitudinal priming (Experiments 2 and 3). Thus, if an attitude object is repeatedly encountered and processed in a nonevaluative manner, the accessibility of the attitude is decreased. The findings indicate that this is not a momentary effect that is limited to the immediate context. In Experiment 3, a reduction in automatic activation was observed a day following the repeated recognition procedure, suggesting that the deautomatization of attitudes is a learning phenomenon that leads to relatively enduring changes in attitude activation.

The changes in attitude activation that were observed in the present study may be ubiquitous given the constantly changing nature of individuals and their social environments. For example, when consumers are in the process of choosing and purchasing a particular product, they often develop highly accessible and differentiated attitudes toward different brands. However, after they begin routinely using their refrigerator, window blinds, kitchen chairs, or the like, their attitudes tend to change. Specifically, their feelings and evaluations become less accessible as they repeatedly use but do not evaluate or make decisions about the product. More social objects such as group memberships and friendships can also lose their evaluative and affective power as a result of repeated nonevaluative encounters. For example, families generally evaluate communities very carefully before moving in. However, as time passes and families get embroiled in work and school, their attitudes may fade even through they live in and travel through their town or city everyday. Although their attitudes may remain positive, they may not be automatically accessed. Instead, prompting may be necessary to activate residents' sentiments about the beauty and comfort of their community. Along the same lines, the commonplace phenomenon of "taking things for granted" may result largely from repeated nonutilization. We lose our appreciation for many of the objects and persons that we use and encounter every day. Only when the services of an object or person are momentarily lost do we realize the value of them once again.

Admittedly, the present study did not examine the effects of repeated nonuse of attitudes in an everyday context. For purposes of internal validity, we purposely sought a highly controlled environment in which the demands for evaluation and nonevaluation could be strictly controlled.

Nevertheless, just as is implied by the examples noted above, people apparently can acclimate to attitude objects that they encounter repeatedly.

The effects demonstrated in this research of repeatedly encountering an object in a setting where an attitude is unneeded are likely to be consequential because of the substantial role that accessible attitudes play in perception, judgment, decision making, and behavior (for a review, see Fazio, 1989). The literature indicates that deautomatization should reduce the functioning of an attitude in the future while, perhaps, directly or indirectly increasing the relative influence of alternative or competing attitudes and representations that are more relevant in a given context.

Some readers may see the effects of the repeated nonuse of attitudes that we examined in the present research as similar to habituation (for reviews, see Hearst, 1988; Thompson & Spencer, 1966). Although there are obvious parallels, some important differences exist between the present research and that on habituation. Most stimulus exposure studies have not focused on attitudes and automatic processing. More interestingly, though, the nonevaluation procedure featured in our studies is unique from habituation procedures in that the very task is to attend to the stimulus. Again, participants in our procedure were required to recognize the attitude object. The decrements in automatic responding resulting from repeated recognition observed in our experiments are also inconsistent with important notions about the conditions under which habituation occurs. For example, according to Thompson and Spencer, "strong stimuli may yield no significant habituation" (1966, p. 19). This principle does not appear to apply to the attenuation of automatic attitude activation, because the stimuli used in the present research clearly were strong enough to be judged extremely and to elicit an automatic attitudinal response under control conditions.

Experiment 3 demonstrated that the change in automatic attitude activation resulting from the repeated recognition procedure generalizes to later temporal settings. However, the extent to which deautomatization generalizes to social or physical contexts that differ from the training environment and to different instantiations of the same attitude object (e.g., synonyms) remains unknown and will need to be investigated in the future. Habituation effects tend to be highly stimulus specific, that is, the generalization gradient tends to be steeply sloped (Hearst, 1988). This suggests that deautomatization may tend to be particular to the context and stimuli that were repeatedly encountered. A related issue that will be important to examine is the conditions under which the strength of deautomatized attitudes can be recovered. Specifically, what events, training, or settings might be necessary for the restoration of automaticity? Studies of the reacquisition of conditioned responding following extinction (e.g., Pavlov, 1927; Ricker & Bouton, 1996) suggest that spontaneous recovery of automatic attitude activation may occur following some retention interval. This research indicates that the likelihood of such recovery of an automatic attitudinal response may depend heavily on the nature of the initial training and the subsequent experiences with the attitude object. The social context and the processing goals of a perceiver undoubtedly will also be important factors affecting the activation of attitudes that have been deautomatized.

In addition to demonstrating the phenomenon, the experiments provided evidence regarding how the repeated nonutilization of attitudes affects attitude accessibility. Although our evidence was not direct, our findings do provide insight into the underlying mechanisms through falsification of the most plausible alternatives (Popper, 1959). As we stated earlier, the usage of a within-subjects design in the experiments ruled out the possibility that a general nonevaluative set was responsible for the observed findings. Both control words and repeatedly recognized words served as primes for all participants. Automatic attitude activation was observed for the control words but not the repeated words. Thus, the training procedure developed a propensity to selectively not evaluate the repeated words, not a general set to not evaluate all words. Our findings also rule out the semantic satiation account of the deautomatization of attitudes. The repeated evaluation procedure in Experiment 2 required participants to continuously activate the attitudes associated with the repeatedly presented words. However, rather than satiating the attitudinal nodes and pathways and diminishing the capacity for attitude activation, the attitudinal priming effects of the repeatedly evaluated words remained strong. Finally, the findings of Experiments 2 and 3 suggest that the effects of repeated nonuse on attitude activation are not mediated entirely by a reduction of response competition and facilitation between the prime and the target. The encoding advantage typically enjoyed by targets that are evaluatively congruent with the primed attitude object is diminished by repeated nonutilization of the attitude. Thus, the studies ruled out three highly viable explanations for the effects of repeated nonevaluation on attitude activation.

Although only indirect, these findings suggest that semantic satiation and the effects of repeated nonuse of an automatically activated attitude may be a learning phenomenon (or, perhaps more correctly, an extinction phenomenon) in which the strength of the association between an attitude and an object is decreased. Automatic attitude activation is presumed to have diminished in the repeated recognition task as the number of repeated presentations of the object increased. The subsequent trials of nonpairings of the attitude object and the attitude (i.e., instances in which the attitude was absent in the presence of the attitude object) in the task would serve to weaken the absolute strength of the attitude-object association in memory and, thus, decrease the likelihood of attitudinal priming during the measurement phase of the study.

An additional possibility is that the repeated recognition task strengthened the association between the attitude object and a nonevaluative response. Presumably, response competition exists between attitudinal and nonattitudinal associates to a given object. The training procedure may

have strengthened a nonevaluative response, such as the verbal labeling or expression of the attitude object, as participants repeatedly recognized and stated the words presented in the task. Consequently, an automatic attitudinal response may have been supplanted by a nonevaluative response, even in absence of any absolute changes in the strength of the attitude-object association. Consistent with this account, research has shown that repeated pairing of an object with a new or novel response may increase the strength of that response and diminish the likelihood of a preexisting automatic response (Kawakami, Dovidio, Moll, Hermsen, & Russin, 2000).

An important parallel to our findings can be found in recent research by Dijksterhuis and Smith (2002), who examined the effects of repeated subliminal presentation on attitude extremity. These investigators found that objects that were repeatedly subliminally encountered were subsequently rated less extremely. The present work, of course, is distinct from this research in that it focused specifically on automatic attitude activation. Our findings indicate that repeatedly encountering an object in which an attitude is unneeded diminishes the subsequent activation of the attitude and, thus, the likelihood that the attitude will be utilized in the future. Nevertheless, the Dijksterhuis and Smith (2002) research is pertinent here because it indicates that attitudes may grow more moderate as a function of their repeated activation but nonutilization. Their findings, combined with ours, suggest that repeated nonuse can weaken an attitude in two senses. The strength of the object-evaluation association is attenuated, thus deautomatizing the attitude, and the evaluation associated with the object is itself diminished.

Our findings generally illustrate the adaptation of the mind to changing needs and environmental demands. Attitudes are activated because they are useful in our social worlds. However, if the context changes and an attitude is no longer needed, the automatic activation of attitudes may diminish. Hence, the mind may be relatively efficient in processing information, focusing on the features and qualities of objects that are functionally relevant in the given setting.

References

Bargh, J. A. (1989). Conditional automaticity: Varieties of automatic influence in social perception and cognition. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought* (pp. 3–51). New York: Guilford Press.

Bargh, J. A., Chaiken, S., Govender, R., & Pratto, F. (1992). The generality of the automatic activation effect. *Journal of Personality and Social Psychology, 62*, 893–912.

Bargh, J. A., Chaiken, S., Raymond, P., & Hymes, C. (1996). The automatic evaluation effect: Unconditional automatic attitude activation with a pronunciation task. *Journal of Experimental Social Psychology, 32*, 104–128.

Banaji, H. R., & Hardin, M. (1996). Automatic gender stereotyping. *Psychological Science, 7*, 136–140.

Blair, I. V., & Banaji, H. R. (1996). Automatic and controlled processes in stereotyping. *Journal of Personality and Social Psychology, 70*, 1142–1163.

Bruner, J. S. (1957). On perceptual readiness. *Psychological Review, 64*, 123–152.

Dijksterhuis, A., & Smith, P. K. (2002). Affective habituation: subliminal exposure to extreme stimuli decreases their extremity. *Emotion, 2*, 203–214.

Esposito, N. J., & Pelton, L. H. (1971). Review of the measurement of semantic satiation. *Psychological Bulletin, 75*, 330–346.

Fazio, R. H. (1986). How do attitudes guide behavior? In R. M. Sorrentino & E. T. Higgins (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (pp. 204–243). New York: Guilford Press.

Fazio, R. H. (1989). On the power and functionality of attitudes: The role of attitude accessibility. In A. R. Pratkanis, S. J. Breckler, & A. G. Greenwald (Eds.), *Attitude structure and function* (pp. 153–179). Hillsdale, NJ: Erlbaum.

Fazio, R. H. (1990). A practical guide to the use of response latency in social psychological research. In C. Hendrick & M. S. Clark (Eds.), *Research methods in personality and social psychology* (pp. 74–97). London: Sage.

Fazio, R. H. (2000). Accessible attitudes as tools for object appraisal: Their costs and benefits. In G. Maio & J. Olson (Eds.), *Why we evaluate: Functions of attitudes* (pp. 1–36). Mahwah, NJ: Erlbaum.

Fazio, R. H. (2001). On the automatic activation of associated evaluations: An overview. *Cognition and Emotion, 15*, 115–141.

Fazio, R. H., Sanbonmatsu, D. M., Powell, M., & Kardes, F. R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology, 50*, 229–238.

Fazio, R. H., Williams, C. J., & Powell, M. C. (2000). Measuring associative strength: Category-item associations and their activation from memory. *Political Psychology, 21*, 7–25.

Ferguson, M. J., & Bargh, J. A. (2004). Liking is for doing: The effects of goal pursuit on automatic evaluation. *Journal of Personality and Social Psychology, 87*, 557–572.

Friedrich, F. J., Henik, A., & Tzelgov, J. (1991). Automatic processes in lexical access and spreading activation. *Journal of Experimental Psychology: Human Perception and Performance, 17*, 792–806.

Greenwald, A. G., Klinger, M. R., & Liu, T. J. (1989). Unconscious processing of dichoptically masked words. *Memory & Cognition, 17*, 35–47.

Hearst, E. (1988). Fundamentals of learning and conditioning. In R. C. Atkinson, R. J. Herrnstein, G. Lindzey, & R. D. Luce (Eds.), *Steven's handbook of experimental psychology* (2nd ed., pp. 3–109). New York: Wiley.

Henik, A., Friedrich, F. J., Tzelgov, J., & Tramer, S. (1994). Capacity demands of automatic processes in semantic priming. *Memory & Cognition, 22*, 157–168.

Hermans, D., DeHouwer, J., & Eelen, P. (1994). The affective priming effect: Automatic activation of evaluative information in memory. *Cognition and Emotion, 8*, 515–533.

Higgins, E. T. (1996). Knowledge activation: Accessibility, applicability, and salience. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 133–168). New York: Guilford Press.

Higgins, E. T., Rholes, W. S., & Jones, C. R. (1977). Category accessibility and impression formation. *Journal of Experimental Social Psychology, 13*, 141–154.

Katz, D. (1960). The functional approach to the study of attitudes. *Public Opinion Quarterly, 24*, 163–204.

Kawakami, K., Dovidio, J. F., Moll, J., Hermsen, S., & Russin, A. (2000). Just say no (to stereotyping): Effects of training in the negation of stereotypic associations on stereotypic activation. *Journal of Personality and Social Psychology, 78*, 871–888.

Kelman, H. C. (1958). Compliance, identification, and internalization: Three processes of attitude change. *Journal of Conflict Resolution, 2*, 51–60.

Kemp-Wheeler, S. M., & Hill, A. B. (1992). Semantic and emotional priming below objective detection threshold. *Cognition and Emotion, 6*, 113–128.

Klauer, K. C. (1998). Affecting priming. *European Review of Social Psychology, 8*, 63–107.

Klauer, K. C., Robnagel, C., & Musch, J. (1997). List-context effects in evaluative priming. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 23*, 246–255.

Klinger, M. R., Burton, P. C., & Pitts, G. S. (2000). Mechanisms of unconscious priming I: Response competition, not spreading activation. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 26*, 441–455.

Logan, G. D. (1989). Automaticity and cognitive control. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought* (pp. 52–74). New York: Guilford Press.

Maio, G. R., & Olson, J. M. (2000). *Why we evaluate: Functions of attitudes*. New Jersey: Erlbaum.

Pavlov, I. (1927). *Conditioned reflexes (G.V. Anrep, Trans.)*. London: Oxford University Press.

Popper, K. R. (1959). *The logic of scientific discovery*. New York: Basic Books.

Pratkanis, A. R., Breckler, S. J., & Greenwald, A. G. (1989). *Attitude structure and function*. Hillsdale, NJ: Erlbaum.

Pynte, J. (1991). The locus of semantic satiation in category membership decision and acceptability judgment. *Journal of Psycholinguistic Research, 20*, 315–335.

Ricker, S. T., & Bouton, M. E. (1996). Reacquisition following extinction in appetitive conditioning. *Animal Learning and Behavior, 24*, 423–436.

Roskos-Ewoldsen, D. R., & Fazio, R. H. (1992). On the orienting value of attitudes: Attitude accessibility as a determinant of an object's attraction of visual attention. *Journal of Personality and Social Psychology, 63*, 198–211.

Sanbonmatsu, D. M., & Fazio, R. H. (1990). The role of attitudes in memory-based decision making. *Journal of Personality and Social Psychology, 59*, 614–622.

Sanbonmatsu, D. M., Osborne, R. E., Fazio, R. H. (1986). *The measurement of automatic attitude activation*. Paper presented at the annual meeting of the Midwestern Psychological Association, Chicago, Illinois.

Severance, E., & Washburn, M. F. (1907). The loss of associative power in words after long fixation. *American Journal of Psychology, 18*, 182–186.

Shavitt, S. (1990). The role of attitude objects in attitude functions. *Journal of Experimental Social Psychology, 26*, 124–148.

Sherman, S. J., Presson, C. C., Chassin, L., Rose, J. S., & Koch, K. (2003). Implicit and explicit attitudes toward cigarette smoking: The effects of context and motivation. *Journal of Social and Clinical Psychology, 22*, 13–39.

Sinclair, L., & Kunda, Z. (1999). Reactions to a Black professional: motivated inhibition and activation of conflicting stereotypes. *Journal of Personality and Social Psychology, 77*, 885–904.

Smith, M. C. (1979). Contextual facilitation in a letter search task depends on how the prime is processed. *Journal of Experimental Psychology: Human Perception and Performance, 5*, 239–251.

Smith, L. C. (1984). Semantic satiation affects category membership decision time but not lexical priming. *Memory & Cognition, 12*, 483–488.

Smith, E. R. (1989). Procedural knowledge and processing strategies in social cognition. In R. S. Wyer & T. K. Srull (Eds.), *Handbook of social cognition* (Vol. 4, pp. 99–151). Hillsdale, NJ: Erlbaum.

Smith, E. R., Branscombe, N. R., & Bormann, C. (1988). Generality of the effects of practice on social judgment tasks. *Journal of Personality and Social Psychology, 54*, 385–395.

Smith, M. B., Bruner, J. S., & White, R. W. (1956). *Opinions and Personality*. New York: Wiley.

Smith, L. C., & Klein, R. (1990). Evidence for semantic satiation: Repeating a category slows subsequent semantic processing. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 16*, 852–861.

Smith, M. C., Theodor, L., & Franklin, P. E. (1983). The relationship between contextual facilitation and depth of processing. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 9*, 697–712.

Strayer, D. L., & Kramer, A. F. (1994). Strategies and automaticity I: Basic findings and conceptual framework. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 20*, 318–341.

Thompson, R. F., & Spencer, W. A. (1966). Habituation: A model phenomenon for the study of neuronal substrates of behavior. *Psychological Review, 73*, 16–43.

Uleman, J. S., & Moskowitz, G. B. (1994). Unintended effects of goals on unintended inferences. *Journal of Personality and Social Psychology, 66*, 490–501.

Wentura, D. (1999). Activation and inhibition of affective information: Evidence for negative priming in the evaluation task. *Cognition and Emotion, 13*, 65–91.

Wittenbrink, B., Judd, C. M., & Park, B. (1997). Evidence for racial prejudice at the implicit level and its relationship with questionnaire measures. *Journal of Personality and Social Psychology, 72*, 262–274.