
Automatic Stereotyping: Category, Trait, and Behavioral Activations

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On the basis of theorizing that proposes that category representations include a variety of associations and not simply trait information, two studies investigated whether the automatic activation of stereotypic traits following category priming is a necessary mediator of automatic social behavior. The results across both studies demonstrated an automatic behavior effect; participants primed with the elderly responded more slowly to general lexical decisions than participants not primed with the elderly. The results also provide evidence for automatic stereotypic trait activation; participants primed with the elderly responded faster to stereotypic than nonstereotypic traits. Moreover, consistent with the view that stereotypes are multicomponential, category priming predicted automatic social behavior in ways independent of mediation-by-trait activation.

Stereotypes are characteristics that are associated with members of social categories (Kunda, 1999; Stangor & Lange, 1994). Although they are typically portrayed as cognitive structures consisting of personality traits, stereotypes also represent physical characteristics, expectations, attitudes, and feelings about social groups (Brewer, 1988; Deaux & Lewis, 1984; Fiske & Taylor, 1991; Kunda, 1999). Behavioral tendencies also may be contained in the mental representations of social groups (Stangor & Lange, 1994). When asked about specific categories, people often refer to behaviors and actions as category features. For example, some groups may be described as “people who are persistent talkers” or “people who sit behind a desk” (Andersen & Klatzky, 1987; Brewer, 1988), doctors may be described as people who make diagnoses and ask in detail about your symptoms (Fiske & Taylor, 1991), or the elderly may be described as people who walk bent over and respond slowly (Bargh,

Chen, & Burrows, 1996). The goal of the present research was to examine the relationships among social categories, stereotypic traits, and the perceivers’ own behaviors.

Recently, a number of studies using a variety of social cognitive techniques have provided evidence for the automatic activation of two components of category representations—evaluative attitudes and personality/physical traits. With regard to attitudes, research has provided widespread support that social categories can activate, without intention and/or conscious effort, general evaluative responses associated with the category. For example, researchers have demonstrated the automatic activation of negative attitudes toward Blacks (Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997; Fazio, Jackson, Dunton, & Williams, 1995; Greenwald, McGhee, & Schwartz, 1998) and positive attitudes toward the young and a generic ingroup (Perdue, Dovidio, Gurtman, & Tyler, 1990; Perdue & Gurtman, 1990). In addition to these general evaluative aspects, social categories also can activate more specific stereotypic characteristics. Research has demonstrated the automatic activation of traits related to Blacks (Devine, 1989; Kawakami, Dion, & Dovidio, 1998; Kawakami &

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Dovidio, 2001; Lepore & Brown, 1997; Wittenbrink, Judd, & Park, 1997), women and men (Banaji, Hardin, & Rothman, 1993; Blair & Banaji, 1996), elderly people (Hense, Penner, & Nelson, 1995), and Asians (Macrae, Bodenhausen, & Milne, 1995).

Besides general attitudes and stereotypic traits, recent research suggests that behaviors associated with a particular category also may become automatically activated (Bargh et al., 1996; Chen & Bargh, 1997; Dijksterhuis & van Knippenberg, 1998). In particular, this research demonstrates the activation of behavioral constructs by examining the behavior of the participants. Participants primed with specific categories actually tend to act in ways congruent with behaviors associated with these categories. For example, Dijksterhuis and van Knippenberg (1998) found that participants primed for 9 minutes with professors answered significantly more general knowledge questions correctly than participants in control conditions.

The aim of the present research was to examine the automatic activation of social behavior more closely, thereby giving particular attention to the cognitive structure of social category representations and the underlying processes related to automatic behavior. Based on the above theorizing that category representations include a variety of associations and not simply trait information (Brewer, 1988; Fiske & Taylor, 1991), the present work investigated whether social category presentation spontaneously produces behavior in ways not mediated by stereotypic trait activation because of a potential direct link between social categories and associated behaviors.

Priming Social Categories and Automatic Social Behavior

A number of studies have demonstrated that priming certain social categories can lead to actions consistent with those categories even when participants are unaware of the priming conditions (Bargh et al., 1996; Chen & Bargh, 1997; Dijksterhuis & van Knippenberg, 1998). These theorists suggest that, similar to other social constructs such as attitudes and trait concepts, behavioral responses are represented mentally and can be triggered without cognitive mediation by features in the environment and relevant situational cues (Bargh et al., 1996; Chen & Bargh, 1997). This process is assumed to occur automatically because of the repeated exposure to paired stimuli (e.g., races and traits) as well as repeated responses to stimuli (Devine, 1989; Logan, 1988). Although reinforcement may moderate the development of automaticity, it is not presumed to be a necessary factor. In contrast to behaviorism's stimulus-response notions, this process is not dependent on a history of reward and punishment related to category-

behavior couplings. Even in the absence of reinforcement, repeated associations of two stimuli may be sufficient for automatic behavior to occur (Dijksterhuis & Bargh, 2001).

In a study by Bargh and his colleagues (1996) that demonstrates the automatic behavior effect related to social categorizations, participants were subliminally primed with either an African American or a Caucasian male face while simultaneously working on a boring dot estimation task. After completing the task, participants were told that because of a computer error they would have to redo the task. As expected, participants who had been presented subliminally with African American faces responded with more hostility to this request than participants primed with Caucasian faces.

Further research by Bargh and his colleagues (Bargh et al., 1996) demonstrated that priming a constellation of stereotypic characteristics, rather than priming the category itself, also may produce automatic social behavior. Specifically, after completing a scrambled sentence task related to the elderly stereotype (i.e., worried, lonely) or a neutral age-nonspecific topic, participants were told the experiment was over and thanked for their participation. Although no words related to the concept of slow were included in either priming condition, participants in the elderly priming condition acted in a way consistent with the elderly category and took significantly longer to walk down the corridor to the elevator than participants in the neutral priming condition.

In combination, these findings suggest that priming a particular category either directly through presentation of category members or by priming a constellation of associations related to the category behaviors can subsequently affect a participant's behavior. It is not clear, however, whether the effect of the social category prime on participants' behavior occurred directly or was mediated by stereotypic trait activation. Specifically, the fundamental interrelationships among category representation, trait activation, and automatic behavior are unknown because these studies did not simultaneously measure these three components. Elucidation of this process, however, is essential for furthering an understanding of the nature and consequences related to the cognitive representations of social categories.

Possible Processes Related to Automatic Social Behavior

Based on the close relationship between trait activation and relevant behavioral schemas that has been demonstrated in past research (Srull & Wyer, 1979; Winter & Uleman, 1984), some current theorists propose a hierarchical process concerning the relationship between category priming and automatic social behavior. In particular, category priming is hypothesized to result in the

activation of specific stereotypic traits, which in turn activates the representation of specific behaviors that influence the tendency for a person to behave in line with this representation (Bargh et al., 1996; Chen & Bargh, 1997; Dijksterhuis & van Knippenberg, 1998). This interpretation assumes that stereotypic trait activation is crucial to the activation of behavioral representations. The mere act of thinking about a behavior by activating the behavioral representation through trait priming is proposed to increase the tendency to engage in that behavior oneself even when the behavior is unintended. In line with this interpretation, research related to trait priming and automatic social behavior demonstrates that priming certain traits can lead to actions consistent with those traits (Bargh et al., 1996; Berkowitz, 1984; Dijksterhuis & van Knippenberg, 1998).

In short, this interpretation suggests that automatic social behavior can occur directly by perceiving a person executing a certain action (Bargh & Chartrand, 1999) or by activation of a trait that is directly associated with that behavior (Bargh et al., 1996). Furthermore, this interpretation assumes that social categories also can instigate automatic behavior by first activating a stereotypic trait, which in turn spontaneously will activate a behavioral representation (Bargh et al., 1996; Dijksterhuis & van Knippenberg, 1998). The activation of traits is thus proposed to be the critical mediator in the relationship between category priming and the automatic activation of behavioral representations. Reflecting this view, Dijksterhuis and Bargh (2001) observed,

If we meet an elderly person, we activate the category elderly as well as associated traits such as "slow." In both cases, the activation of the trait construct "slow" will guide our behavior, irrespective of how the trait was activated. (p. 17)

Another less complex process of automatic social behavior, however, is possible in which category priming directly activates behavioral representations. From this perspective, category priming results in the activation of a node in memory that spreads to the nodes of stereotypic associations. In principle, this could result in the activation of not only personality traits but also a variety of other associations such as physical characteristics, attitudes, and behaviors. Thus, to the extent that behavioral representations, such as traits, are cognitively linked to social categories (Deaux & Lewis, 1984; Kunda, 1999), priming a category may directly activate behavioral representations. This activation of behavioral representations, in turn, elicits automatic behavior in the perceiver that conforms to these behavioral representations. For example, the mere presentation of an elderly person may not only activate the trait "slow" but also may directly

activate the behavioral representation of a slow action. This activation of the behavioral representation can subsequently create the tendency in the perceiver to move more slowly—an "automatic social behavior effect." The relationship between category activation and automatic social behavior thus need not necessarily be mediated by stereotypic trait activation. Stereotypic trait activation may occur simultaneously with activation of the behavioral representation, but it does not necessarily exert a direct causal influence on the elicitation of automatic social behavior.

Although both the hierarchical trait mediation and direct nonmediation interpretations assume that perceptual inputs such as the presentation of a social category or perceiving actions can translate into corresponding behavioral outputs without conscious deliberation (Dijksterhuis & Bargh, 2001) and that stereotypic trait activation can produce automatic social behavior, the latter interpretation further suggests the possibility of a direct link between a category representation and performed action that can occur independently of stereotypic trait activation.

Overview

The primary goal of the present research was to investigate the mechanisms underlying automatic social behavior and to thereby study cognitive representations related to social categories. Our plan was to examine whether stereotypic trait activation following category priming necessarily mediates automatic social behavior. Specifically, the present studies explored evidence of two processes. First, we examined the effects of category priming on automatic behavior in a lexical decision task. Because conventional stereotypes characterize the elderly as both physically and mentally slower than the general population (Fiske, 1998; Hense et al., 1995; Rosencranz & McNevin, 1969), one relevant manifestation of automatic social behavior may be the length of time it takes participants to respond to decision-making tasks. Based on Bargh et al.'s (1996) results, which suggest that people associate slow behavior with the elderly, we predicted that participants would respond slower to word/nonword decisions in general when primed with the elderly category than when not primed with the elderly category. In the present research, the effects of elderly category priming on participants' responses to words unrelated to either stereotypic or nonstereotypic associations, country labels, were used as an index of automatic social behavior.

Second, we investigated the potential mediation of the automatic activation of stereotypic traits in the elicitation of automatic behavioral effects. The lexical decision task enabled us to examine not only the effects of category priming on automatic behavioral effects (i.e.,

slower responding in lexical decisions to country labels) but also the effects of category priming on the automatic activation of stereotypic traits (i.e., faster responding in lexical decisions to stereotypic words). This task is, therefore, uniquely suited to measure not only the dependent variable, automatic social behavior, but also the hypothesized mediator, automatic stereotypic trait activation. Furthermore, because both automatic behavior and trait activation effects are measured in the same metric (i.e., millisecond response latencies), this procedure allowed for meaningful comparisons between these two processes.

Although stereotypic trait activation has been shown to produce automatic social behavior (Bargh et al., 1996), it may not be a necessary mediator of the relationship between category priming and automatic social behavior. If the activation of stereotypic words mediates participants' slower responses, controlling for stereotypic trait activation should decrease the effect of elderly priming on automatic social behavior. However, if stereotypic trait activation does not mediate automatic social behavior, the relationship between elderly category priming and participants' slower responses to the lexical decisions of unrelated country labels would be expected to remain significant even after controlling for the activation of associated traits.

To achieve the above goals, two studies were conducted in which participants were given two separate tasks—a priming task and a lexical decision task. Half of the participants were presented with a priming task in which they were instructed to categorize a series of photographs of young and elderly men and women according to whether they were elderly. The other half of the participants was presented with an alternative control priming procedure. Following the priming procedure, all participants were presented with a series of letter strings consisting of words stereotypically associated with the elderly category, words not associated with the elderly category, the names of various countries, and nonexistent nonsense words. In this ostensibly separate lexical decision task, participants were simply instructed to indicate whether the letter string was an existing word.

Both Studies 1 and 2 examined the critical question of whether automatic social behavior can occur independently of automatic stereotypic trait activation or whether trait activation necessarily mediates the relationship between category priming and automatic social behavior. These studies, therefore, offer potentially convergent evidence for the direct relationship between stereotypic behaviors and the activation of category representations. In Study 1, response latencies related to country labels (hypothesized to reflect the automatic social behavior effect) and stereotype activation were examined for participants who categorized people by age and for participants who were not presented with a priming task. In

Study 2, differences in response latencies related to country labels (i.e., the automatic social behavior effect) and the specific stereotypic concept of "slow" were explored as a function of priming by age or sex.

STUDY 1

Study 1 explored the potential routes by which category priming can influence automatic social behavior. Participants in the elderly prime condition first performed a task in which they categorized photographs of people as elderly or not; participants in the control condition did not engage in this task. To assess stereotype activation and automatic social behavior, all participants performed a lexical decision task. Stereotype activation was hypothesized to be manifested in a Prime Condition \times Type of Word interaction for responses to stereotypic and nonstereotypic words. Specifically, participants who were in the elderly prime condition were expected to be faster in making lexical decisions to elderly stereotypic words in comparison to nonstereotypic words. Participants in the control condition, alternatively, were not expected to show this difference. Automatic social behavior, reflecting the activation of behavioral representations of the elderly as physically slow (Fiske, 1998; Hense et al., 1995), was expected to be reflected in longer latencies to stimuli unrelated to the elderly (i.e., country names) in the lexical decision task for participants in the elderly priming condition in comparison to the control condition. For these stimuli, a main effect for prime condition was expected. Tests of the direct effect of category priming on automatic social behavior and mediation-by-stereotype activation were conducted using Baron and Kenny's (1986) multiple regression mediation approach.

Method

Participants and design. Sixty (37 women and 23 men) undergraduate students participated in the experiment and received five Dutch guilders (approximately U.S.\$3). Two independent variables were included in a 2 (prime: elderly vs. control) \times 2 (type of word: stereotype vs. nonstereotype) design. The Prime factor was between-participants and the Type of Word factor was within-participants.

Procedure. After entering the laboratory, all participants were randomly assigned to either the control or the elderly prime conditions and placed in a cubicle containing a Macintosh Performa and a button box designed to measure response latencies. Participants in the elderly prime condition were informed that they would take part in two separate, unrelated studies that had been combined to save the experimenter time and money. The experimental procedure, therefore,

consisted of two tasks. The purpose of the first task was to prime the participants with the elderly category. The purpose of the second task was to assess the activation of stereotypic words and general response speed (i.e., automatic social behavior) in a lexical decision task. Participants in the control condition received only the lexical decision task.

Priming task. Participants in the elderly prime condition were informed that the first experiment concerned the way in which people categorize persons and things. They were further told that they would be presented with a series of photographs on a computer screen and would be asked to indicate whether the person in the photograph was elderly. Specifically, participants were instructed to press “yes” on the button box when they saw a photograph of an elderly person and to press “no” on the button box when they saw a photograph of a person who was not elderly. In total, 32 full-facial, black-and-white photographs were presented in a random order. Half of the photographs depicted 8 male and 8 female individuals of college age. The other half of the photographs depicted 8 male and 8 female individuals who were clearly elderly.

On each trial, participants were presented with a photograph for 250 ms followed by a blank screen for 50 ms. The word *old?* was then presented and remained on the monitor until the participant responded. After response latencies were recorded, participants were presented with a blank screen for 1,000 ms before the next trial.

Lexical decision task. After completing the elderly priming or no-priming phase, all participants were asked to perform an ostensibly unrelated word perception task. They were informed that they would be presented with a series of trials on a computer screen that consisted of an initial asterisk to prepare them for the stimulus presentation followed by a letter string. They were asked to indicate whether the string was an actual existing word or not a word. Specifically, when the letter string did not spell an existing word, participants were instructed to press “no” on a button box. When the letter string did spell an existing word, participants were instructed to press “yes.” They were further instructed to respond as quickly and as accurately as possible.

In short, on each trial, participants were presented with an asterisk in the center of the computer screen for 300 ms, followed by a blank screen for 500 ms. Next, the target array was presented until the participant responded. After responding, participants were presented with a blank screen for 2,000 ms before the next trial. A total of 112 trials were randomly presented in which 56 nonwords were presented to elicit a “no” response and 56 existing Dutch words were presented to elicit a “yes” response. The 56 nonwords were pro-

nounceable anagrams of the actual words. The actual existing words consisted of 28 stereotypic and nonstereotypic items to examine the automatic activation of stereotypic associations and 28 names of countries to examine automatic social behavior. Whereas the use of stereotypic and nonstereotypic words to measure trait activation is standard practice in the automatic stereotyping literature (Blair & Banaji, 1996; Kawakami et al., 1998), the use of country names was chosen to measure automatic behavior in the present study because these items were not remotely related to the priming category or to the stereotypic and nonstereotypic words. The multiple regression mediation technique (Baron & Kenny, 1986), which is critical for evaluating our hypotheses, requires that the mediator variable (automatic stereotype activation) and the dependent variable (automatic behavior) be conceptually unrelated.

Specifically, the stereotypic and nonstereotypic associations consisted of eight traits stereotypic of the elderly (e.g., serious and distrustful), eight traits nonstereotypic of the elderly (e.g., practical and jealous), six synonyms for the category “old” (e.g., pensioner and elderly), and six unrelated category labels (e.g., florist and teacher). All words classified as stereotypic of the elderly were pre-tested in a pilot study ($N=50$) and had an association rating of +1 on a 9-point scale ranging from *totally not associated* (−4) to *very much associated* (+4). All nonstereotypic words had an association of 0 or less. The stereotypic and nonstereotypic associations were matched on valence; all associations and 28 country labels (e.g., China and Argentina) were matched on word length.

Before beginning the experimental trials, participants were presented with 12 practice trials that consisted of 6 words and 6 nonwords not shown in the actual experiment. Debriefing upon completion of the lexical decision task confirmed that participants were unaware of the effects of the priming on the response latencies. None of the participants expressed any suspicion that the two tasks were related in any way.

Results

Response latencies related to errors when participants responded “yes” to nonwords and “no” to words were excluded from the analyses (4.85%). Response latencies exceeding more than three standard deviations from the mean were classified as outliers (Ratcliff, 1993) and also were excluded (1.01%). For each participant, the mean lexical decision latencies for elderly stereotypic and nonstereotypic items and the country labels were computed in the elderly prime and control conditions.

Automatic activation of stereotypic words and social behavior analyses. To examine the effects of priming on the automatic activation of social behavior, a *t* test was per-

formed on the response latencies related to the country labels. As predicted, participants who had been primed with the elderly category responded slower ($M = 623$, $SD = 144$) in deciding that country labels were words than control participants who had not been primed with the elderly ($M = 547$, $SD = 88$), $t(58) = 2.46$, $p < .05$.

To examine the effects of priming on the automatic activation of stereotypic words, a 2 (priming: elderly vs. control) \times 2 (type of word: stereotypic vs. nonstereotypic) analysis of variance was performed on the response latencies related to stereotypic and nonstereotypic words. Preliminary analyses revealed no difference in the pattern of results for stereotypic and nonstereotypic adjectives (e.g., distrustful and jealous) and for stereotypic and nonstereotypic category labels (e.g., pensioner and florist). Consequently, in the main analyses, these responses were combined to represent the repeated-measure type of word independent variable. In accordance with the automatic social behavior effect, a main effect for priming was found, $F(1, 58) = 5.46$, $p < .05$. Overall, participants who had been primed with the elderly category responded slower ($M = 666$, $SD = 191$) than control participants who had not been primed with the elderly ($M = 570$, $SD = 124$). Furthermore, a significant main effect for type of word was found in which participants responded faster to stereotypic ($M = 609$, $SD = 163$) in comparison to nonstereotypic words ($M = 626$, $SD = 172$), $F(1, 58) = 7.57$, $p < .01$.

More important, and as illustrated in Figure 1, the latter effect was qualified by a significant two-way Prime \times Type of Word interaction, $F(1, 58) = 5.87$, $p < .05$. Because participants who were primed with the elderly category responded generally slower than no-prime participants (i.e., the automatic social behavior effect), the appropriate comparisons in examining automatic stereotype activation involve differences between stereotypic and nonstereotypic words within each priming condition separately. The results demonstrate that participants in the elderly prime condition were faster at responding "yes" to elderly stereotypic words ($M = 650$, $SD = 185$) than to nonstereotypic words ($M = 682$, $SD = 201$), $F(1, 58) = 13.39$, $p < .001$. Participants in the control condition did not differ in the speed with which they responded to elderly stereotypic words ($M = 569$, $SD = 127$) in comparison to nonstereotypic words ($M = 571$, $SD = 116$), $F(1, 58) = .05$, $p = .82$.

Mediational analyses. To examine whether the effect of priming the elderly category on automatic social behavior was mediated by automatic stereotypic word activation, a multiple regression mediation approach (Baron & Kenny, 1986) was utilized. In particular, the independent variable was the priming task in which participants were asked to categorize people as elderly versus the control condition. For the mediating variable, a difference

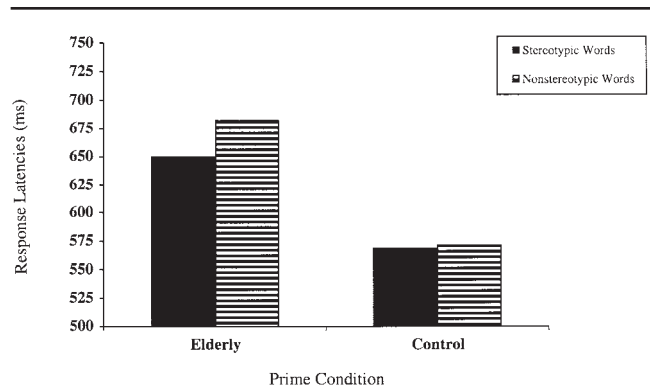


Figure 1 The effect of elderly category priming on the activation of stereotypic words and social behavior in Study 1.

score was computed to reflect the degree to which participants responded faster to elderly stereotypic words in comparison to nonstereotypic words ($M = 20$, $SD = 49$). The dependent variable, the automatic social behavior effect, was indexed by the participants' speed of responding to the country labels in the lexical decision task ($M = 586$, $SD = 118$).

As expected, the findings are consistent with the ANOVA results when the dependent variable and the mediator were regressed separately on the independent variable. In particular, the priming task significantly predicted automatic social behavior, $\beta = .31$, $p < .05$, and also predicted the automatic activation of stereotypic words, $\beta = .30$, $p < .05$. Furthermore, when the dependent variable was regressed simultaneously on the independent and mediator variables, the priming task continued to significantly predict automatic social behavior, $\beta = .29$, $p < .05$. In accordance with this evidence that suggests a direct relationship between the priming task and automatic social behavior, no significant relationship was found between the automatic activation of stereotypic words and automatic social behavior, $\beta = .07$, $p = .61$.

Discussion

In accordance with earlier research (e.g., Bargh et al., 1996), the present findings provide support for the effects of category priming on automatic social behavior. Participants primed with the elderly category responded slower to lexical decisions related to country labels than participants not primed with the elderly category. In addition to this behavioral effect, automatic stereotype activation also was found. Specifically, after being primed with the elderly category, participants were faster at responding to stereotypic elderly associations such as "careful" than nonstereotypic associations such as "creative." In the no-prime condition, as expected, no difference was found between participants' responses to stereotypic and nonstereotypic words.

Furthermore, both the social behavior and stereotypic word activation effects were found on one measure of construct activation, the lexical decision task. Slower responses on lexical decisions following elderly priming occurred even though participants were repeatedly asked to complete this task as swiftly as possible. In combination with the fact that all participants were unaware of the link between the priming task and the lexical decision task, these findings suggest that social behavior and stereotyping effects in the present study occurred without intention or awareness.

More important, the present results provide new evidence for the multicomponential character of stereotype representations. Specifically, the results from the multiple regression analyses suggest that the automatic activation of stereotypic characteristics did not cause the participants' slower responses to lexical decisions when primed with the elderly category. By demonstrating that the effects of category priming on automatic social behavior were not mediated by stereotypic word activation, these results imply, in contrast to a hierarchical model of automatic social behavior (Bargh et al., 1996; Dijksterhuis & van Knippenberg, 1998), a more direct link between the activation of a category representation and the execution of action tendencies in line with behaviors related to this category. For example, priming the category "Black" can result in more aggressive behavior by an actor not necessarily because the trait "aggressive" is activated but because of a direct link between the "Black" category node and specific behavioral associations such as "making abrasive remarks" (Chen & Bargh, 1997).

STUDY 2

Although Study 1 offers clear evidence for automatic social behavior, it is possible that differences unrelated to category activation between the no-prime control condition and the elderly priming condition may have influenced these findings. Specifically, although participants in the elderly prime condition completed two tasks, the priming task and the lexical decision task, participants in the control condition did not receive a priming task. The experimental participants, therefore, besides being primed with the elderly category, also received more practice using the button box and experienced a more complex and longer study. It is possible that activating any social category, not only the elderly category, caused motivational and fatigue effects, thereby influencing the participants' overall responses to the lexical decisions. To examine this proposition, Study 2 compared the degree of automatic behavior when the elderly category is primed against response latencies when the female category is primed.

Based on the general proposition in the schema literature that a schema is accessed and used as a single unit (Bargh et al., 1996; Devine, 1989; Fiske & Taylor, 1991), we assumed in Study 1 that activating any part of the stereotype would render all the structured knowledge within the schema more readily accessible. Nevertheless, one explanation for the absence of mediation of automatic social behavior by stereotype activation was that we did not directly or sufficiently activate the specific, relevant stereotypic characteristic of "slow." Therefore, Study 2 was designed to test the proposition that activating the elderly category not only results in the activation of elderly stereotypic words as a whole but also in the activation of traits specifically associated with the concept of slow. Moreover, Study 2 examines whether partialing out specific stereotypic traits related to the automatic social behavior (in this case, slow) may be more likely to demonstrate mediation of automatic social behavior by stereotypic trait activation.

To examine if the specific activation of stereotypic trait associations related to the concept of slow may prove to be a necessary mediator to slower responding related to the elderly prime, the target stimulus material in the lexical decision task was either a synonym of slow or of the nonstereotypic concept dirty. In accordance with the findings related to automatic stereotype activation, participants primed with the elderly category were expected to respond faster to lexical decisions related to the trait slow in comparison to the trait dirty. No difference between response latencies to the dirty and slow traits were, however, expected for participants primed with the female category. Furthermore, the results are expected to demonstrate a direct link between the activation of the elderly category and automatic social behavior (i.e., slower responses to the lexical decisions related to country labels) not mediated by the activation of the trait slow.

Method

Participants and design. Sixty-six (25 women and 41 men) undergraduate students participated in the experiment and received five Dutch guilders. Two independent variables were included in a 2 (prime: elderly vs. female) \times 2 (type of word: slow vs. dirty) design. The Prime factor was between-participants and the Type of Word factor was within-participants.

Procedure

The procedure in Study 2 was similar to Study 1 except that upon entering the laboratory all participants were presented with two ostensibly unrelated studies—a categorization task in which they were randomly assigned to either the female or the elderly prime conditions and the lexical decision task.

Priming task. Participants were presented with the same photographs as in Study 1: 8 male and 8 female individuals of college age and 8 male and 8 female individuals who were clearly elderly. Participants in the female priming condition were instructed to press “yes” on a button box when the person in the photograph was female and to press “no” when the person in the photograph was not female. Participants in the elderly prime condition, alternatively, were once again instructed to indicate whether the person in the photograph was elderly.

Lexical decision task. After finishing the priming task, all participants completed 80 trials on a lexical decision task, which included 40 nonwords and 40 existing words. The existing words consisted of 20 country labels, 5 traits related to the slow concept (e.g., slow, gradual) and 5 nonstereotypic traits related to the dirty concept (e.g., dirty, soiled). Furthermore, 10 positive nonstereotypic filler traits (e.g., trustworthy, honest) were used to balance the valence of the trait words and reduce the relative frequency of the slow and dirty trait words. Both slow and dirty trait words and country labels were matched on word length.

Before beginning the experimental trials, participants were presented with eight practice trials of words and nonwords not shown in the actual experiment. Debriefing upon completion of the lexical decision task confirmed that only two participants expressed any suspicion that the priming task and the lexical decision task were related in any way. Analyses excluding these two participants did not alter the significance levels or the pattern of results.

Results

Response latencies related to errors (3.18%) and outlier response latencies exceeding more than three standard deviations from the mean (4.81%) were excluded from analyses. For each participant, the mean response latencies for slow traits, dirty traits, and country labels were computed for the elderly and female priming conditions.

Automatic activation of slow traits and social behavior analyses. To examine the effects of priming on automatic social behavior, a *t* test was performed on the lexical decision latencies related to country labels. As predicted, participants in the elderly priming condition responded more slowly ($M = 552$, $SD = 82$) than participants in the female priming condition ($M = 512$, $SD = 63$), $t(64) = 2.18$, $p < .05$.

To examine the effects of priming on the automatic activation of stereotypic traits, a 2 (prime: elderly vs. female) \times 2 (type of word: slow vs. dirty) mixed-factorial analysis of variance was performed on response latencies

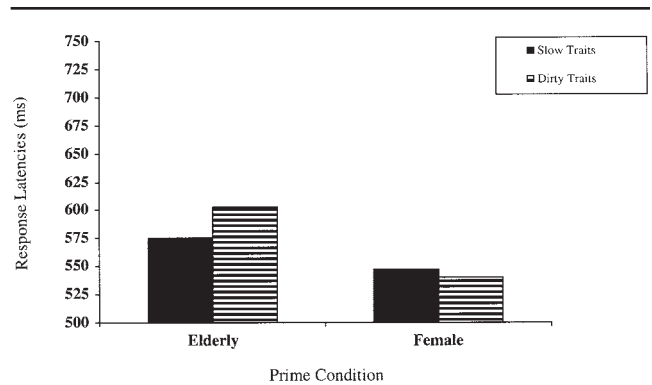


Figure 2 The effect of elderly category priming on the activation of “slow” traits and social behavior in Study 2.

related to slow and dirty traits; the type of word was a repeated measure. In accordance with an automatic social behavior effect, a main effect for Prime was found, $F(1, 64) = 4.90$, $p < .05$. Participants in the elderly priming condition responded more slowly ($M = 589$, $SD = 87$) than participants in the female priming condition ($M = 544$, $SD = 78$). Furthermore, the Prime \times Type of Word interaction was significant, $F(1, 64) = 3.83$, $p = .05$. As illustrated in Figure 2, participants in the elderly prime condition were faster when responding to slow ($M = 575$, $SD = 86$) in comparison to dirty ($M = 603$, $SD = 100$) traits, $F(1, 64) = 4.84$, $p < .05$. Participants in the female prime condition did not differ in their response to slow ($M = 547$, $SD = 93$) in comparison to dirty ($M = 540$, $SD = 81$) traits, $F(1, 64) = .32$, $p = .57$.

Mediation analyses. To examine if the elderly priming effect on the participants’ slower lexical decisions related to the country labels (i.e., the automatic social behavior effect) was mediated by stereotypic trait activation, a multiple regression mediation analysis was carried out. For the mediating variable, a difference score was computed to reflect the degree to which participants responded faster to lexical decisions to “slow” traits in comparison to nonassociated “dirty” traits ($M = 10$, $SD = 75$). As to be expected, the findings from the first two regression analyses were consistent with the results of the ANOVA. When the dependent variable, responses to the country labels ($M = 532$, $SD = 75$), and the mediator were regressed separately on the independent variable, the priming task significantly predicted automatic social behavior, $\beta = .26$, $p < .05$, and the automatic activation of slow traits, $\beta = .24$, $p = .05$. Furthermore, as predicted, when the dependent variable was regressed simultaneously on the independent and mediator variables, priming the elderly category continued to significantly predict automatic social behavior, even after controlling for the impact of the activation of the stereotypic trait “slow,” $\beta = .25$, $p < .05$. In accordance with this direct

association between elderly priming and automatic social behavior, no significant relationship was found between the automatic activation of slow traits and automatic social behavior, $\beta = .05$, $p = .71$.

Discussion

The results from Study 2 replicate the findings from Study 1 and provide strong support for the concept of automatic social behavior. Participants instructed to categorize photographs according to age in a preliminary priming task responded slower to subsequent lexical decisions related to country labels than participants instructed to categorize photographs according to sex. Consistent with the ideomotor effect described by Bargh and his colleagues (Bargh et al., 1996; Chen & Bargh, 1997), when behavioral representations related to specific categories are activated, people will tend to behave in line with this representation. This effect can occur even when they are not aware of the influence of or intend to act according to the activated construct. The results from the present studies suggest that when the elderly category is primed, behaviors related to this category, such as moving slowly, will be activated and will increase the tendency for individuals to behave according to these activations.

The findings in Study 2 also provided further support for automatic stereotype activation and the all-or-none concept of stereotypic schema activation (Chen & Bargh, 1997; Devine, 1989). Specifically, the results related to the automatic activation of slow traits in Study 2 mirrored the findings related to the activation of the elderly stereotypic words in general in Study 1. As predicted, participants instructed to categorize the person in the photograph as elderly responded faster to the slow stereotypic traits than to the dirty nonstereotypic traits. Conversely, participants instructed to categorize the person in the photograph as female did not show differential response latencies to slow and dirty traits.

Furthermore, the results related to the regression analyses once more provided clear evidence for the effect of category activation on automatic social behavior independent of trait activation. Even when the effect of only traits related to the word *slow* was partialled out of the regression, the relationship between the priming task and automatic social behavior remained significant. These results suggest that social stereotypes include not only a direct link between category representations and stereotypic traits but also between category representations and associated behaviors. Automatic social behavior may therefore occur not because of the activation of stereotypic traits but because of an independent association with the category node, thus providing strong evidence for the multicomponential view of social stereotypes.

GENERAL DISCUSSION

An important development in the field of cognitive processing in the past two decades has been the study of the automaticity of social life (Bargh, 1997). Researchers have successfully provided evidence for the automaticity of attitudes (Dovidio et al., 1997), stereotypes (Kawakami et al., 1998), trait inferences (Winter & Uleman, 1984), and dispositional attributions (Gilbert, Pelham, & Krull, 1988). The aim of the present research was to further examine the automatic activation of associations related to social categories.

Across two studies, we found strong support for automatic social behavior. Specifically, and in accordance with earlier findings related to elderly stereotype priming (Bargh et al., 1996), participants consistently responded more slowly in their lexical decisions related to country labels when primed with the elderly in comparison to no-prime or female prime control conditions. It is important to note that, as revealed in debriefing sessions, participants in the present studies were unaware of the effect of the category priming on their lexical decisions. Furthermore, because all participants had been specifically instructed to respond as quickly and as accurately as possible, participants in the elderly priming condition presumably did not intend to respond slowly on the lexical decision task. This relative slowness by these participants occurred apparently without their conscious intention or knowledge.

Instead of assuming mediation by default (Bargh et al., 1996), a further goal of the present studies was to examine the importance of stereotypic trait activation in the link between category priming and automatic social behavior. The results from both studies indicate that the automatic activation of stereotypic traits is not a necessary mediator for automatic social behavior. In particular, we found significant evidence for the activation of elderly stereotypic traits as a function of priming participants with the elderly category. This finding replicates previous research (e.g., Hense et al., 1995; cf. Kawakami, Dovidio, Moll, Hermsen, & Russin, 2000) demonstrating the automatic activation of elderly stereotypes. This effect is also an essential component for tests of mediation (Baron & Kenny, 1986) and offers evidence for the sufficient impact and statistical power of the manipulation to show mediation if it occurred (Greenwald, 1975). Although previously it has been demonstrated that activating stereotypic traits directly can produce automatic social behavior (Bargh et al., 1996), the present research indicates that stereotypic trait activation is not a necessary mediator of the effect of category priming on automatic social behavior.

This finding was consistent across two studies, regardless of differences between control conditions and the type of stereotypic associations. Specifically, the present studies reveal that even when stereotype activation in general (Study 1) or the trait slow in particular (Study 2) is controlled for statistically, priming the elderly category continues to result in slower responses in lexical decisions. In both studies, elderly category priming significantly affected responses over and above the effects of stereotypic trait associations. In combination, these variations in the control conditions and the target words demonstrate that the automatic social behavior effect is robust and reliable and that stereotypic behavioral representations are directly associated with category constructs.

Although our conclusions in the present research support the notion of a direct relationship between category priming and automatic social behavior, we recognize that our evidence is based on accepting the null hypothesis. As Greenwald (1975) notes, however, there may be a disciplinary "prejudice against the null hypothesis" (p. 1). Greenwald argues cogently that accepting the null hypothesis can provide valuable evidence if the validity of the procedures and the variables can be demonstrated elsewhere within the study and if there is sufficient statistical sensitivity in the measures. In the present study, we purposefully assessed stereotypic activation and automatic social behavior using the same metric (i.e., response times) on the same task to help ensure the comparability of the measures. Moreover, evidence of the validity of the procedure and the sensitivity of these measures was shown in that elderly category priming systematically produced automatic activation of elderly stereotypic traits and also elicited automatic social behavior. Thus, the priming manipulation was sufficiently effective and the measures were sufficiently sensitive to demonstrate the predicted effects on the hypothesized mediating and main dependent variables. Furthermore, in this case, support for the null hypothesis is theoretically important because it provides insight concerning the structure of stereotype constructs and the interrelationships among category, stereotypic trait, and behavioral representations of social groups. Specifically, results related to nonmediation provide evidence that behaviors can be directly associated with category representations.

Another interpretation of the absence of mediation effects for the relationship between category priming and automatic social behavior in the present studies, however, is that priming the elderly may have resulted in automatic behaviors related to carefulness rather than slowness. If this were true, it is possible that we did not measure the appropriate mediating variable, in this case "carefulness," in Study 2. An examination of findings

related to the number of nonvalid responses (i.e., the combination of errors and outliers) as an index of carefulness, however, does not support this explanation. Greater carefulness would be expected to be related to a lower percentage of nonvalid responses. The results related to Study 1, in which participants who had been primed with the elderly category did make fewer ($p < .01$) nonvalid responses (and presumably were more careful) in deciding that country labels were words than control participants who had not been primed with the elderly, were consistent with this possibility. However, the results of Study 2, in which there was no significant difference ($p = .17$), were not. These findings, in combination with the results from previous research (Bargh et al., 1996; Dijksterhuis & Bargh, 2001), suggest that the most parsimonious explanation of the present findings is that the automatic behavior in the present study was related to the activation of the behavioral representation of slow actions and not simply carefulness. The use of stereotype activation related to the trait slow in the second study, therefore, appears to be an appropriate mediator in the present studies.

Our position that behavioral responses may occur independent of stereotype activation is consistent with traditions and orientations within the broader context of social psychology. Attitudes, for example, have long been hypothesized to reflect separate affective (e.g., feelings), cognitive (e.g., stereotypes), and behavioral components (see Dovidio, Brigham, Johnson, & Gaertner, 1996). Furthermore, scholars have suggested that responses based on these components can, and frequently do, operate independently (e.g., Zajonc, 1980; see also Dovidio & Gaertner, 1993).

The lack of mediation of trait activation on behavior also is consistent with a number of studies that demonstrate strong and predicted behavioral effects and small or nonexistent "mediator" effects. In fact, evidence by Bargh (1997) suggests that support for mediation of social perceptions on social behavior is often weak at best. One strength of the present research paradigm is the operationalization of both the dependent variable and the mediating variable in similar terms. Specifically, because the measurement of both automatic social behavior and stereotypic trait activation was based on lexical decision latencies, the experimental procedure avoided some of the methodological problems associated with measures that differ on a number of dimensions (e.g., response mode) in addition to the critical one.

In summary, the research to date has demonstrated that not only can social category representations automatically activate stereotypic traits (e.g., Devine, 1989; Kawakami et al., 1998) but also that the presentation of traits can elicit automatic social behavior (e.g., Bargh

et al., 1996; Berkowitz, 1984; Dijksterhuis & van Knippenberg, 1998). Furthermore, the current research shows that the priming of social categories also can elicit automatic social behavior independent of trait activation. In combination, these findings suggest that priming one group with the elderly category and one group with the slow trait would both result in comparable automatic behavior effects. Only the former group, however, also would demonstrate automatic stereotype activation effects by responding faster to stereotypic in comparison to nonstereotypic traits.

On the basis of the present results, we propose that category priming results in the activation of a node in memory. This node is associated not only with personality traits but also with physical characteristics, expectations, attitudes, feelings, and social behaviors (Andersen & Klatzky, 1987; Brewer, 1988; Deaux & Lewis, 1984; Fiske & Taylor, 1991; Kunda, 1999). The activation of the category node is thus assumed to spread to the nodes of a variety of stereotypic associations, including behaviors. A direct link between category activation and specific behavioral representations, in turn, may increase a person's tendency to act in accordance with these representations—the automatic social behavior effect.

Importantly, we are not arguing that trait activation plays no role at all in automatic social behavior but that the effect of social category activation on social behavior does not necessarily rely on the activation of stereotypic traits. It is possible that for some social categories or for some groups of people, stereotypic trait activation can influence automatic behaviors. Within the attitude literature, for example, orientations toward other groups can be developed directly through personal experience or indirectly through socialization. Attitudes that are based on direct experience tend to be stronger and more stable, more readily activated, and more predictive of behavior than are attitudes that are acquired indirectly (see Eagly & Chaiken, 1993).

One potential implication of this work on attitudes for automatic social behavior is that behavioral associations may be more likely to develop in ways related to trait associations for people who have more direct experience with a social category than with those who develop their orientations in secondhand ways. People who have more direct exposure to a group are more likely to witness both traits and behaviors, to develop implicit personality theories about how these traits may lead to behavior (e.g., Sedikides & Anderson, 1994), and thus to form stronger and more readily activated associations between these traits and behaviors. In contrast, people who have limited experience may develop their trait and behavioral associations with a group in a more independent fashion. As a consequence, although both trait and behavioral associations may be automatically acti-

vated by exposure to a category, trait activation may not affect the activation of behavioral associations. Because of the stronger links between trait and behavioral activation for people with more direct experience, people with more contact with a group may be more likely to show mediation-by-trait activation in their manifestation of automatic social behavior effects (Dijksterhuis, Aarts, Bargh, & van Knippenberg, 2000).

Not only may this mediation occur as a function of the relative strength of trait-to-behavior associations, but the existence of mediation also may vary with different behaviors. That is, even within a single category (e.g., elderly), some behaviors may be more vivid or frequently observable than others (e.g., slowness vs. forgetfulness) and thus may be more likely to become automatically activated directly by the category itself. As a consequence, mediation-by-stereotypic trait activation may be less likely to occur for behaviors that are activated directly, and thus quickly, than for more abstract or less vivid and frequent behaviors that may more commonly occur with or be inferred from trait information (Dijksterhuis et al., 2000). Future research may thus productively consider more fully the role of individual differences in experience, personality differences relating to the development of implicit personality theories, and systematic differences in the nature of the behaviors being considered for understanding both the magnitude and dynamics of automatic social behavior effects.

This line of reasoning highlights the importance of the concept of associative strength to the processes hypothesized to underlie the elicitation of automatic social behavior. Because associative strength is considered to be a fundamental moderator of automaticity (Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Kawakami et al., 1998; Lepore & Brown, 1997; cf. Bargh, Chaiken, Govender, & Pratto, 1992), we assume that, in general, priming a social category will only activate behaviors strongly associated with that category and lead people to act in accordance with those behavioral representations. Although reactance or correction processes (Brehm & Brehm, 1981; Wegener & Petty, 1997; Wilson & Brekke, 1994) may interfere with this phenomena when people are aware of the influence of category priming on their reactions, when people are not conscious of this process we assume a direct link between exposure to social categories and a person's tendency to act in accordance with behaviors associated with that category. When categories are not strongly associated with specific behaviors, however, priming those categories will not result in automatic behavior effects.

The nature of priming is also critical. For example, priming with stereotypic traits directly rather than with social categories per se (e.g., with category names) can have different effects on activation. For example,

whereas priming with stereotypic traits automatically activates stereotypic representations for both high and low prejudice people (Devine, 1989; Lepore & Brown, 1997), priming with social categories automatically elicits stereotypic associations among high but not low prejudice people (Kawakami et al., 1998; Lepore & Brown, 1997). Stereotypic trait and category priming also may have similar effects on automatic social behavior. Likewise, the use of extreme and concrete exemplars of the category instead of category labels when priming also can alter the occurrence or type of automatic behavior. In particular, Dijksterhuis et al. (1998) found that priming extreme exemplars of specific categories can result in behavioral contrast rather than assimilation with the behaviors associated with the specific category. For example, whereas priming professors in general can produce a better score on a general knowledge test, priming Albert Einstein can produce a weaker score. Because the present findings concentrate on the presentation of the social category "elderly," in general, and the importance of stereotypic trait activation for the occurrence of automatic behavior, our analyses has focused on assimilation rather than contrast effects. Future research examining the importance of stereotypic traits as a mediator in exemplar priming, however, is a useful next step.

In conclusion, despite theoretical and methodological issues that remain, the results of our studies offer evidence of the impact of category representations on perceivers' own behaviors. These effects occur even when the consequences appear not to be consistent with perceivers' temporary objectives or in their apparent best interest. In the present research, for example, participants responded more slowly when primed with stimuli representing the elderly even when they were instructed to, and presumably intended to, respond as quickly as possible. Moreover, research by Bargh and his colleagues (Bargh et al., 1996; Chen & Bargh, 1997), and Dijksterhuis and van Knippenberg (1998), shows that the activation of a behavioral construct may not only affect the speed of responses on a verbal task but also how polite, how rude, how aggressive, how smart, or how dumb people appear. Thus, practically as well as theoretically, it is important to consider how the mere presentation of category members may not only be directly and strongly associated with stereotypic personality traits but also how it activates a host of other constructs, such as evaluations, expectations, attitudes, and social behavior. A better understanding of the process and form of stereotypes would clearly follow from future research that examines the effects of category priming on such alternative variables. Although it is possible that different category associations may be intertwined and may influence each other, the present research demonstrates, in accordance with the multicomponential nature of ste-

reotypes, that it is also possible that these stereotypic links may run parallel and to some extent operate independently.

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