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Habits in Everyday Life: Thought, Emotion, and Action

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To illustrate the differing thoughts and emotions involved in guiding habitual and nonhabitual behavior, 2 diary studies were conducted in which participants provided hourly reports of their ongoing experiences. When participants were engaged in habitual behavior, defined as behavior that had been performed almost daily in stable contexts, they were likely to think about issues unrelated to their behavior, presumably because they did not have to consciously guide their actions. When engaged in nonhabitual behavior, or actions performed less often or in shifting contexts, participants' thoughts tended to correspond to their behavior, suggesting that thought was necessary to guide action. Furthermore, the self-regulatory benefits of habits were apparent in the lesser feelings of stress associated with habitual than nonhabitual behavior.

In this research we address the relation between ongoing thought, emotion, and everyday action. In the standard predictive models in social psychology, behavior is a product of a series of cognitive and affective events, typically preceded most closely by conscious intentions to perform the act (Ajzen, 1987; Eagly & Chaiken, 1993; Gollwitzer, 1999; although see Greve, 2001). Intentions can be generated through thoughtful deliberation or relatively superficial processes. Research that has measured people's intentions and then behavior has provided strong support for these models (see meta-analytic reviews by Armitage & Conner, 2001; Randall & Wolff, 1994; Sheppard, Hartwick, & Warshaw, 1988).

However, not all behaviors are preceded by conscious intentions. Only minimal, sporadic thought is required to initiate, implement, and terminate actions that in the past have been repeated in stable contexts. Such actions reflect habits, and Ouellette and Wood (1998) demonstrated that specific intentions to perform repeated behaviors are not good predictors of such acts. Instead, habit performance reflects the routine repetition of past acts that is cued by stable features of the environment. In this view, the disposition or tendency to perform habitual behaviors is implicit, it is expressed through the performance itself, and it may not be reflected in people's thoughts or reported intentions. Thus, predictive models of behavior indicate that action can emerge from conscious intentions or from implicit guides developed through past performance.

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Research on the organization of memory systems is consistent with the idea that behavior can be generated through multiple processes. For example, neuropsychological studies of memory have examined patients with brain lesions that yield selective memory impairment or have used functional neuroimaging techniques to examine activation of brain regions during performance of behavioral tasks (see reviews by Schacter, 1992, 1995). In this research, noncognitive habit and skill memory have been linked to a complex of specific brain systems involving the basal ganglia, cerebellum, and motor neocortex (Gabrieli, 1998; Squire, Knowlton, & Musen, 1993). These differ from the systems associated with priming and other forms of nonconscious memory and from the systems involved in declarative, conscious memory for facts and events. In addition, a number of studies of memory performance have supported a dual-process model in which habitual patterns and conscious recollection contribute independently to memory performance (e.g., Caldwell & Masson, 2001; Hay & Jacoby, 1996; Jacoby, Yonelinas, & Jennings, 1997). In sum, research on behavior prediction and on memory systems has distinguished habitual responses from more thoughtful modes of behavior generation.

Despite the emerging evidence for habitual patterns of responding, social psychological models of habit are in the early stages of development. In part, this is because of the often-noted problem of how to construct appropriate measures of habit (Eagly & Chaiken, 1993; Verplanken & Aarts, 1999). The standard measure is the frequency with which a behavior has been performed in the past. Although past performance frequency appears to be an effective predictor of future behavior, this relation is not necessarily informative about habits. Ajzen (2002) elaborated on these concerns in his critique of the behavior prediction research that has demonstrated the effects of past behavior on future behavior. In his view, the residual effect of past behavior on future behavior emerges to the extent that intentions are weakly formed, poorly specified, or unrealistic. Thus, past behavior effects emerge to the extent that the true predictors of behavior are not accurately captured in self-reports of intention. Although it is reasonable to suppose that stronger intentions are better predictors of behavior than weaker

ones, this explanation does not account for the mounting evidence of the systematic, independent effects of past behavior on future behavior. That is, past behavior is the primary predictor of future behavior when habits have developed through past repetition in stable contexts, whereas intentions are the primarily predictor when behaviors are relatively novel or performed in unstable contexts (Albarracin, Kumkale, & Johnson, 2002; Ferguson & Bibby, 2002; Ouellette & Wood, 1998; Verplanken, Aarts, van Knippenberg, & Moonen, 1998). This pattern of findings is consistent with the view that behavior can be guided by automatic processes outside of conscious awareness as well as through more thoughtful processing modes.[1]

Past studies demonstrating the differential impact of habits and intentions have largely focused on behavior prediction, and they yield limited evidence of the cognitive processes associated with behavior performance. To provide a basis for further development of psychological theorizing and measurement of habits, the present research offers a descriptive view of the nature and functioning of repeated behaviors in everyday life. Consistent with Rozin's (2001) call for more descriptive research in social psychology, we evaluate habits as they are naturally "situated in the structure of social life" (p. 13). We used a diary methodology to assess people's thoughts and emotions while performing habitual behaviors. Our basic analytic strategy was to compare these with people's thoughts and emotions during performance of nonhabits. We could then evaluate whether behaviors that have been performed frequently in the past, especially frequent behaviors in stable contexts, are appropriately defined as habits in the sense that they can be performed with minimal explicit thought. The present investigation also estimated the incidence of habitual behaviors in everyday life. Given that conscious self-regulation of judgments and behavior requires some effort (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Baumeister, Muraven, & Tice, 2000), we expected to find that people often rely on habits as an efficient, nontaxing mode of initiating and controlling daily activities. Finally, we examined whether the habitual versus nonhabitual mode of behavior performance is linked to emotional experience, especially to self-regulatory emotions of stress and perceived control.

Automaticity and Conditioning of Repeated Acts in Stable Contexts

Habitual behaviors typically emerge from repeated actions in stable contexts. This repetition can reflect people's attempts to achieve some goal or people's unintentional reactions, when they are unaware of what has been learned (Squire et al., 1993). Repetition of a behavior in a given setting promotes automaticity because the cognitive processing that initiates and controls the response comes to be performed quickly, in parallel with other activities, and with the allocation of minimal focal attention (e.g., Posner & Snyder, 1975). In the present work, we focus on one of the defining features of automatic, environmentally triggered action, that being people's awareness of action.[2]

Stable contexts facilitate this propensity to perform repeated behaviors with minimal cognitive monitoring. Although no situation ever completely maps onto earlier experiences, responses proceed quickly without limiting processing capacity to the extent that the current environment is similar to the one in which the behavior was performed in the past. Research on transfer of learning and stimulus generalization have addressed the question of what makes features of stimuli and contexts interchangeable for learning and performance (e.g., Bouton, Nelson, & Rosas, 1999; Proctor & Dutta, 1993). For our purposes, contexts are stable to the extent that they present the same contextual cues integral to performing the response and to the extent that they are similarly conducive to fulfilling an actor's goals. As Barker and Schoggen (1978) noted in their analysis of the genotype of behavior settings, contexts may vary in superficial attributes but be stable in the features supporting performance. Unstable contexts are ones in which shifts in the supporting environment implicate alternate goals or challenge the smooth initiation, execution, and termination of practiced responses. Because of the importance of context stability to automatic responding, we define habits as behaviors that are repeated in stable contexts.

How do stable environmental events cue behavior? In classic learning theories, features of the environment directly cue well-practiced behavior through stimulus–response linkages (e.g., Hull, 1943; Spence, 1956). However, more recent models of cognitive processing outline how external events mobilize action by automatically triggering behavioral goals or intentions, which then can be implemented with minimal thought (e.g., Bargh & Ferguson, 2000; Heckhausen & Beckmann, 1990). In the next section, we consider how thought might be implicated in environmentally triggered action.

Thought and Habitual Behavior

Popular culture contains a variety of images of the extent to which people's thoughts correspond to their ongoing behavior.

[1] Although Ajzen (2002) concluded that "empirical tests of the habituation hypothesis have so far met with little success," (p. 107), his analysis was based on the bivariate correlations between past behavior, intention, and future behavior. Specifically, he noted that Ouellette and Wood (1998) found that past behavior and intention were both correlated with future behavior, and that these correlations emerged in domains and contexts in which habits were likely to develop as well as ones in which they were not. Yet, these bivariate correlations are not an appropriate test of the habituation perspective. Past behavior is often highly correlated with intention, presumably because people reason from their typical behavior and report intentions that correspond to what they usually do. A more informative test is provided by analyses that have examined the independent predictive power of intention and past behavior. Although Ajzen (2002) neglected to mention these findings, they reveal the expected pattern—past behavior tends to emerge as the primary predictor when habits have developed, whereas intention is the primary predictor when habits are unlikely to have developed (Ferguson & Bibby, 2002; Ouellette & Wood, 1998; Verplanken et al., 1998). Thus, models that examined the unique impact of past behavior and intention provided evidence of the relatively automatic processes guiding habits.

[2] Several additional constructs can be distinguished from habit. Scripts are cognitive structures representing people's understanding of stereotyped sequences of action in well-known situations (Schank & Abelson, 1977). As Abelson (1981) noted, "the difference between a script and a habit is that a script is a knowledge structure, not just a response program" (p. 722). In addition, Langer (1989a, 1989b) cautioned against equating the construct of mindlessness with habits. Although both involve relatively effortless, invariant behavior, habits are more closely linked to behavioral response. In contrast, mindlessness reflects a general mental state of the organism as a whole (Langer, 1989b).

These range from a Walter Mitty-ish detachment from daily activities (Thurber, 1942) to the ideal in some Eastern religions of thoughtful awareness of all behaviors. Some psychological analyses also imply a close correspondence between thought and action. For example, James's (1890) analysis of ideomotor action suggested that cognitive representations of action function as templates for subsequent overt behavior. In this approach, an action is generated from thought of the act (see also Bargh & Ferguson, 2000). Similarly, Vallacher and Wegner's (1987, 1989) action identification theory links actions to people's understanding of what they are doing. Although this perspective is primarily concerned with the conditions under which people understand their actions in terms of mechanistic performance details versus broader goals and identities, a central assumption is that "well-learned, automated acts are performed with a representation of the act in mind, just as difficult unfamiliar acts are" (Vallacher & Wegner, 1987, p. 9). In addition, the idea that intentional behavior emerges from thought informs Wegner's (2002) notion of the empirical will, in which intentional behavior is demonstrated from causal relations between people's conscious psychological states and their subsequent actions.

Other perspectives allow for greater variability in the extent to which thought corresponds to action. As Heckhausen and Beckmann (1990) noted, the relation between attention and ongoing activity is likely to vary with the mode being used to guide behavior. With novel activities or activities in unfamiliar contexts, the uncertainties associated with performance require that people continuously attend to and evaluate new information as it is presented in order to respond appropriately. In contrast, habitual action does not require continuous attention to behavior or the circumstances in which it occurs. For frequently performed behaviors, specific intentions become implicit as individual behaviors come to be incorporated into sequences of multiple actions and as intentions come to be specified at high levels of abstraction (Ouellette & Wood, 1998; Wegner & Bargh, 1998). People are then freed-up to orient their thoughts toward unrelated concerns. Intriguing neurological evidence that habits are stored as larger action sequences rather than discrete acts was provided by Jog, Kubota, Connolly, Hillegaart, and Graybiel's (1999) study of the sensorimotor striatum of rats during learning of a maze. Because neuronal responses after successful acquisition emphasized the beginning and the end of the learned procedure, these authors concluded that an action template was developed for the behavioral unit as a whole (i.e., the full maze), and this was triggered by specific contexts at the start and the end of the maze.

Variability in the extent to which thought corresponds to action is also suggested by Bargh's (1990) auto-motive model of how goal structures guide behavior. In this view, purposive actions can be elicited by directly thinking about relevant goals or, when actions are well-practiced and automatic, by the environment triggering the relevant goal structures and these structures guiding behavior without conscious awareness. Some support for this model was provided by the finding that goals experimentally primed outside of awareness affected behavior independently of reported intentions (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001, Study 2). These findings contrast with Aarts and Dijksterhuis's (2000) demonstration that intentions for habitual behavior are highly accessible to consciousness. Specifically, people who had performed an act relatively frequently in the past, and thus had established habits, were found to have short response latencies to rate behavioral intentions (e.g., to ride a bike) when relevant goals were primed (e.g., go to the store). However, because Aarts and Dijksterhuis did not measure behavior, it is unclear whether their findings are relevant to the cognitive mechanisms that guide action. In sum, past research has demonstrated that primed goals can affect behavior independently of conscious intentions, but it remains to be demonstrated that habitual behavior can be generated without conscious awareness of intentions to initiate and/or perform the act.

In the present research, we anticipate that people engaged in habitual actions do not consciously access habit intentions, either because they do not need to do so in order to repeat well-learned intentional responses or because the behavior was not intended to begin with and perhaps became well-learned as a byproduct of some other action sequence (see, e.g., Lippa & Goldstone's, 2001, demonstration of the acquisition of unintended responses through association). Instead, we anticipate that people often think about things other than their behavior during habit performance. However, we also recognize that situational factors can sometimes focus people on their habitual behavior. For example, people may self-consciously think about what they are doing when others are present and they are concerned about these others' evaluations. Thus, our estimate of behavior-relevant thought may be affected by factors in addition to the habitual or nonhabitual mode of guiding behavior.

The naturally-occurring correspondence between people's thought and behavior also may vary across behavioral domain. For our college student participants, a number of everyday behaviors inherently require deliberation to generate an appropriate response, and these include studying, talking with others, taking notes during lectures, and reading. Some thought about these complex behaviors is necessary because each enactment contains considerable novel information. To achieve behavior-relevant goals, people must constantly tailor their behavior to events as they unfold (e.g., Did they understand the prior paragraph?; Is their interaction partner responding as desired?). But even with these behaviors, we anticipate that frequent performance of the act and stability of the context will reduce the amount of thought necessary for performance. This suggests that habits will be associated with less behavior-relevant thought than nonhabits, regardless of whether the behavior is one in which some deliberation is necessary for effective performance.

Emotion and Habitual Behavior

The mode of behavior performance has implications for emotional experience as well as for the contents of consciousness. Although there is little research evidence on the relation between mode of performance and emotion, several theoretical perspectives provide a basis for anticipating that habitual behaviors are associated with less intense emotions than nonhabitual behaviors. According to one of Frijda's (1988) laws of emotion, "continued pleasures wear off; continued hardships lose their poignancy" (p. 353). From this perspective, people are likely to adapt psychologically and physiologically to the emotion-inducing aspects of repeated actions in a way that reduces emotional intensity. In addition, the anticipation of lesser intensity emotions associated with habits can be derived from Mandler's (1975) theory of mind and

emotion. In this view, emotions arise when the interruption of one's plans and organized behavior sequences generates arousal (i.e., of the autonomic nervous system) and initiates an interpretation of the interruption that implicates particular emotions. Because infrequently performed behaviors and behaviors in unstable contexts are plausibly more likely than habitual behaviors to encounter difficulties and interference, nonhabitual behaviors are more likely to be associated with emotions. Finally, from the perspective of Carver and Scheier's (1998, 1999) cybernetic model of self-regulation, emotions emerge from discrepancies between one's behavior or related outcomes and one's goals and self-standards. Specifically, emotions emerge from changes in the rate at which one's behavior and outcomes are meeting or failing to meet self-goals. To extend these ideas to include mode of performance, it seems plausible that people will be more attentive to discrepancies when deliberating about behavior than when acting habitually. In sum, a variety of theoretical perspectives provide the basis for anticipating that people are less likely to experience intense emotions when engaged in habitual than nonhabitual behavior.

One implication of the limited emotional responses associated with habitual behavior is that when people do experience emotions during habit performance, these emotions are likely to be linked to their thoughts rather than to their behavior. Because habit performance requires minimal explicit thought, people are able to entertain unrelated concerns, and the intruding thoughts may themselves be highly emotionally charged. Thus, when performing behaviors habitually, people are likely to report that their emotions are associated with what they are thinking about—which will often be unrelated to their actions. This tendency for thoughts and not behaviors to elicit emotions should be less evident for nonhabitual behaviors.

Habitual performance of behavior also has specific implications for emotions associated with self-regulation and control. Given that deliberation about even a single behavior can induce self-control deficits (Baumeister et al., 1998, 2000; Muraven & Baumeister, 2000), performance of nonhabits may be associated with lowered feelings of control compared with habits. Specifically, the deliberation involved in the initiation and performance of nonhabits may induce self-regulatory strains evident in participants' feelings of stress, loss of control, and helplessness. Habit performance does not require deliberation and thus is not likely to elicit the same control deficits. In addition, given that burnout and work stress have been linked to the pressure of jobs that require simultaneous performance of multiple tasks (Leiter & Maslach, 2001; Nelson, Quick, & Simmons, 2001), feelings of stress might emerge when participants perform multiple behaviors simultaneously, especially when these are nonhabitual and require conscious decision making.

The Present Research

The present investigation consists of two self-report diary studies that yielded online appraisal of the thoughts and emotions associated with performance of habitual and nonhabitual behaviors. Participants in this research were signaled with a watch alarm each hour to report on their behaviors, thoughts, and emotions.

We anticipated that the habitual or nonhabitual mode of behavior performance would be reflected in how closely people's thoughts corresponded to their actions. That is, less correspondence should emerge when behaviors have been performed frequently in the past in stable contexts, and thus habits have developed, than when behaviors have been performed less often or in unstable contexts, and thus habits have not developed. We also anticipated that participants would report lower intensity emotions during performance of habits than nonhabits, given that habituation occurs to repeated behaviors (Frijda, 1988), that habits are likely to be associated with few arousal-inducing interruptions (Mandler, 1975), and that people may not be aware of emotion-inducing discrepancies between habitual behaviors and personal goals. Because habits require little behavior-relevant thought, people are likely to report that any emotions experienced during habit performance emerged from their thoughts rather than from their behaviors. In addition, the self-regulatory advantages of habits should be apparent in lower levels of stress and burnout when performing behaviors habitually rather than with awareness.

As a secondary focus of the research, we examined participants' interpretations of habitual and nonhabitual behavior. On the one hand, given the low intensity emotions and the minimal cognitive monitoring associated with habit performance, these behaviors may not strongly implicate the self and instead may be explained in terms of external factors such as situational constraints. Alternatively, reasoning from Bargh et al.'s (2001) assumption that the goals and associated behaviors that become automated through frequent selection are likely to reflect individuals' guiding values, habitual behaviors may be especially self-defining and participants may report that they reflect personal attributes, desires, and preferences.

Also, given our correlational design, a number of alternate interpretations exist for any findings. First, we considered the possibility that the predicted relations might be obtained spuriously as a result of some third factor rather than the mode of behavior performance. To address this issue, we selected several behaviors that, according to participants' diary responses, were sometimes performed habitually and sometimes nonhabitually. We then tested our hypotheses within these behavioral domains, and in this way were able to hold constant many of the extraneous factors that might vary with domain. A second concern is whether the diary method can illuminate the causal ordering between thought, emotion, and behavior. We discuss the benefits and limitations of the diary method in the General Discussion.

The two studies in this article overlap considerably in their designs and results, and for this reason we present them jointly. In the first study, participants reported on a single behavior at each hourly diary assessment. The second study included more participants, a longer recording period, and allowed reports of multiple simultaneous thoughts and behaviors. Because people are likely to be most aware of actions that require attention and control, reports limited to a single behavior at each assessment might underestimate the incidence of habits.

Method

Participants

Study 1. A total of 70 undergraduate students (35 women and 35 men) at Texas A&M University participated in partial fulfill-

ment of a requirement in their introductory psychology course. The data from an additional 19 participants were excluded from the analyses either because they failed to complete the form correctly or they completed it retrospectively.

Study 2. A total of 209 undergraduate students (131 women and 78 men) at Texas A&M University participated in partial fulfillment of a requirement in their introductory psychology course. The data from an additional 16 participants were excluded from the analyses because they either failed to complete the form correctly or they completed it retrospectively.

Procedure

The studies were conducted in three phases: an introductory session, a recording period of 1 day (Study 1) or 2 days (Study 2), and a follow-up session in which participants provided additional information about the behaviors they listed in the diary.

Phase 1: Introductory session. In groups of approximately 40, participants attended an introductory meeting for a study investigating the behaviors people perform in their daily lives. Participants were told that they would be tracking their behaviors, thoughts, and emotions. Observations were to be recorded once per hour while participants were awake. Participants received a wristwatch programmed to chime on the hour to cue them to complete the diary.

Participants received copies of the diary forms and examples of correct entries. To ensure accuracy in completing the diary, participants were instructed to make their hourly entries while the events occurred. To encourage completion of the diary, participants rated their implementation intentions on a questionnaire, identified the best day(s) to complete the diary, and described how they would remember to complete the form each hour (Gollwitzer, 1999). In addition, participants signed a "contract" indicating their commitment to complete the data collection. Participants then scheduled a follow-up session and were excused.[3]

Phase 2: Diary records. Participants carried the diary forms with them, recording their behaviors, thoughts, and emotions once per hour (see diary measures below).

Phase 3: Follow-up session. Participants attended a follow-up session in small groups to provide additional information about their diary entries (see follow-up questionnaire below). Upon completion, participants received their experimental credit and indicated whether they had reported the events listed in the diary as they occurred or retrospectively. Participants were then debriefed and excused.

Measures

Diary behavior reports. Participants recorded the single behavior (Study 1) or all of the behaviors (Study 2) in which they were engaged at the moment of the watch chime. For each behavior, participants rated: (a) the frequency with which they had performed the behavior in the past month, with response options 1 (*monthly or less often*), 2 (*at least once a week),* or 3 (*just about every day*); (b) the extent to which they performed the behavior in the same physical location each time, from 1 (*rarely*) to 3 *(usually*); and (c) the involvement of other people in the behavior (*others involved* vs. *others not involved*). In Study 2, participants also rated: (a) the amount of attention normally required for successful performance, from 1 (*almost no attention*) to 4 (*constant attention*); (b) the degree of difficulty of the behavior, from 1 (*very easy)* to 5 (*very difficult*); and (c) the importance of the behavior for achieving personal goals, from 1 (*unimportant*) to 5 (*highly important*).

In the analyses, habits were defined as behaviors participants reported performing "just about every day" and "usually in the same location." Nonhabits were behaviors performed less often (i.e., once a week or monthly) and in less stable contexts (i.e., rarely or sometimes in the same location).

Diary thoughts. Participants reported their thoughts by answering the open-ended question, "What were you thinking about during this activity?" Space was provided for participants to write a short description of a single thought (Study 1) or multiple thoughts (Study 2).

Correspondence between diary thoughts and behaviors. Two independent raters coded the diaries for whether participants were thinking about the behavior in which they were engaged at each recording period. Thoughts were classified as corresponding with behavior when they involved the specific actions being performed (e.g., when eating, "about how good the bread was") or implicated abstract goals and outcomes that related in some way to the actions being performed (e.g., "how I need to start eating more healthy so I can get back in the shape I was during summer"). Thus, we judged that participants' thoughts corresponded to their behavior when the thoughts reflected either specific, relatively low-level instrumental intentions or more abstract, higher level intentions. This was done to capture the more abstract thoughts reflecting high levels of intention and goal specification that may direct habitual performance (Heckhausen & Beckmann, 1990; Vallacher & Wegner, 1987). Thoughts and behaviors were classified as not corresponding when they were clearly about unrelated issues (e.g., thinking about an upcoming math test while driving home). Because participants in Study 2 were allowed to report multiple simultaneous behaviors and multiple concurrent thoughts, correspondence was coded at the level of the individual behavior, rather than at the level of the hourly entry. Raters agreed on 84% of behaviors in Study 1 and 89% of behaviors in Study 2. Disagreements were resolved through discussion.

Behavior complexity. Two independent raters categorized all behaviors as (a) complex, meaning those that required responses tailored to new information as it emerged during performance; or (b) less complex, meaning those that could be performed effectively with minimal modification to new information. The most common examples of complex or difficult activities appearing in participants' diaries included behaviors related to academic achievement (e.g., studying, listening to lectures), extended interactions with other people (i.e., conversations, as opposed to brief, routinized greetings), creative endeavors (e.g., composing a letter or essay), and challenging games or competitions (e.g., sports, cards). Examples of less complex behaviors included driving, cooking, and paying bills. Raters agreed on 88% of judgments in Study 1 and 93% in Study 2. Disagreements were resolved through discussion.

Diary emotion measures. Participants rated whether their emotions varied from the day's baseline level of emotion on a 5-point scale ranging from *much more negative* to *much more positive,* with the midpoint representing no change. Analyses on this raw valence scale yielded no effects and we do not discuss them further. To form a 3-point scale reflecting changes in emotional intensity regardless of valence, responses were treated as deviations from the scale midpoint. The resulting change in emotional intensity scale ranged from 1 (*no change from baseline*) to 3 (*much more positive/negative than baseline*).

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[3] Participants also completed several individual difference measures during the introductory session. These included the Need for Cognition Scale (Cacioppo, Petty, & Kao, 1984), the Need to Evaluate Scale (Jarvis & Petty, 1996), the Affect Intensity Measure (Larsen, Diener, & Emmons, 1986), the Personal Need for Structure (Neuberg & Newsom, 1993), and additionally in Study 2, the Emotional Intensity Scale (Bachorowski & Braaten, 1994) and Goldberg's (1992) 100 Adjective Markers for the Big 5. In Study 1, individual's tendency to perform habits, reflected in the proportion of habitual behaviors they reported, was marginally related to their scores on need for cognition, $r(62) = -0.24$, $p = .06$, and need to evaluate, $r(61) = -0.22$, $p = .08$. However, no relations between habitual behavior and personality emerged in Study 2.

Participants reported on the source of their emotions by checking the appropriate box to indicate whether the cause was their thoughts, their actions, or both. In Study 2, participants also reported on specific emotions associated with self-regulatory challenges. They rated on 5-point scales, ranging from 1 (*very little or not at all*) to 5 (*extremely*), the extent to which they felt stressed, fatigued, overwhelmed, tired, burned out, helpless, out of control, weak, and bored.

Follow-up questionnaire to assess participants' implicit theories. In both studies, participants indicated with a response of *yes* or *no* whether they considered each behavior to be a habit. They also indicated whether the behavior reflects the kind of person they are (in Study 1 they answered with *yes* or *no* and in Study 2 they answered on a 5-point response scale ranging from *not at all* to *a lot*).

In Study 1, participants indicated whether performing each behavior caused them to experience feelings of pride or shame (with a response of *yes* or *no*). We further explored self-related emotions in Study 2 by instructing participants to rate their feelings about performing each behavior using a 5-point scale, from 1 (*very bad about myself*) to 5 (*very good about myself*).

In Study 2, participants also rated a number of possible causes for their behavior. On 5-point scales ranging from 1 (*not at all*) to 5 (*a lot*), they indicated the extent to which the behavior was performed because of (a) dispositional factors ("because of something about you," i.e., because "you like to do it"), (b) another person, (c) temporal factors ("because it was the right time to do it"), and (d) situational factors ("because of the situation you were in"). Also on the 5-point scale, participants indicated how much they had thought about the behavior before performing it.

Results and Discussion

As can be seen in Tables 1 and 2, between a third and a half of all behaviors listed were classified as habits, given that they were performed just about every day and usually in the same location. This estimate was greater in Study 2 (43%) than in Study 1 (35%), $\chi^2(1, N = 6{,}830) = 14.34$, $p < .01$, consistent with our expectation that the procedure of listing multiple behaviors in Study 2 would encourage participants to include more activities performed habitually. To illustrate the kinds of activities participants listed, we classified diary entries in Study 2 into broad behavioral domains. As shown in Table 3, the most commonly reported domains in students' lives included studying and other school-related behaviors, activities related to entertainment and news- and information-gathering, social interaction, and eating and drinking. Of the domains we identified, attending to hygiene and appearance and sleeping and waking activities were most likely to be classified as habitual in the sense that they were performed frequently in stable contexts.

Correspondence Between Thoughts and Behaviors

Examples of thoughts that did or did not correspond to actions for some common behaviors listed in participants' diaries are presented in Table 4. For the analyses, the diary design yielded a hierarchically nested data structure with participants' hourly reports nested within individual participants. Because the hourly reports from an individual were not independent, we treated participants as the units of analysis. To do this, data were aggregated across each participant's hourly reports, and analyses were conducted on participant-level data. Thus, to evaluate the relationship between mode of behavior performance (habitual vs. nonhabitual) and correspondence between thoughts and behaviors (correspond vs. do not correspond), the hourly reports for each participant were aggregated by tallying the frequency of habitual behaviors for which thought corresponded with the behavior and the frequency of habitual behaviors for which thought and behavior did not correspond. To generate participant-level percentage estimates, these frequencies were divided by the total number of habitual behaviors reported by the participant. The same procedure was followed for nonhabitual behaviors. The four percentages yielded by each participant (correspondence/habit, noncorrespondence/habit, correspondence/nonhabit, noncorrespondence/nonhabit) were analyzed in a Mode of Performance (habit vs. nonhabit) × Thought/Behavior Correspondence (thoughts did vs. did not cor-

Table 1
Means and Standard Deviations of Variables Assessed in Study 1

Variable	*M*	*SD*
Number of hourly diary entries per participant	9.58	3.12
On the basis of the experimenter's rating, the proportion of behaviors classified as:		
habitual (performed almost daily, usually in same location)	.35	.19
corresponding with thoughts	.61	.19
On the basis of participants' ratings of each behavior, the proportion of behaviors in which:		
other people were involved	.49	.18
any emotions were caused by actions	.43	.24
any emotions were caused by thoughts	.35	.21
pride was experienced	.20	.22
shame was experienced	.03	.06
Participants' ratings of:		
frequency of past performance	2.23	0.36
stability of context	2.55	0.34
intensity of emotions	1.86	0.42

Note. Proportions were computed for each participant and the mean value that is reported in the table was calculated across participants in the sample. Ratings of frequency of past performance and stability of context were obtained on scales ranging from 1 to 3, with higher numbers indicating greater frequency or stability. Emotional intensity ratings are reported on a scale ranging from 1 (*no change in emotion from baseline for the day*) to 3 (*much more negative or positive than baseline*).

Table 2
Means and Standard Deviations of Variables Assessed in Study 2

Variable	*M*	*SD*
Number of hourly diary entries per participant	20.74	5.47
Number of behaviors total reported per participant	30.12	10.84
Number of behaviors per hourly entry	1.46	0.37
Number of thoughts per hourly entry	1.08	0.23
On the basis of the experimenter's rating, the proportion of behaviors classified as:		
corresponding with thoughts	.53	.16
habitual (performed almost daily, usually in same location)	.43	.19
On the basis of participants' ratings of each behavior, the proportion of behaviors in which:		
other people were involved	.44	.16
any emotions were caused by actions	.56	.21
any emotions were caused by thoughts	.33	.19
Participants' ratings of:		
frequency of past behavior performance	2.49	0.22
stability of context	2.57	0.23
attention required	2.27	0.38
behavior difficulty	1.94	0.38
importance of behavior for personal goals	2.47	0.63
intensity of emotions	1.82	0.31
loss of control	1.56	0.52
fatigue/lack of interest	2.03	0.63
amount of thought required before performance	2.19	0.56
attribution of behavior to internal causes	2.61	0.60
attribution of behavior to another person	2.08	0.65
attribution of behavior to the situation	3.17	0.87
attribution of behavior to time	3.25	0.77

Note. Proportions were computed for each participant and the mean value that is reported in the table was calculated across participants in the sample. Ratings of frequency of past performance and stability of context were obtained on scales ranging from 1 to 3, with higher numbers indicating greater frequency or stability. Ratings of attention, difficulty, importance, and prior thought were obtained on scales ranging from 1 to 5, with higher numbers reflecting greater amounts of the attribute. Emotional intensity ratings are reported on a scale ranging from 1 (*no change in emotion from baseline for the day*) to 3 (*much more negative or positive than baseline*). Loss of control and lack of interest are reported on scales ranging from 1 to 5, with higher numbers indicating greater experience of each emotion. Attribution ratings were obtained on scales ranging from 1 to 5, with higher numbers reflecting stronger attributions.

respond to behavior) repeated measures analysis of variance (ANOVA) design.[4]

Study 1. The analyses yielded a significant interaction between mode of performance and correspondence, $F(1, 63) = 48.63$, $MSE = .12$, $p < .001$. Analyses of simple main effects indicated that, for behaviors classified as habits, thoughts were more likely not to correspond with behaviors ($M = 60\%$) than to correspond ($M = 40\%$), $t(62) = -2.27$, $p < .05$, whereas for nonhabitual behaviors, thoughts were more likely to correspond with behaviors ($M = 70\%$) than not to correspond ($M = 29\%$), $t(62) = 7.40$, $p < .001$.

Study 2. The analyses yielded a significant main effect for correspondence, $F(1, 208) = 16.73$, $MSE = .09$, $p < .001$ (*M*s = 56% and 44% for correspondence and noncorrespondence, respectively), and a significant interaction between mode of performance and correspondence, $F(1, 208) = 90.99$, $MSE = .06$, $p < .001$. Consistent with Study 1, simple effects comparisons revealed that during performance of habits, participants' thoughts were more likely not to correspond with their behavior (51%) than to correspond (44%), $t(207) = -2.52$, $p = .01$, whereas for nonhabits, thoughts and behaviors were more likely to correspond (60%) than not to correspond (36%), $t(207) = 9.99$, $p < .001$. It should be noted that these percentages sum to less than 100% because we were unable to code some of the listed behaviors and thoughts.

The thought–behavior correspondence findings across both studies are consistent with our prediction that performance of habitual behaviors allowed people to focus their attention away from their current behavior. The lower levels of behavior-relevant thought associated with habits than nonhabits is an indicator of greater automaticity in the guidance of habitual acts. The finding that participants thought about habits about 40% of the time is consistent with the idea that this mode of behavior regulation is best characterized by minimal or sporadic cognitive monitoring and not by the complete absence of thought (see Pashler, 1994).

Additional evidence of the extent to which behavior was guided by explicit thought emerged in Study 2 from participants' ratings of the attention and thought required to perform each behavior and the difficulty of performance. Because these ratings represent continuous dependent measures, they were analyzed with a multilevel regression approach (Kenny, Kashy, & Bolger, 1998). In essence, a regression equation was estimated for each participant to represent the relationship between a predictor (e.g., mode of performance) and an outcome measure (e.g., rated attention to behavior). In the analyses, the inter-

[4] Because participants listed more nonhabitual than habitual behaviors, we calculated the percentage correspondence for habits and nonhabits separately. Thus, our results reflect the percentage of each type of behavior that corresponds to thought, not the percentage of the total number of behaviors listed.

Table 3
Behaviors Frequently Listed in Participants' Diaries: Study 2

Type of behavior	Examples of common entries	% of all diary entries	% entries categorized as habits
School work	Attending classes, studying, reading, doing homework and assignments, taking notes, going to the library	32	32
Entertainment, news, & information	Watching TV, listening to music, using the Internet, reading the newspaper, going to movies/entertainment, playing games	14	54
Social interaction	Talking to friends, family, and others; face-to-face, on the phone, via computer; reading/writing e-mail	10	47
Eating, drinking	Eating, drinking (except alcohol), cooking or preparing food	7	46
Hygiene & appearance	Showering, washing hands, brushing teeth, dressing, putting on make-up	4	88
Transportation & travel	Driving, riding a bike, taking a bus, walking to or from some location	4	58
Going to sleep/waking	Waking up, lying in bed, getting ready for bed, taking a nap	3	81
Exercise	Lifting weights, running, swimming, playing sports	1	44
Working	Part-time or full-time jobs	1	55
Cleaning	Doing laundry, washing dishes, cleaning dorm/apartment	1	21
Relaxing	Resting, relaxing, sitting on the couch	1	48
Other	Various behaviors appearing infrequently in participants' diaries	21	32

cepts and slopes from these equations were then aggregated to yield a mean intercept and slope across participants.[5]

The multilevel analyses conducted with mode of performance (habit vs. nonhabit) as a dichotomous predictor at the behavior level revealed that participants rated habits as less demanding of attention than nonhabits, unstandardized regression coefficient, $B = -0.44$, $SE = .04$, $t(193) = -11.85$, $p < .001$. Participants also reported that they thought less about their actions before performing habits in comparison with nonhabits, $B = -0.61$, $SE = .04$, $t(199) = -14.00$, $p < .001$. In addition, habits were rated as being less difficult to perform than were nonhabits, $B = -0.47$, $SE = .04$, $t(188) = -11.40$, $p < .001$. These findings are consistent with the thought–behavior correspondence results in indicating the greater conscious processing required to guide nonhabit than habit performance. With frequent performance of behaviors in stable contexts, aspects of the cognitive processes controlling performance appear to become automatic and relatively easy to execute.[6]

Controlling for Plausible Alternate Explanations

Given the correlational design of this research, additional analyses were necessary to verify that the obtained relations do not reflect some artifactual difference between the behaviors classified as habits and those classified as nonhabits (e.g., habitual behaviors being inherently easier to perform). To address this concern, we examined whether participants' thoughts corresponded with behavior more for nonhabits than for habits when analyses were conducted within behavioral domain (see similar analysis in Ouellette & Wood, 1998).

[5] It should be noted that in Study 2, the full three-level hierarchical design consisted of individual behaviors that were nested within hourly diary entries and entries that were nested within persons. However, we treated the data as having two levels because of the relatively low number of observations at the behavior level, with a mean of only 1.46 ($SD = 0.37$) behaviors reported within each hourly diary entry. Thus, in most cases, the behavior level did not differ from the hour level.

[6] To provide some evidence of the validity of our measure of thought–behavior correspondence, we examined whether it increased with factors that should focus participants' attention on what they are doing, especially whether other people were present and involved in the behavior. In the presence of others, people may have a self-conscious concern with appearing appropriately and with generating responses to ongoing interaction (Baumeister, 1984; Carver & Scheier, 1978). Indeed, the pattern of means indicated that the presence of others increased the correspondence between thought and action, although the effect emerged as significant only in Study 2. That is, in Study 2, analysis on thought–behavior correspondence yielded a two-way interaction between performance mode and correspondence, $F(1, 208) = 90.42$, $MSE = .02$, $p < .001$, which revealed the expected pattern of greater behavior-relevant thought when others were present.

Table 4
Examples of Corresponding and Noncorresponding Thoughts and Behaviors

Behavior	Example of corresponding thought	Example of noncorresponding thought
Attending classes	"I was getting the answer to my test back and was worried."	"I'm really tired."
Studying	"Thinking about passing my test."	"That I would really like to go home."
Watching television	"I'm watching game shows so I am thinking about the answers."	"I'm hungry."
Eating	"This dinner stinks."	"Thinking about my test again."
Talking on the telephone	"I made an *A* on my test, and I was telling him how relieved I was. I was happy just to talk to him."	"About sleeping."
Working on the computer	"Who e-mailed me?"	"Excited about my friend coming to visit."
Reading	"I was concentrating on the events in the book."	"Getting ready to exercise."
Listening to music	" . . . 80s music was so great."	"I was thinking I had to find a parking place and I would be late for class."
Driving	"Not running over pedestrians that keep walking in front of me."	"I was thinking about all I had to accomplish today."
Exercising	"That I'm dead tired, and I've only got a few more exercises left to do."	"Where I'd like to go for spring break."
Cooking	"I am so hungry. This smells good."	"'Friends' comes on in 30 minutes."

We selected two behaviors from participants' diaries in Study 2: watching TV and driving. These behaviors were approximately equally often classified as habits (52%) and as nonhabits (48%) and were noted with sufficient frequency in the diaries to allow analyses to be performed solely on these domains (i.e., TV watching: $n = 614$; driving: $n = 83$). Because the variables were categorical and independent at the level of individual participants, we conducted Mode of Performance (habit vs. nonhabit) × Correspondence (thoughts do vs. do not correspond with behavior) repeated measures ANOVAs on the aggregated percentage estimates for each individual (percentage of habits/correspond, habits/not correspond, nonhabits/correspond, nonhabits/not correspond). A marginal main effect for correspondence, $F(1, 79) = 3.27$, $MSE = .27$, $p < .10$ (*M*s = 41% and 59% for correspond and do not correspond, respectively) was qualified by the predicted interaction between performance mode and correspondence, $F(1, 79) = 18.33$, $MSE = .26$, $p < .001$. Simple effects tests showed that participants' thoughts were more likely not to correspond (64%) than to correspond to their behaviors (28%) when they performed the behaviors habitually, $t(127) = -5.85$, $p < .001$. When performing behavior in a nonhabitual manner, however, only a slight trend emerged for thoughts to correspond (49%) rather than not correspond (46%, $t < 1$). These findings indicate that the overall relation between mode of performance and the extent to which participants think about the activity when performing it is not due to some confounding feature of the behaviors we classified as habitual or nonhabitual.

Additional evidence that our results do not reflect some artifact of the behaviors classified as habits and nonhabits comes from the ratings of attention, thought, and performance difficulty for the domains of watching TV and driving. Because these continuous ratings were performed for each behavior, we conducted multilevel regression analyses on behavior ratings within participants, with mode of behavior performance as the predictor. Consistent with the findings from the full sample of behaviors, participants reported less attention and less thought when they were watching TV and driving in a habitual manner than in a nonhabitual one, $B = -0.18$, $SE = .07$, $t(102) = -2.50$, $p < .05$; $B = -0.32$, $SE = .08$, $t(124) = -4.09$, $p < .001$, for attention and thought, respectively. Analyses on rated performance difficulty, although yielding a trend in the same direction, did not reach significance ($t < 1.5$). These findings provide additional reassurance that the minimal cognitive monitoring associated with frequently performed behaviors in stable contexts reflects mode of performance and not other factors.

Habits and Emotion

Study 1. Two strategies were used to evaluate whether habits were associated with lesser intensity emotional experiences. The first approach evaluated this relation at the level of participants' mean ratings. We computed correlations between the aggregated percentage of each participant's behaviors that were habitual and each participant's overall mean ratings of emotional intensity. As

we anticipated, the greater the percentage of participants' behaviors that were habitual, the less likely they were to report increases in the intensity of their emotions, $r(64) = -.25$, $p < .05$. The second approach evaluated the relationship between mode of performance and ratings of emotional intensity at the level of the diary entry by calculating correlations across entries for each participant. The mean correlation aggregated across participants yielded no effect ($t < 1$), which is perhaps understandable given that participants provided on average less than 10 diary entries.

Study 2. Because each hourly diary entry included one or more behaviors but only one rating of the intensity of change in participants' emotional state, we could not identify which behavior was associated with the rated emotion. Thus, analyses of the habit-emotion relationship were conducted at the level of the diary entry rather than at the level of the individual behavior. For these purposes, each diary entry was classified as involving the performance of (a) a single habitual behavior (26% of behavior entries), (b) a single nonhabitual behavior (37% of entries), (c) multiple behaviors, all of which were habits (10% of entries), (d) multiple behaviors, all of which were nonhabits (15% of entries), (e) only one nonhabit and one or more habits (11% of entries), and (f) two or more nonhabits and one or more habits (2% of entries).

We examined whether nonhabits were associated with more intense changes in emotion than habits by computing a multilevel regression model. A dichotomous predictor was formed to represent diary entries in which participants reported only habits versus diary entries with at least one nonhabit (i.e., from the entry classifications given in the prior paragraph, this represents a comparison between a + c vs. b + d + e + f). Consistent with expectations, less intense emotion change emerged in the habit-only entries than in entries that included at least one nonhabit, $B = -0.09$, $SE = .02$, $t(206) = -3.65$, $p < .001$. The intercept of this regression model revealed that the mean emotional intensity while performing at least one nonhabitual behavior was 1.85 on the 3-point intensity scale ranging from *no change* to *much more positive/negative than baseline feelings*. The regression coefficient indicates that entries composed only of habits were rated .09 scale points lower in intensity than entries that included at least one nonhabit.

We conducted additional multilevel analyses to address a number of more specific questions concerning the relation between emotion change and performance of habitual and nonhabitual behaviors. First, the intensity of emotional change was unrelated to a continuous numerical representation of the total number of behaviors being performed simultaneously ($t < 1$).[7] Thus, our findings concerning mode of behavior performance and emotional intensity do not depend on the number of behaviors participants reported performing at a diary entry.

In addition, the performance of multiple nonhabits simultaneously did not yield a greater increase in emotional intensity than performance of a single nonhabit. Specifically, emotional intensity did not increase with the performance of multiple rather than single nonhabits ($t < 1$), or with the performance of combinations of habits and nonhabits that involved only one nonhabit rather than multiple nonhabits ($t < 1$). Thus, even though performing a single nonhabitual behavior was associated with changes in emotional intensity, emotions did not shift further with the performance of additional nonhabits.

As anticipated, analyses revealed that performance of habits simultaneously with other behaviors was not associated with increased emotional intensity. That is, emotional intensity did not increase with the performance of multiple rather than single habits ($t < 1$), or with the performance of combinations of habits and nonhabits rather than only nonhabits ($t < 1.5$).

In summary, behaviors performed habitually were associated with lesser change in emotional intensity than behaviors performed nonhabitually. This effect might arise from habituation processes, given that emotional intensity generally decreases with increasing exposure to a stimulus (Frijda, 1988). It also might emerge because performance of habits is associated with few arousal-inducing interruptions that form the basis for emotional experiences (Mandler, 1975). And this effect also is consistent with our reasoning from Carver and Scheier's (1999) theory of self-control, in that people may not be aware of emotion-inducing discrepancies between behaviors and personal goals when they perform behaviors habitually.

Source of Emotion

Study 1. To evaluate whether the source of participants' emotions varied with the mode of behavior performance, we aggregated these dichotomous variables to yield percentage data that were independent at the level of the individual, following the strategy used to analyze thought–behavior correspondence. A Source of Emotions (actions vs. thoughts) × Mode of Performance (habit vs. nonhabit) repeated measures ANOVA revealed a marginally significant interaction, $F(1, 57) = 3.62$, $MSE = .16$, $p = .06$. Simple main effect analyses revealed that when performing nonhabits, participants were more likely to identify the source of their emotions to be their actions (43%) rather than their thoughts (30%), $t(56) = 2.16$, $p < .05$. However, when performing habits, this pattern did not emerge, and instead participants showed a nonsignificant tendency to identify the origin of their emotions as their thoughts (43%) more than their actions (36%, $t < 1$). These percentages do not sum to 100 because some participants indicated that their emotions stemmed from both thoughts and behaviors. Consistent with predictions, then, when compared with nonhabits, participants' emotions during habit performance were slightly more likely to be associated with their thoughts than with the behavior itself.

Study 2. We first conducted analyses on diary entries that reported only single behaviors. A Mode of Performance (habit vs. nonhabit) × Source of Emotions (actions vs. thoughts) repeated measures ANOVA resulted in a significant main effect for source of emotions, $F(1, 174) = 63.09$, $MSE = .26$, $p < .001$ (Ms = 66% and 34% for actions and thoughts, respectively), and a significant interaction, $F(1, 174) = 11.42$, $MSE = .12$, $p < .001$. Although, in general, participants were more likely to attribute their emotions to their actions, this tendency was more pronounced for nonhabits (Ms = 65% and 29% for actions and thoughts, respectively), $t(202) = 9.50$, $p < .001$, than for habits (Ms = 59% and 37% for

[7] In the multilevel regression analysis, the number of behaviors performed was centered on the grand mean prior to inclusion in the model. Because other predictors in these analyses were categorical, they were not centered because the value zero is meaningful and corresponds to one of the levels of the categorical predictor.

actions and thoughts, respectively), $t(175) = 4.09$, $p < .001$. Comparable results emerged in analyses on diary entries composed of multiple behaviors in which all of the behaviors listed were either habits or nonhabits.

In summary, across both studies the most frequently mentioned source of emotion was participants' behavior. This pattern did not hold as strongly for habits as nonhabits, and, as we had anticipated, participants mentioned their thoughts as an important source of emotional experience when engaged in habitual behavior. These findings are consistent with our expectation that habitual behaviors themselves do not generate strong emotional responses, and emotions during habit performance are likely to emerge from the thoughts that intrude during action, including reflections of past and future experiences and the recognition of ongoing events unrelated to behavior.

It is worth noting that the correlational nature of the present design generates some ambiguity in how best to interpret these findings. Although we prefer to conclude that the source of emotion when performing habitual behaviors differs from that with nonhabitual behaviors, it could also be that the ratings of source of emotion reflect the different thought processes that guide habits and nonhabits. For example, it could be that people identified as the source of their emotion whatever they were attending to at that moment—when performing habits, this happened to be their thoughts, but when performing nonhabits, this happened to be their behavior. Regardless of the most appropriate account, participants' identification of somewhat different sources of emotion for habits and nonhabits contributes to our thesis that the cognitive and emotional processes that guide habit performance differ from those that guide nonhabits.

Habits and Self-Regulatory Emotions: Study 2

A maximum likelihood factor analysis was performed on participants' hourly ratings of emotional experiences indicative of self-regulatory challenges, and two factors emerged with eigenvalues greater than one. The first factor reflected stress, and the items that loaded primarily on this factor were helpless (loading of .86), out of control (.80), overwhelmed (.64), stressed (.53), and weak (.49). The second factor concerned fatigue, and the items that loaded primarily on this factor were fatigued (loading of .85), tired (.81), burned out (.59), and bored (.33). Mean ratings were calculated across the items that loaded heavily on each factor.

To evaluate the relations between stress, fatigue, and change in emotional intensity, we computed bivariate correlations within participants and then aggregated these across participants to yield mean correlations. As would be expected, feelings of stress and fatigue were related to greater changes in emotional intensity, $r(199) = .26$ and .21, ps $< .001$, for stress and fatigue, respectively. No additional effects were obtained in any analysis on the fatigue factor, and it will not be discussed further.

We conducted multilevel regression analyses to evaluate whether the conscious direction of nonhabitual behavior was associated with greater feelings of stress. Because mode of performance refers to the level of individual behavior listings and stress was rated at the level of diary entries, the analyses were similar to those outlined above for emotional intensity. Participant ratings of stress were predicted from a dichotomous variable that compared habit-only diary entries ($M = 1.51$ on the 5-point stress scale) with entries that included at least one nonhabit ($M = 1.59$). Lesser feelings of stress emerged with entries consisting only of habits, $B = -0.08$, $SE = .02$, $t(198) = -3.69$, $p < .001$. These findings suggest that the habitual mode of performance plays a role in the self-regulation of behavior in that habits are associated with lesser experience of helplessness and stress than nonhabits.

We then examined whether the reduced stress emerged with the performance of a single nonhabitual behavior or whether this feeling characterized multiple nonhabits. That is, these analyses tested whether lowered stress emerged with the cognitive processing requirements of consciously guiding a single behavior or whether it emerged with the additional processing demands of multitasking several consciously guided behaviors. A multilevel regression model predicting stress from the raw number of nonhabitual behaviors performed concurrently revealed that, as anticipated, the larger the number of nonhabitual behaviors, the more participants felt stressed, $B = 0.04$, $SE = .01$, $t(187) = 3.12$, $p < .01$. However, examination of the mean ratings revealed that, compared with performance of habits ($M = 1.51$), performance of any nonhabitual behaviors reduced stress (Ms $= 1.60$ and 1.58 for diary entries with one nonhabit and entries with two or more nonhabits, respectively). The comparison between single and multiple nonhabits was not significant ($t < 1$). Thus, the decrement in stress emerged with the cognitive processing required to engage in a single nonhabitual behavior and did not reflect the deleterious effects of multitasking nonhabits.

In summary, the analyses on self-regulatory emotions revealed an important advantage to the lesser emotional intensity associated with habits than nonhabits. That is, the habitual performance mode was associated not only with lower intensity emotions overall, but these effects were specifically reflected in lesser feelings of stress, overload, and lack of control and did not extend to experiences of fatigue and lack of interest. Furthermore, although we had anticipated that multitasking of several nonhabits might pose a particular threat to self-regulation and thus be associated with the greatest increase in stress, instead it appeared that the performance of any single nonhabitual behavior increased stress.

Explanations for Behavior and Self-Related Emotions

Study 1. To evaluate the extent to which participants' postdiary questionnaire ratings of pride and shame varied with the mode of performance, we aggregated data for these dichotomous variables to yield percentage estimates that were independent at the level of the individual (see comparable analysis on thought–behavior correspondence). A Pride (pride reported vs. not reported) $\times$ Mode of Performance (habit vs. nonhabit) repeated measures ANOVA yielded a significant main effect, $F(1, 62) = 133.98$, $MSE = .17$, $p < .001$, reflecting the overall low frequency of the experience of pride (20% of diary entries), and a significant interaction, $F(1, 62) = 5.87$, $MSE = .10$, $p < .05$. Simple effects tests revealed that pride was unlikely when performing habits (Ms $= 13\%$ and 84% for pride and neutral feelings, respectively), $t(61) = 11.64$, $p < .001$, but more likely with nonhabits (Ms $= 23\%$ and 74% for pride and neutral feelings, respectively), $t(61) = 7.17$, $p < .001$. Analyses on participants' feelings of shame revealed only a main effect indicating that participants rarely experienced this emotion (3% of diary entries), $F(1, 62) = 2{,}351.88$, $MSE = .02$, $p < .001$. The lesser pride participants

reported concerning habitual than nonhabitual behaviors suggests that habits are relatively unimportant aspects of participants' ideal self-concepts.

Study 2. The relationship between mode of behavior performance and self-related emotions as reported in the postdiary questionnaire was evaluated with multilevel regression equations. Mode of performance (habit vs. nonhabit) was represented as a dichotomous predictor at the behavior level, and emotion ratings were continuous variables obtained for each behavior reported. Overall, habits were not judged to contribute positively to the self-concept. Compared with nonhabits, performance of habits was more likely to lead to negative self-evaluations, $B = -0.14$, $SE = .03$, $t(195) = -4.31$, $p < .001$. Habits also were less likely than nonhabits to be considered important to attaining personal goals, $B = -0.72$, $SE = .06$, $t(190) = -12.86$, $p < .001$, and were judged less informative to others about the self, $B = -0.43$, $SE = .04$, $t(194) = -9.94$, $p < .001$. These findings echo the effects for pride in Study 1 in suggesting that frequently performed acts in stable contexts are not strong components of participants' favorable self-views.

To evaluate the relation between mode of performance and participants' causal attributions for each behavior as reported in the postdiary questionnaire, we conducted multilevel regression equations with performance mode (habit vs. nonhabit) as a dichotomous predictor at the behavior level. Overall, participants expressed less certainty about the causal factors responsible for habitual than nonhabitual behavior. That is, habits were judged (marginally) less likely than nonhabits to be performed for internal reasons, such as because the participant liked to do it, $B = -0.09$, $SE = .05$, $t(191) = -1.76$, $p < .10$. Habits also were judged less likely than nonhabits to be performed because of such external reasons as the influence of other individuals, $B = -0.73$, $SE = .05$, $t(193) = -14.61$, $p < .001$, and the influence of situational factors, $B = -0.42$, $SE = .05$, $t(194) = -8.26$, $p < .001$. The relatively low attribution ratings for habitual behavior are consistent with the notion that participants are not thinking about what they are doing during habit performance and thus are unaware of the factors responsible for their habits.

In summary, habitual behaviors proved to be, at best, unrelated to participants' self-concepts and, at worst, associated with negative aspects of the self. Participants' relatively unfavorable slant on habitual behaviors emerged in the low levels of pride they expressed concerning such acts, the association between such behaviors and negative self-evaluations, and the relative unimportance of these behaviors for attaining personal goals. One interpretation of participants' negative spin on habitual behavior is that it reflects the dissociation between the implicit intentions that guide habits and participants' explicit intentions and goals. Indeed, habits were judged to be relatively uninformative about the self and were given uniformly low attribution ratings, suggesting that participants were uncertain about the causes for such behaviors. As Ouellette and Wood (1998) speculated, the intentions that initially directed habits can become implicit as behavior becomes more automatic, and performance of such acts often continues even when they conflict with conscious desires. The dissociation between habitual behavior and explicit cognitive judgments is illustrated in Trafimow's (2000) finding that intentions for habitual behavior tend not to be well-integrated with other aspects of conscious reasoning (e.g., attitudes, subjective norms). Presumably, these judgments about habitual behavior lack coherence because people do not rely on them to guide behavior and thus rarely think about them. The possibility that behavior can be determined by implicit as well as explicit intentions has parallels to Wilson, Lindsey, and Schooler's (2000) analysis of dual attitudes, in which people access and rely on implicit attitudes except when motivated and able to override these with their explicit judgments.

Habits and Complex Behaviors

To evaluate the generality of the present framework across behavioral domains, we conducted analyses to examine whether the correspondence between behavior and thought varied with behavioral complexity. Highly complex behaviors, such as studying and taking lecture notes, likely require more thoughtful guidance to tailor responses to novel feedback from the environment than less complex behaviors, such as cooking and exercising. For the analyses, we aggregated the ratings to yield percentage data that were independent at the level of the individual. These percentages were analyzed in a Mode of Performance (habit vs. nonhabit) × Correspondence (thoughts and behavior did vs. did not correspond) × Behavior Complexity (high vs. low) repeated measures ANOVA.

Study 1. The three-way interaction between mode of performance, correspondence, and complexity was not significant ($F < 2$), indicating that behavior complexity did not modify the relation between performance mode and thought–behavior correspondence. However, all two-way interactions and main effects were significant. The Mode of Performance × Correspondence interaction, $F(1, 63) = 47.10$, $MSE = .06$, $p < .001$, revealed the standard pattern obtained in the overall analysis. The Complexity × Correspondence interaction, $F(1, 63) = 53.61$, $MSE = .08$, $p < .001$, yielded a pattern consistent with our prediction that people are more likely to think about their behavior when performing complex actions. Specifically, for complex behaviors, participants' thoughts were more likely to correspond to their behavior ($M = 83\%$) than to not correspond ($M = 16\%$), $t(61) = 11.65$, $p < .001$, whereas for simpler behaviors, thoughts were more likely not to correspond ($M = 55\%$) than to correspond ($M = 44\%$), $t(62) = -1.68$, $p < .10$. The significant Mode of Performance × Complexity interaction, $F(1, 63) = 59.99$, $MSE = .06$, $p < .001$, revealed that habits were more likely to be low in complexity ($M = 79\%$) than high in complexity ($M = 21\%$), $t(62) = -8.57$, $p < .001$, whereas nonhabits did not demonstrate an effect (*M*s = 54% and 46% for high and low complexity, respectively, $t < 1.5$).

Study 2. The results of the analyses above were highly similar to those from Study 1. A nonsignificant three-way interaction ($F < 1$) emerged in conjunction with significant two-way interactions between mode of performance and correspondence, $F(1, 208) = 84.80$, $MSE = .03$, $p < .001$, complexity and correspondence, $F(1, 208) = 207.51$, $MSE = .03$, $p < .001$, and mode of performance and complexity, $F(1, 208) = 121.50$, $MSE = .03$, $p < .001$. Because the patterns of means comprising the interactions were essentially identical to the first study, they will not be presented in detail.

As we had anticipated, both studies revealed that the complexity of behavior affected the extent to which participants thought about their actions while performing them. Greater thought was devoted to complex behaviors (e.g., studying, conversing with others),

presumably because these required tailoring responses to ongoing input, than to less complex behaviors (e.g., exercising, cooking). Although we had suspected that behavioral complexity might interact with mode of performance to predict thought about behavior, such an effect did not emerge in either study. Instead, it seems that greater thought is required to perform less complex behaviors as well as more complex ones when the behaviors are performed infrequently or in unstable contexts than when performed frequently in stable ones. Thus, it appears that the effects of behavior complexity on behavior-relevant thought were relatively independent from mode of performance, and that the relations between mode of behavior performance and extent of behavior-relevant thought were robust across behavioral domains.

Implicit Theories of Habit: Study 2

As a secondary focus of this research, we examined participants' implicit theories about habitual behavior. After completing the diary measures, participants identified whether they considered each behavior they listed to be a habit. The analysis examined the extent to which the participants' categorizations of their own behaviors as habits could be accounted for by other features of the behavior (e.g., frequency of performance). Specifically, we used hierarchical linear modeling to evaluate the extent to which variability in habit judgments could be predicted by these other attributes of behavior. This analysis was conducted using the statistical package HLM Version 5 (Raudenbush, Bryk, Cheong, & Congdon, 2001), which includes an option for modeling categorical outcome measures.

The analysis revealed that participants were more likely to label behaviors as habits to the extent that the behaviors had been performed frequently in the past, $t(204) = 19.82$, $p < .001$, had been performed in stable contexts, $t(204) = 3.71$, $p < .001$, did not require much thought to perform, $t(204) = 14.33$, $p < .001$, were low in complexity, $t(204) = -2.23$, $p < .001$, and were explained in terms of external causes rather than internal ones, $t(204) = 6.46$, $p < .001$. In this model, the following proved not to be significant when entered simultaneously with the above predictors: changes in the intensity of emotional experience, whether thoughts corresponded to behavior, the presence of other people, ratings of attention required by a behavior, and the difficulty in performing the behavior. It appears, then, that our participants' definitions of habits relied on our frequency and stability criteria, but in addition took into account the complexity of the behavior, the thought required for performance, and the perceived causes of the act.

Given our reliance on self-reports, readers may wonder whether participants' theories about habitual behavior affected their responses in the diaries. To minimize this possibility, we did not inform participants until the debriefing that the study concerned habits. Also, participants rated whether behaviors were habitual only at the end of the study, after they had completed all diary measures. Thus, we envision that diary responses were generated through a relatively simple process in which participants were actively engaged in their everyday activities and they reported on their immediate experiences when cued by the watch.

General Discussion

Our findings demonstrate the differing thought processes and emotional experiences associated with habitual and nonhabitual performance of behavior. Participants were less likely to think about their behavior when performing habits, defined as repeated acts in stable contexts, than when performing nonhabits, defined as relatively novel acts and acts in variable contexts. Specifically, participants' thoughts wandered from their behavior during habit performance about 50%–60% of the time. We assume that thought about behavior-irrelevant factors is an indicator of the limited, sporadic conscious processing required by habit performance. Of course, behavior-relevant thought is only one indicator of automatic behavior, and we did not evaluate other indicators such as the ability to multitask with minimal performance interference or the ability to perform tasks efficiently. However, we see no reason to assume that these other indicators of automaticity would have yielded highly divergent findings from the ones we report.

In addition, we were able to estimate the percentage of all of participants' actions that were performed with seemingly minimal conscious guidance. Our participants performed almost 50% of their behaviors without thinking about them. This estimate is considerably lower than prior speculations, which placed the percentage of behaviors in daily life that are performed in a nondeliberative, relatively thoughtless manner at around 95% (see Bargh & Chartrand, 1999). It could be argued that our estimate is a lower bound to the incidence of nonthoughtful behavior, given that our sample was comprised of college students who may spend greater portions of their day in thought, study, and novel activities than other individuals. However, even the present estimate renders a picture of people as relatively detached from their ongoing activity—at least half of the time.

Thought about behavior was varied and addressed specific instrumental intentions about how to do something (e.g., "what lipstick color am I going to wear?"), subjective reactions to the performance (e.g., "how boring and pointless what we are doing is"), outcomes of the behavior (e.g., "we better win"), aspects of the context that might facilitate or hinder performance (e.g., "I was thinking that I need to write faster to keep up with the notes"), self-related thoughts (e.g., "that I am mathematically inept"), and simple descriptions ("driving"). Our estimate of behavior-relevant thought thus included specific, lower level concrete details as well as higher level, more abstract goals (Vallacher & Wegner, 1987). We coded all of these types of thoughts as corresponding to behavior because we assumed that they all can contribute to conscious guidance of action.

Although we have emphasized the occasions on which participants did not think about their behavior, the finding that participants thought about habits about 40% of the time suggests that the habitual mode of behavior regulation is best characterized by minimal or sporadic cognitive monitoring and not by the complete absence of thought. Yet, it is also likely that the present study provides a somewhat inflated estimate of the thoughtful processing guiding behavior. One reason is that the measure of thought was sufficiently global that it may not have captured automaticity when it emerged in only the initiation, execution, or termination of a response. Participants may have indicated thinking about their behavior when any of these aspects of performance required deliberation. In addition, it is worth noting that thoughts were assessed immediately following actions in the diaries. Thus, consistency and saliency pressures may have encouraged participants to focus on their actions when reporting their thoughts. Finally, in natural settings a number of factors in addition to the mode of

processing guiding behavior are likely to increase thought–behavior correspondence. As we explained in Footnote 6, the presence of others increased correspondence, presumably as a result of increased self-consciousness. Thus, it may be that the present study overestimates the extent to which thought was involved in guiding behavior, especially habitual behavior.

Multiple Processes Guiding Behavior

The present results contribute to the developing evidence that action emerges from multiple systems that guide behavior. As we noted in the introduction to this article, predictive models of behavior, neuropsychological evidence of brain activation, and cognitive analyses of memory performance all converge in suggesting that behavior can be guided by habitual processes in the case of well-learned behaviors or by more explicit processes in the case of novel behaviors or ones performed in difficult, shifting contexts.

The present results illuminate several aspects of this multiple system model. First, they are relevant to the question of how to measure habits. The differing content of thoughts during performance of well-practiced behavior in stable contexts versus less practiced behavior or behavior in unstable contexts provides some validation for the traditional definition of habits in terms of behavior frequency (e.g., Triandis, 1977). Although in some accounts the predictive effects of frequent past behavior emerge in part because past behavior reflects intentions, perceived control, and other factors (Ajzen, 2002), our findings suggest that people are not necessarily thinking about intentions or these other predictors of behavior during habit performance. Thus, the limited thought about habitual behavior is consistent with the idea that frequently performed acts in stable contexts are habitual in the sense that they are guided by relatively automatic processes that involve minimal thought.

In addition, the limited thought associated with habit provides insight into the psychological mechanisms through which habitual tendencies guide behavior. Specifically, our findings imply a minor role for conscious intentions. Our findings cast doubt on the idea that habitual behavior is guided by conscious intentions that are automatically activated when behavior-relevant goals are salient (Aarts & Dijksterhuis, 2000; Ajzen, 2002). Although people may be able to report on their intentions when directly requested in experimental contexts, in daily life habitual behavior is apparently guided by implicit processes that operate outside of conscious awareness. These implicit processes may include intentions that are incorporated into broad sequences of action that are cued by stable environmental conditions. Such intentions are not easily accessed by standard self-report procedures but instead are expressed in behavior. Given that the focus of the present study was not on behavior prediction, we did not measure intention or other components of planned behavior. Yet, the limited evidence for thought about habitual behavior suggests that these components as assessed explicitly in the standard behavior prediction study may not provide much insight into the factors guiding habits in everyday contexts.

Our findings also provided reassuring evidence of the generality of a dual-mode model of guiding behavior. That is, the distinction between explicit and habitual guides to behavior held across behavioral domains. Even complex acts that required online monitoring for effective performance (e.g., studying, conversing with others) were performed with less behavior-relevant thought, and presumably greater automaticity, given frequent practice in stable contexts. Thus, the habitual performance mode is not only relevant to simple actions such as typing, driving, and cooking, but is also useful for understanding the guidance of complex behaviors that are tailored to ongoing input. It may be that, with practice, people form expectations about the general form and content of this input and develop standard patterns of response that reduce the amount of thought required for actions. This is perhaps illustrated in the stereotypic interaction between long-married couples at breakfast, in which a conversation can be maintained despite the inattention of one partner who has learned to respond appropriately to pauses while reading the newspaper or being otherwise engaged.

Habitual Behavior and Emotional Response

The mode of behavior performance proved to have implications for emotional experiences. Overall, habitual behavior was associated with lesser intensity emotions than nonhabits. Also, participants were especially likely to identify their thoughts rather than their behavior as the source of emotions when engaged in habits. This general pattern in which habit-related emotions are low in intensity and elicited by thoughts could have implications for broader lifestyle patterns. We speculate that people whose lives are characterized by large proportions of habitual behavior can find that their emotional experiences become dull and subdued over time. Much like Thurber's (1942) character, Walter Mitty, they may find that their own ruminations and fantasies are the primary source of their emotions rather than their immediate behavioral experiences.

It is also worth noting that the mode of behavior performance did not affect all emotions in the same manner. Although we had anticipated that habituation would increase ratings of fatigue and boredom, these experiences did not vary with behavior mode. Yet, self-related emotions did vary with the mode of behavior performance. Specifically, participants experienced lesser pride and worse feelings about the self associated with habitual than nonhabitual behavior. This effect seems to be part of a broader pattern in which habits were not judged to be especially self-relevant. Habits were considered relatively uninformative about the self, relatively unimportant to attaining personal goals, and the causal mechanisms responsible for them were not readily apparent to participants. These effects may reflect the overall tendency for habitual behaviors to be viewed as imposed and not freely chosen (see Wegner & Wenzlaff, 1996). In daily life, the disconnection between habitual behavior and the self has a number of implications. For example, if people do not see themselves as especially responsible for their habits, they may not believe that they have sufficient efficacy to change such acts. Also, goals achieved through routinized activity may not be a strong source of pride. Thus, healthy lifestyle decisions that become routinized as part of one's daily behavior may not yield a sense of personal accomplishment because the behavior does not appear to be volitional.

Another noteworthy aspect of the emotion findings is the lesser stress, burnout, and feeling of being out of control that participants experienced when engaged in habitual than nonhabitual behaviors. Their feelings of stress increased with the deliberation involved in a single nonhabitual behavior, but did not increase further when

participants were performing multiple nonhabits simultaneously. This finding echoes Baumeister et al.'s (1998) laboratory research indicating that the act of decision making about a single behavior can deplete self-control mechanisms and impair subsequent acts of self-regulation such as decision making and performance. From this perspective, the stress-reducing benefits of the muted emotional experiences associated with habit performance emerged because habits do not drain self-control resources to the same extent as nonhabits. In general, the lesser stress associated with habits than nonhabits provides an initial framework to develop a social psychological perspective on the role of habit in the everyday self-regulation of behavior.

Diary Data Collection Methods in Social Cognition

We used a signal-contingent diary method to provide a new perspective on the much researched question of the processes and consequences associated with habitual versus explicit guides to behavior (and related distinctions between conscious vs. nonconscious, automatic vs. controlled processes). Although diary methods do not appear to have been mined extensively by researchers in attitudes and social cognition (see Rozin's, 2001, analysis of the articles appearing in the Attitudes and Social Cognition section of the *Journal of Personality and Social Psychology*), they have been used effectively to track the naturally occurring prevalence of a variety of social and personality phenomena and their fluctuations with natural events (see Reis & Gable, 2000; Stone, Shiffman, & DeVries, 1999). These data collection techniques also have been used in ecological studies of memory in everyday life (Neisser & Libby, 2000). Contemporaneous reports are especially useful to study habitual behavior because they can minimize the biases associated with retrospection that emerge when people have not attended to the behavior of interest (Reis & Gable, 2000; Stone, Shiffman, & DeVries, 1999).

Our diary studies of everyday experience are inherently correlational and need to be combined with other methodologies to illuminate the causal ordering between thought, emotion, and behavior. We have argued that thought content and emotional intensity are products of the mode through which behavior is performed. This sequence of events is consistent with experimental research in cognitive and social psychology demonstrating the various consequences of automatically versus consciously guided action (e.g., Bargh & Ferguson, 2000; Frijda, 1988; Jacoby et al., 1997; Baumeister et al., 2000). However, the relations that emerged in our research between thoughts, emotions, and behaviors also might suggest that the mode of initiating and guiding behavior depends on emotions or on thoughts. Experimental investigation would be needed to evaluate the plausibility of these alternate scenarios.

Conclusion

Overall, our findings provided a highly textured picture of the consequences associated with the mode of behavior performance. Habits appear to be associated with a variety of benefits as well as costs. Probably the most striking benefit is the one that is best-known—the cognitive economy and performance efficiency of habits. This emerged in the lesser awareness of habitual than nonhabitual behavior. Habits potentially free people to engage in other kinds of important thoughtful activities such as rumination of past events and planning for future activities. Another important advantage of habits is their association with reduced stress and greater feelings of control. In daily life, habit performance is not likely to deplete self-regulatory resources in the same way as deliberative behavior and this may allow people to conserve regulatory strength for important decisions.

Yet, these potential benefits of habitual acts co-occur with clear disadvantages of automating behavior. Other research has already begun to suggest some of the disadvantages of automaticity. For example, when judgments become automatic, people may react on the basis of past experience and be less responsive to small changes in the relevant stimuli (e.g., Fazio, Ledbetter, & Towles-Schwen, 2000). Repetition of behavior may continue even when the behavior is no longer the most appropriate, effective response. A vivid example of this possibility was provided by Ferguson and Bibby's (2002) habitual blood donors, who were apparently undeterred in their future willingness to donate when other donors fainted in their presence. In contrast, occasional donors contributed less in the future when fellow donors suffered in this manner. In the present study, another potential disadvantage of habits emerged in the subdued emotions and lesser pride people experienced when performing behaviors habitually. Habit performance seems to have an insulating quality that reduces the immediacy of emotional experience. Other disadvantages are apparent in the findings that people viewed habits to be relatively uninformative about the self, unimportant in attaining personal goals, and associated with relatively negative self-evaluations. It may be that, when people do not think about their behavior, their acts reflect implicit intentions that do not necessarily represent their current goals and plans. In general, these varying benefits and costs of automating behavior highlight the importance of strategically using habits in daily life to accomplish tasks efficiently with minimal stress and yet still maintain a sense of personal involvement and emotional engagement in ongoing activities.

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