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# The generalization of deliberative and automatic behavior: The role of procedural knowledge and affective reactions ☆

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ABSTRACT

Individuals' goal-directed activity in one situation can affect their behavior in a later, ostensibly unrelated situation. This effect can depend on whether the latter behavior is also goal-directed or is performed automatically. Three studies showed that participants' rate of speaking in the course of performing a speech shadowing task has a positive influence on the speed with which they later complete an ostensibly unrelated marketing survey. Furthermore, when participants' attention is called to the goal of working rapidly on the survey, the effect of their past behavior depends on their perception of the goal's desirability. When the time to complete the survey is not mentioned, however, participants' speed of working on the survey is influenced by their speed of speaking in the earlier situation without their awareness and it does not depend on the desirability of the goal with which their behavior is associated. An additional experiment showed that the relative impact of goal-directed and automatic processes also depends on the cognitive resources that people have available to construe the evaluative implications of their decisions.



Conscious goal-directed activity typically requires a series of decisions to perform behavior that facilitates the attainment of the goal at hand. This behavior, in turn, comprises more specific cognitive and motor actions. Completing a survey, for example, may include reading the questions, retrieving judgment-relevant knowledge from memory, and circling the answers. When these actions are relevant to the objective being pursued, people may consciously decide on how to perform them. When they are incidental to individuals' primary objective, however, the actions could occur automatically and without awareness of how they are performed. If the time to complete a survey is limited, for example, people with a goal of finishing it might intentionally decide to work quickly. When speed is irrelevant to their goal, however, they may complete it without being conscious of how fast they are working. Similarly, speaking loudly or softly could sometimes result from a conscious decision to attain a goal that requires it (e.g., to override someone's attempt to interrupt or to avoid waking up the baby). At other times, the action might occur without any goal in mind to which it is relevant.

As these examples suggest, goal-directed behavior is usually a mix of both deliberative and automatic processing. Moreover, the specific actions that compose this behavior (e.g., speaking loudly) can be a result of either type of processing, depending on their relevance to the goal that is consciously being pursued. We examined implications of this possibility. Like many other conceptualizations (Chaiken & Trope, 1999; Strack & Deutsch, 2004; Wyer & Srull, 1989), we assumed that deliberative and automatic processes are governed by two different cognitive systems. However, we attempted to specify more precisely the manner in which the two systems interact in guiding people's actions.

Our own account of the deliberative-automatic interface is similar to that suggested by Wyer, Xu, and Shen (2012; see also Wyer, Shen & Xu, in press). According to our conceptualization, the deliberative processing system makes use of procedures that are stored in memory as part of declarative knowledge (Kruglanski et al., 2002). These procedures, or *plans*, are composed of semantic concepts of the actions required to attain the goal to which they pertain and are consciously used as bases for deciding whether to take the actions prescribed and, in some cases, how to perform them. In contrast, the automatic processing system is composed of "*productions*" similar to those conceptualized by Anderson (1982, 1983). That is, it contains learned sequences of behaviors, each of which is associated with a different configuration of cognitive and perceptual features and is elicited automatically when this configuration of features is encountered. The automatic system governs the specific actions that result from decisions identified by the deliberative system. These actions may be performed without cognitive deliberation and often without awareness. A given motor behavior could therefore be a consequence of either type of processing.

A particularly important implication of our conceptualization surrounds the impact of a goal's desirability on the likelihood of

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performing behavior to which the goal is relevant. If individuals' behavior in a situation is associated with a desirable or undesirable goal and if a similar goal to which the behavior is relevant is called to their attention in a later situation, their performance of the behavior is likely to depend on the goal's desirability. If the goal-relevance of the behavior in a later situation is not salient, however, we assumed that individuals' performance of the behavior might occur without awareness and might not be affected by the desirability of the goal with which the behavior is associated.

In addition to confirming this possibility, we identified a contingency in its occurrence. As Strack and Deutsch (2004) noted, automatic processing can occur spontaneously when no goal is consciously being pursued. However, it can also occur when individuals have a goal in mind but are prevented from engaging in the cognitive deliberation that is required to attain it. Consistent with this possibility, we found that when participants are able to think about their actions, their behavior depends on the desirability of its implications. When participants are under cognitive load, however, their behavior is guided by a production that they applied independently of its evaluative implications.

## Theoretical Background

To reiterate, a particular motor action can be performed intentionally when it is useful in attaining a higher-order goal. However, it might occur without awareness when it is irrelevant to any goal in mind. To account for this difference, we postulate two separate mental representations, each of which is governed by a different processing system. In this respect, our conceptualization differs from recent formulations that assume a single mental representation in which behavior, goals, and the concepts associated with them are all contained (e.g., Barsalou, 2008).

We further distinguish between *goal concepts* and *behavior concepts*. Although these concepts can have the same verbal label (e.g., "doing things quickly"), they have different roles in cognitive functioning. For example, the goal concept of "doing things quickly" refers to an activity that individuals are more or less motivated to perform, either as an end in itself or in order to attain a higher order goal to which the activity is relevant. However, the behavior concept of "doing things quickly," considered in isolation, is purely descriptive and does not have motivational implications. (For example, people might use the concept to describe another's actions or to interpret a behavior that they see or read about without considering any objective to which the behavior might be relevant.) The goal of performing a behavior typically activates a concept of the behavior. However, a consideration of the behavior in isolation does not always activate a concept of the goal of performing it. This distinction becomes important in conceptualizing the interface between deliberative goal-directed processing and automatic, production-based processing. Before describing this interface, each type of processing will be considered in more detail.

### *Deliberative Goal-Directed Processing*

#### *General considerations*

The deliberate pursuit of a goal is presumably guided by a cognitive procedure, or *plan*, that exists in memory as part of declarative knowledge and is retrieved for use as a guide in deciding how to attain the objective to which it pertains (Kruglanski, 1996; Kruglanski et al., 2002; Markman & Brendl, 2000; see also Schank & Abelson, 1977; Wyer, 2004; Wyer, Adaval, & Colcombe, 2002). Such a plan consists of a goal concept along with a temporally related sequence of subgoal concepts that denote the cognitive or motor actions that can lead to its attainment (Thus, the plan for "making tea" may include subgoal concepts pertaining to "boiling some water," "getting a teabag," etc.). A procedure and the subgoal concepts that compose it can exist at different levels of abstractness, and several specific goal concepts might exemplify the same more general one. (For example, "deciding which of two animals is larger" and "deciding which of two products to purchase" both exemplify the more general concept of "making a comparative judgment".).

These assumptions, along with auxiliary assumptions concerning the determinants of knowledge accessibility (see Förster & Liberman, 2007; Wyer, 2008), can account for the effects of behavioral mind-sets (Wyer & Xu, 2010; Wyer et al., 2012). Thus, for example, comparing the physical attributes of animals can activate a more general goal concept of making comparative judgments. The increased accessibility of this general concept (and thus of more specific concepts associated with it) can lead a different exemplar of the concept (deciding which product to purchase) to be activated and applied in a later situation, increasing the likelihood of making a purchase in the situation without considering the possibility of buying nothing at all (Xu & Wyer, 2007, 2008). Alternatively, responding differently to each of several questions about animals can activate a more general goal concept of "making different responses." Consequently, it can increase the variety of products that individuals choose in a later, multiple-product decision situation (Shen & Wyer, 2010).

#### *The impact of desirability*

Goals and subgoals vary in their desirability and, therefore, in the effort that is devoted to their attainment. Moreover, factors that influence the desirability of one goal can affect the desirability of other goals that are directly or indirectly associated with it and, therefore, the motivation to attain these objectives. This influence can occur without conscious awareness. In a study by Custers and Aarts (2007); Aarts, Custers, & Holland, 2007), for example, participants were exposed to either positively-valenced or negatively-valenced words while goal-relevant concepts were primed subliminally. The valence of the words became associated with these concepts and the goal to which they pertained. As a result, it influenced the effort that participants expended in a goal-related task that they were asked to perform later. Although participants were presumably conscious of the goal they pursued in the later situation and the effort they expended in pursuing it, they were unaware of the factors that led them to consider the goal to be more or less desirable.

In Custer and Aarts's study, goal-relevant concepts were directly primed. However, if performing a goal-relevant behavior activates the concept it exemplifies, it could have similar effects. In the studies we report in this article, participants spoke either quickly or slowly in the course of shadowing a speech. After doing so, they completed a marketing questionnaire. Suppose positive or negative affect has become associated with the goal being pursued during the shadowing task (e.g., speaking quickly). This affect may generalize to a general goal concept that it exemplifies (e.g., "doing things quickly"), leading this goal to be perceived as more or less desirable. This perception, in turn, may influence judgments of the desirability of other goals that exemplify the concept (e.g., completing a questionnaire quickly) and may influence the effort expended in pursuit of these goals in a later situation. At the same time, a concept of the *behavior* of doing things quickly is also likely to be activated in the course of performing the initial shadowing task. If this concept remains accessible in memory, the motor actions that are associated with it might be applied in a later situation without awareness and independently of any goal to which the behavior is relevant. This latter influence, however, may be governed by a different process.

### *The Role of Productions*

#### *General considerations*

To reiterate, people may often be aware of the general goal-directed behavior they are performing (e.g. cleaning a bathroom, cooking food, or completing a survey) but may be unconscious of the motor actions that compose the behavior (Morsella & Bargh, 2011). The mechanism that governs these actions is suggested by

Anderson (1983); see also Smith, 1990, 1994). According to this formulation, well-learned cognitive and motor procedures are represented in memory as "[X]→[Y]" (i.e., "if [X], then [Y]") *productions*, where [X] is a configuration of perceptual or cognitive features and [Y] is a sequence of cognitive or motor acts that are performed automatically when the production specified by [X] is experienced.

Productions are acquired through learning. A person who has little experience driving a car might intentionally recall and consult a procedure (i.e., a plan) for backing out of the driveway. In this case, both the objective and the steps required to attain it are conscious and deliberate. With practice, however, a production is formed (Schneider & Shiffrin, 1977). Once this occurs, activating the concept "backing out" (a component of [X]) might automatically elicit the sequence of motor actions that are associated with it ([Y]), and these actions might be performed with little if any conscious monitoring (Heckhausen & Beckmann, 1990; Wood & Neal, 2007).

We assume that the precondition of a production is responded to configurally, without articulating its individual features (Wyer et al., 2012, in press). Thus, it can elicit behavior without awareness of all of the specific features that compose it. In the aforementioned study by Bargh, Chen, and Burrows (1996), for example, individuals who had been unobtrusively primed with concepts associated with the elderly walked more slowly to the elevator upon completion of the experiment. The concepts associated with the elderly (some of which are presumably related to doing things slowly) may have combined with features of the immediate situation (e.g., walking, the elevator, etc.) to form the precondition of a production of the form [do things slowly, walking]→[walk slowly]) that elicited slow walking behavior without awareness of how the behavior was performed.

The concepts that elicit a production can also be activated by past behavior. Shen and Wyer (2008) showed that rank ordering stimuli either from high to low or from low to high affected the attention that participants paid to high-valued or low-valued items in an array they encountered later and consequently influenced their estimate of the average value of these items. Mussweiler, Ruter, and Epstude (2004) demonstrated that when people were asked to compare their athletic ability to an extreme (versus moderate) standard, thus leading them to focus on dissimilarities between themselves and the standard, they judged two pictures to be more dissimilar in an unrelated task they performed subsequently.

### *The deliberative-automatic interface*

The aforementioned situations provide examples of the interface between deliberate decisions to pursue a goal and automatic, production-based processes that are involved in its attainment. People may be conscious of their decision to behave in a way that will attain a goal they are pursuing (e.g., to leave an experiment, to average a set of stimulus values, to compare pictures, etc.). However, concepts associated with the decision to perform the behavior may activate a production that elicits specific actions of which they are unaware (walking slowly, considering high values before low ones, focusing on dissimilarities, etc.). Moreover, the precondition of this production (a sample of concepts that are accessible in working memory at the time) may sometimes contain goal-irrelevant features. When this occurs, individuals may engage in actions that are irrelevant to the goal they are consciously pursuing but are relevant to other goals instead.

Research on unconscious goal seeking is worth considering from this perspective. In one of the first studies in this area (Chartrand & Bargh, 1996), for example, participants were unobtrusively primed with concepts associated with either person impression formation or memory. Then, they read a series of behaviors with instructions simply to comprehend them. Later, they were asked to recall the behaviors they had read. The number and organization of the behaviors they recalled suggested that they had thought about the behaviors in ways that were similar to those of individuals who were consciously motivated either to remember the behaviors or to form an impression of a person who had performed them. Participants obviously had some goal in mind when they processed the behaviors (i.e., to comprehend them). However, the concepts activated by the priming task, along with features of the task situation (e.g., the behaviors) composed the precondition of a production that was activated and applied automatically, without consciousness of its relevance to the goal that was activated by the priming task. More recent studies of unconscious goal-directed activity (for a review, see Dijksterhuis, Chartrand, & Aarts, 2007) can be interpreted similarly, as noted later in this article.

In some instances, goal-irrelevant features can activate a production whose behavior is incompatible with the goal that is consciously being pursued. As an example, suppose a person has formed two different productions as a result of repeatedly driving both to the supermarket and to the office:

[Wal-Mart; "Prospect St." road sign]→ [turn right]
[office; "Prospect St." road sign]→ [turn left]

Suppose further that the driver is on his way to Wal-Mart but happens to be thinking about a meeting he attended earlier in the week at the time he gets to Prospect Street. Concepts associated with this meeting, along with the road sign, might activate the second production rather than the first. Consequently, the individual might unexpectedly find himself in front of the Psychology Building rather than the department store.

### *The role of desirability*

When a goal to which a particular behavior is salient, individuals might consciously evaluate the desirability of the goal in deciding how much effort they should devote to its attainment. In this case, situational factors that lead a goal to be perceived as more or less desirable can influence the effort that the individuals expend. Furthermore, this can occur without awareness of the factors that give rise to these perceptions (Custers & Aarts, 2005).

At the same time, a concept of the *behavior* that is performed in pursuit of the goal may be contained in the precondition of a production and this precondition, which has become associated with the behavior through learning, may not contain desirability-related features. (This is particularly true if the actions have not systematically been associated with desirable or undesirable situations in the past.) This means that when a goal to which the behavior is relevant is not salient, the precondition of the production might elicit the behavior independently of the desirability of the goal to which it is relevant.

Implications of these analyses were examined in the research to be reported. Suppose participants have deliberately spoken rapidly in the course of performing a speech-shadowing task. This activity presumably activates a goal concept associated with doing things quickly. It may also activate a more general behavior concept of doing things quickly. Consequently, this latter concept, along with a subset of the features of a situation that participants encounter subsequently could activate a production that elicits the behavior of working quickly in the absence of any goal that requires it. These considerations imply that if, in a later situation, the concept of a goal to which the behavior is related (i.e., the goal of completing a questionnaire quickly) is called to individuals' attention, situational factors that influence the desirability of the *goal* of doing things quickly might influence the effort that individuals devote to the attainment of this goal. When this goal is not salient, however, its desirability should not influence the nature of the production that governs the behavior and should not have an impact on this behavior.

### *Overview*

Four experiments examined implications of the conceptualization we propose. The first three studies showed that when individuals

engage in conscious goal-directed activity to which their past behavior is relevant, the influence of this behavior on the activity depends on their perceptions of the desirability of the goal to which their past behavior was directed. When participants are unaware of the goal-relevance of their past behavior, however, a production that is activated by this behavior influences their later behavior independently of these perceptions.

A fourth experiment showed that the conscious decision to perform a behavior in pursuit of a goal to which it is relevant was based on the favorableness of the goal to which the behavior was relevant. However, when participants were unable to think carefully about the decision and its goal-relevant consequences, their decision was governed by a production that was activated by their past behavior and applied automatically, independently of its implications for the objective to which their decision pertained.

## Experiment 1

Experiment 1 provided preliminary evidence that deliberately performing a goal-directed behavior in one situation can influence the likelihood of performing a similar behavior automatically, without awareness, in a later situation. Participants shadowed a speech that was delivered at either a fast or a slow speed. After doing so, they completed an unrelated marketing survey. We assumed that speaking quickly or slowly would activate a more general concept of doing things quickly or slowly that would remain accessible in memory at the time participants responded to the survey. We further assumed that this concept, along with more specific features of the task to be performed, would compose the precondition of a production that governed the speed with which they completed the survey. Finally, we expected the production to be applied with little cognitive deliberation and without conscious awareness of the conditions that led it to be activated.

### *Method*

Forty Hong Kong university students were randomly assigned to one of two priming conditions. They were introduced to the priming task with instructions that it concerned the development of a method for improving spoken English. Specifically, they received a questionnaire with the following instructions:

> "The language center at our university would like to test the efficiency of a teaching method that can help students improve their English pronunciation. In particular, we are interested in whether shadowing is a useful way to improve speaking and pronunciation. In this study, you will listen to an audio script. The text of the script is provided in the next page. As you listen to the tape, please read along with the speaker. It is very important that you read the text in exactly the same way the speaker does."

On this pretense, participants read a written transcript of the speech while listening to it, thus shadowing the voice of the speaker. The speech was concerned with children's education problem. It was 373 words long. However, it was delivered at either 3 words per second in *fast-speech* conditions or 1.8 words per second in *slow-speech* conditions. Thus, participants were induced to speak quickly in one condition but slowly in the other. To maintain the illusion that the purpose of the task was to assess its usefulness as a teaching device, participants after hearing the speech were asked to write down a brief summary of it.

Participants were then asked to provide pretest data for a marketing survey to be used in an unrelated experiment. To this end, they were given a list of 40 stimuli including different products, brands or activities (e.g. Iphone, table tennis, IBM), and were asked to evaluate each stimulus along a scale from −5 (dislike) to +5 (like). Thirty seconds after beginning this task, however, all participants were told to stop working because of the limited time remaining in the experimental session, and were given another short questionnaire in which they were asked to estimate both (a) the rate at which the speech they had heard had been delivered and (b) the speed with which they had worked on the survey. Both questions were answered along a scale from −3 (very slow) to +3 (very fast). All participants were then thanked and dismissed.

### *Results*

Participants were quite aware of the rate at which they spoke when performing the shadowing task; they indicated the speech was delivered at a faster speed in fast speech conditions ($M = 1.05$, $SD = 1.27$) than in slow speech conditions ($M = -2.14$, $SD = 0.73$), $F\ (1,\ 38) = 97.94$, $p < .001$, $\eta 2 = .72$. In contrast, they were apparently *not* aware of the speed with which they completed the marketing survey. Participants' estimates of this rate did not differ (0.89 vs. 0.95, in fast vs. slow speech conditions, respectively, $F < 1$). An interaction of task type (speech vs. survey) and speech rate was significant ($F\ (1,\ 38) = 29.42$, $p < .001$, $\eta 2 = .44$).

Although participants reported no difference in the speed with which they worked on the marketing survey, however, they completed more survey items in fast-speech conditions ($M = 8.84$, $SD = 3.70$) than in slow-speech conditions ($M = 6.24$, $SD = 3.40$), $F\ (1,\ 38) = 5.37$, $p < .05$, $\eta 2 = .12$. Thus, although some caution should be taken in interpreting self-reports of awareness, these results are consistent with our hypothesis that the speed with which participants completed the survey was influenced without their awareness.

## Experiment 2

Experiment 1 showed that the performance of a behavior in one situation can influence the likelihood of performing a conceptually similar behavior in a later, quite different situation. However, it did not distinguish between the factors that influence deliberative goal-directed behavior and those that influence behavior that is governed by a production. Experiment 2 accomplished this. In doing so, it confirmed our hypothesis that the desirability that has become associated with a goal-directed behavior in a past situation can influence people's behavior in a later situation when the behavior's relevance to their objectives is called to their attention, but that when its goal-relevance is not salient, their past behavior influences their later behavior independently of its desirability.

Participants were again asked to shadow a speech that was delivered at either a fast or slow speed. After doing so, however, they wrote down either positive or negative thoughts they had about shadowing a speech at the speed they had been required to use. Then, they completed the marketing survey employed in Experiment 1. Before beginning the survey, however, some participants were told that they might not be able to finish all the questions within the time allotted. In other conditions, the time available for completing the questionnaire was not mentioned.

We assumed that the favorableness of the thoughts that participants listed would affect their perception of the desirability of either speaking rapidly or speaking slowly and that the concept activated by this perception would generalize to the concept of doing things quickly or slowly in general (For evidence that motivation can generalize over stimulus domains, see Wadhwa, Shiv, & Nowlis, 2008). Therefore, we expected that calling participants' attention to the time available to complete the survey would reactivate this general goal concept and that the effort participants directed to the goal implied by this concept would depend on their perception of its desirability. When the time available to complete the survey was not mentioned and so the goal of working quickly or slowly was not salient, we expected that participants' behavior would be governed by

a production whose precondition was unlikely to contain desirability-relevant features. We therefore expected the activation of this production to influence the speed with which they completed the survey independently of the desirability of the goal with which the behavior was associated.

### Method

One hundred thirty-five Hong Kong university students were randomly assigned to conditions of a 2 (speech rate: fast vs. slow) x 2 (thought generation: positive vs. negative) x 2 (time salience: salient vs. not salient) between-subjects design.

The procedure was similar to that employed in experiment 1. Participants were asked to shadow a speech that was either conveyed at a fast or slow speed. After that, participants in *positive thought generation* priming conditions were asked to list positive features of shadowing a speech at this speed, whereas participants in *negative thought generation* priming conditions were asked to list negative features of doing so.

Participants were given the marketing survey to complete with instructions similar to those used in the first experiment. Before starting to work, however, participants in *time-salient* conditions were told that because of time restrictions, they would not be able to finish all questions and that they would have to stop working when the experimenter asked them to do so. However, participants in *time-not-salient* conditions were not given this information. Then, all participants began working on the survey but were stopped after 30 seconds. Finally, they estimated both the speed of the speech they had heard in the first task and the speed with which they worked on the questionnaire along scales from −3 (very slowly) to +3 (very fast).

## Results and Discussion

### Manipulation checks

Participants recalled that the speech was delivered more quickly in fast-speech conditions ($M = 1.92$, $SD = 0.82$) than in slow-speech conditions ($M = -2.28$, $SD = 0.70$), $F$ (1, 127) = 978.72, $p < .001$, $\eta 2 = .89$. The thoughts that participants wrote down about the speed of the speech were coded as 1 (positive), -1 (negative), or 0 (neutral). These thoughts were more favorable on average if participants had been asked to list positive thoughts ($M = 1.55$, $SD = 0.85$) than if they had been asked to list negative ones ($M = -1.94$, $SD = 0.65$), $F$ (1, 127) = 687.89, $p < .001$, $\eta 2 = .84$.

### Survey completion speed

The speed with which participants worked on the marketing survey was again inferred from the number of items they completed. These data are summarized in the top half of Table 1. Participants completed more items if the time available for completing the questionnaire had been mentioned ($M = 11.53$, $SD = 3.65$) than if it had not ($M = 7.68$, $SD = 3.27$), $F$ (1, 127) = 52.67, $p < .001$, $\eta 2 = .26$, confirming our assumption that the manipulation of time salience was effective. They also worked faster if they had spoken rapidly during the shadowing task than if they had spoken slowly ($M = 10.42$, $SD = 4.29$ vs. $M = 8.79$, $SD = 3.47$, under fast vs. slow speech conditions, respectively), $F$ (1, 127) = 13.89, $p < .001$, $\eta 2 = .07$. However, these effects were qualified by a marginally significant three-way interaction of time salience, thought generation and speech rate, $F$ (1, 127) = 3.41, $p = .07$, $\eta 2 = .02$. The nature of this interaction, shown in the top half of Table 1, is consistent with our expectations.

Specifically, when the time available to do the survey was called to their attention, participants' rate of speaking during the shadowing task had a significant effect on the speed with which they worked on the survey. When they had listed favorable thoughts about the shadowing task, they completed more survey items when they had spoken rapidly than when they had spoken slowly (14.14 vs. 9.60, respectively), $F$ (1, 127) = 15.75, $p < .001$, $\eta 2 = .34$. When they had listed negative thoughts about the shadowing task, however, this difference was not apparent (12.08 vs. 11.26, respectively), $F < 1$. The interaction of thought generation and the speech rate was significant under time-salient conditions alone, $F$ (1, 127) = 5.14, $p < .05$, $\eta 2 = .07$.

In contrast, when the time to complete the questionnaire was not mentioned, the goal of working quickly was not called to participants' attention. In this case, participants worked faster on the survey in fast-speech conditions than in slow-speech conditions ($M = 8.43$, $SD = 3.20$ vs. $M = 6.81$, $SD = 3.18$, respectively; $F$ (1, 127) = 3.98, $p < .05$, $\eta 2 = .06$), and this difference did not depend on whether participants had listed positive or negative thoughts about the speech-shadowing task ($F < 1$).

### Self- reported performance speed

Participants were assumed to be sensitive to the speed of completing the marketing survey only if their attention was called to it at the outset. This was the case, as shown in the bottom half of Table 1. The three-way interaction of speech rate, thought generation and time salience was marginally significant, $F$ (1, 127) = 3.12, $p = .08$, $\eta 2 = .02$. When the time available for completing the questionnaire was made salient, participants who had listed positive thoughts about the speaking task reported working faster in fast-speech conditions than in slow-speech conditions (1.29 vs. 0.30, respectively), $F$ (1, 127) = 5.19, $p < .05$, $\eta 2 = .14$. When participants had listed negative thoughts about the shadowing task, the speed at which they reported working on the survey was similar in the two conditions (1.15 vs. 1.37, respectively), $F < 1$. The interaction of thought generation and speech rate under time-salient conditions alone was marginally significant, $F$ (1, 127) = 3.73, $p = .06$, $\eta 2 = .06$, and was similar to that observed in analyses of the actual speed with which participants worked on the survey. Furthermore, the correlation between self-reported speed and participants' actual speed (the number of questions completed) was significant ($r = .51$, $p < .001$).

When the time to complete the survey was not mentioned, however, the speed that participants reported working did not significantly depend on their rate of speaking in the shadowing task (0.57 vs. 1.06, under fast-speech and slow-speech conditions, respectively), $F$ (1, 127) = 2.44, $p = .12$ and this was true regardless of whether they had reported positive or negative thoughts about the shadowing task. Finally, self-reported speed was not correlated with participants' actual speed (the number of questions completed) ($r = .16$, *ns.*). This again suggests that participants were unaware of the speed with which they were working on the survey despite a difference in the actual speed with which they performed it.

In summary, Experiment 2 confirmed the different effects of deliberate and automatic behavior and the factors that influence these

**Table 1**
The number of completed questions (SD) and self-reported performance speed (SD) as a function of speech conditions, the valence of thoughts generated and time salience–Experiment 2.

| | Time salient | | Time not salient | |
|---|---|---|---|---|
| | Positive thought generation | Negative thought generation | Positive thought generation | Negative thought generation |
| Number of items answered | | | | |
| Fast speech | 14.14 (3.90) | 12.08 (4.25) | 8.12 (3.41) | 8.70 (3.08) |
| Slow speech | 9.60 (2.78) | 11.26 (2.68) | 6.78 (3.10) | 6.86 (3.39) |
| Self-reported performance speed | | | | |
| Fast speech | 1.29 (1.07) | 1.15 (1.34) | 0.59 (1.50) | 0.55 (1.15) |
| Slow speech | 0.30 (1.38) | 1.37 (0.83) | 1.22 (1.06) | 0.86 (1.51) |

effects. When the time to complete the survey was called to their attention, the speed with which participants completed the survey was based on the desirability of working quickly or slowly, as reflected in the thoughts they had been asked to generate. When their attention was not called to the time available to complete the survey, however, the speed with which they worked on it was driven by a production that was activated by their behavior in a previous situation and was applied automatically, independently of the desirability of working fast or slowly.

## Experiment 3

Although the results of Experiment 2 confirmed our expectations, a potential ambiguity exists in interpreting them. Instructing participants to list positive or negative thoughts about the shadowing task could induce an implicit expectation that the experimenter considered working quickly (or slowly) to be desirable. This could have influenced participants' rate of completing the questionnaire when the time available was called to their attention. Furthermore, this could have occurred regardless of whether participants actually believed that the strategy they applied was desirable or not. Experiment 3 avoided this ambiguity.

In this experiment, participants were induced to experience positive or negative affect while performing the speech-shadowing task. We assumed that the affect that participants experienced would become associated with a goal concept that was activated in the course of performing this task, leading the goal to be seen as more or less desirable. Consequently, we expected that affect would influence the speed with which participants completed the marketing survey when the time available to work on it was made salient. However, participants' performance of the speech-shadowing task presumably activated a behavior concept as well and this concept may be contained in the precondition of a production associated with doing things quickly or slowly. Doing things at a particular rate of speed is unlikely to have been systematically associated with positive and negative affect in participants' past experiences. To this extent, affect-related features should not be contained in the precondition of such a production and should not influence its activation. Therefore, we expected that when the time available to work on the questionnaire was not called to their attention, participants would work faster when they had spoken quickly during the speech-shadowing task than when they had spoken slowly but that the affect associated with the goal of doing things quickly or slowly would have no influence.

### Method

One hundred ninety-five Hong Kong university students were randomly assigned to conditions of a 2 (speech rate: fast vs. slow) x 2 (affect induction: positive vs. negative) x 2 (time salience) between-subjects design. Participants were told that they would be asked to complete several unrelated studies. In the first, they were told that student affairs office was interested in collecting data about college students' personal experience. On this pretense, they were asked to write about a recent event that was very important to them and that made them feel either very happy or very unhappy when they thought about it. (For details of the procedure, see Schwarz & Clore, 1983; Adaval, 2001.) Participants were given 10 minutes to write about the event.

Participants were then asked to perform the speech-shadowing task as in earlier experiments and to complete the marketing survey under time-salient and time-not-salient conditions similar to those employed in Experiment 2. After working for 30 seconds, they were asked to stop and complete a post-experimental questionnaire in which they estimated the speed of the speech they had heard in the previous task and their speed of completing the survey along a scale from −3 (very slowly) to +3 (very fast). Finally, they were asked to recall the feelings that they had after completing the event writing task along a scale from −3 (very unhappy) to +3 (very happy).

### Results and Discussion

#### *Manipulation checks*

As expected, participants recalled that the speech was delivered more quickly in fast-speech conditions ($M=1.43$, $SD=1.18$) than in slow-speech conditions ($M=-2.55$, $SD=0.60$), $F$ (1, 187) = 849.06, $p<.001$, $\eta 2=.82$. They also recalled feeling happier after writing about the event in positive affect conditions ($M=1.38$,$SD=1.25$) than in negative affect conditions ($M=-1.22$, $SD=1.16$), $F$ (1, 187) = 223.56, $p<.001$, $\eta 2=.55$. Moreover, this difference did not depend on the speed with which the speech was delivered ($F<1$).

#### *Survey completion speed*

We assumed that participants' positive or negative feelings while performing the speech-shadowing task would generalize to the concept of doing things quickly or slowly in general. To this extent, participants whose attention was called to the time available to complete the questionnaire should complete it more or less quickly, depending on the feelings associated with the goal concept that was activated. When the time to complete the survey was not mentioned, however, we expected that participants' speed of completing the survey would be determined only by their speed of speaking in the shadowing task and would not depend on the affect associated with the goal of doing things quickly or slowly.

These predictions were confirmed. Participants generally completed more questionnaire items if the time available for completing the survey was salient ($M=11.56$, $SD=4.10$) than if it was not ($M=10.31$, $SD=4.16$), $F$ (1, 187) = 5.75, $p<.05$, $\eta 2=.03$. However, this main effect was qualified by a three-way interaction of time salience, affect, and speech rate, $F$ (1, 187) = 6.81, $p<.01$, $\eta 2=.03$), the nature of which was shown in Table 2. When participants' attention was called to the time available for completing the survey, the affect associated with their rate of speaking during the shadowing task had a significant impact on their rate of completing the questionnaire. If they had experienced positive affect while performing the speech shadowing task, they completed more items under fast-speech conditions than under slow-speech conditions (13.27 vs. 10.86, respectively), $F$ (1, 187) = 3.87, $p=.05$, $\eta 2=.09$. If they had experienced negative affect, however, the reverse was true (9.62 vs. 12.95, respectively), $F$ (1, 187) = 7.77, $p<.01$, $\eta 2=.17$. The interaction of affect and speech rate was significant under goal activation conditions alone, $F$ (1, 187) = 11.26, $p<.001$, $\eta 2=.12$.

When the speed of completing the marketing survey was not mentioned, however, participants worked faster on the survey in fast-speech conditions than in slow-speech conditions, $F$ (1, 187) = 4.06, $p<.05$, $\eta 2=.04$ and this difference did not depend on whether

**Table 2**
The number of completed questions (SD) as a function of speech conditions, affect and time salience–Experiment 3.

| | Time salient | | Time not salient | |
|---|---|---|---|---|
| | Positive affect | Negative affect | Positive affect | Negative affect |
| Number of items answered | | | | |
| Fast speech | 13.27 (4.39) | 9.62 (3.24) | 11.10 (4.69) | 11.04 (4.82) |
| Slow speech | 10.86 (3.53) | 12.95 (4.33) | 9.68 (3.39) | 9.31 (3.36) |
| Self-reported performance speed | | | | |
| Fast speech | 1.45 (1.01) | 0.23 (1.66) | 0.90 (1.59) | 1.31 (1.26) |
| Slow speech | 1.29 (1.49) | 1.10 (1.65) | 1.48 (1.29) | 1.54 (1.30) |

participants had experienced positive affect at the time they shadowed the speech (11.10 vs. 9.68, respectively) or negative affect (11.04 vs. 9.31, respectively).

*Self- reported performance speed*

Again, participants seemed to be sensitive to the speed of working on the survey only if their attention had been called to the limited time available for completing it. The three-way interaction of time salience, affect, and speech rate was marginally significant, $F$ (1, 187) $= 2.87$, $p = .09$, $\eta 2 = .02$. When the time available for completing the questionnaire was made salient, participants reported working nonsignificantly faster in fast-speech conditions than in slow-speech conditions if they had experienced positive affect at the time they shadowed the speech (1.45 vs. 1.29, respectively; $F < 1$) but reported working more slowly in fast-speech conditions than in slow-speech conditions if they had experienced negative affect (0.23 vs. 1.10, respectively; $F$ (1, 187) $= 4.21$, $p < .05$, $\eta 2 = .07$). The interaction of affect and speech rate under time-salient conditions alone was marginally significant, $F$ (1, 187) $= 2.93$, $p = .09$, $\eta 2 = .03$.

When the time available for completing the survey was not mentioned, participants' reported speed did not significantly depend on their rate of speaking in the shadowing task ($M = 1.10$, $SD = 1.44$ vs. $M = 1.51$, $SD = 1.29$, under fast-speech and slow-speech conditions, respectively), $F$ (1, 187) $= 2.16$, $p = .14$. Moreover, this was true independently of the affect that was associated with performing the speech task.

## Experiment 4

The first three experiments confirmed our hypothesis that the influence of individuals' past behavior on their later behavior was governed by a production when the goal to which the behavior was related was not salient, but that motivational factors override the influence of the production when the goal to which the behavior was relevant was called to participants' attention. However, the impact of a production is also likely to be evident when individuals are aware of the goal to which their past behavior is relevant but are unable to deliberate on its implications. Other research suggests that behavioral decisions may only be influenced by goal-related factors when individuals have sufficient cognitive resources available to engage in this deliberation (see Ward & Mann, 2000; Drolet, Luce, & Simonson, 2009 for related evidence). When individuals' cognitive resources are limited, the impact of a production on their responses may be more evident. This may be true even when they are conscious of the goal to which their behavior is relevant.

Experiment 4 examined this possibility. We constructed a situation in which participants' perceptions of the implications of their goal-directed behavior differed from the implications of a production that was theoretically activated by this behavior. Participants first completed a form in which they indicated whether or not they would participate in a number of different activities. In one condition, the activities had socially desirable implications (e.g., supporting human rights, protecting the environment, etc.). In a second condition, the activities had undesirable implications (harming the country, breaking the law, etc.). Regardless of which condition they were in, however, some participants were asked to respond to each item by circling the option they favored ("join" vs. "not join") whereas others were asked to respond by circling the option they opposed.

We assumed that considering desirable activities would activate a general goal concept with positive implications for participating in activities, whereas considering undesirable activities would activate a goal concept with the opposite implications. When the items were desirable, however, participants were expected to choose the "join" option when they were asked to indicate which option they favored but to choose the "not join" option when they were asked which option they opposed. When the activities were undesirable, they were expected to choose the "not join" option in the first case and the "join" option in the second. Thus, participants' overt responses to the opinion items ("join" or "not join") were manipulated independently of the implications of these responses for the desirability of joining activities in general.

After completing this survey, participants were asked to decide whether they would like to participate in an unrelated promotion for a soft drink being offered by a foreign country. While making this decision, however, they were put under either high or low cognitive load by asking them to remember either a 12-digit number or 2-digit number. (For the use of this procedure in other research, see Shiv & Fedorikhin, 1999).

We expected that when participants were not under cognitive load, they would base their decision to participate in the promotion on the desirability of the goal concept that was activated by the implications of their decisions during the initial task. That is, they would be more inclined to participate in the promotion if the priming task exposed them to desirable activities and activated a concept that participation was desirable. When participants were under cognitive load, however, we expected their decision to be governed by a production that was activated by their responses to the survey independently of the evaluative implications of these responses. Thus, they were expected to choose to participate in the promotion when they had chosen the "join" option repeatedly in the opinion survey than if they had chosen the "not join" option, regardless of the implications of these responses.

### Method

Two hundred seventeen Chinese university students participated. They were randomly assigned to conditions of a 2 (item type: desirable vs. undesirable) x 2 (response criterion: support vs. oppose) x 2 (cognitive load: high vs. low) between-subjects design.

Participants were given a survey that consisted of 15 questions concerning participants' opinions about public issues. Ten questions solicited opinions concerning the desirability of either joining or not joining an activity. In the *desirable-activity* questionnaire, the items referred to socially desirable activities ("we should join/not join any activity that would protect the environment," "we should join/not join any activity that would protect our human rights," etc.). In the *undesirable-activity* questionnaire, the items referred to undesirable activities ("we should join/not join any activity that breaks the law, "we should join/not join any activity that is harmful to our own country," etc.). (The remaining five questions were fillers and did not pertain to participation in an activity; e.g., "we should protect/ infringe on others' privacy").

In each case, however, participants in *support-judgment* conditions were told to indicate which of the options (join vs. not join) they would support. Thus, these participants were expected to choose "join" repeatedly when the activities described in the questionnaire were desirable but to choose "not join" repeatedly when the activities described were undesirable. In contrast, participants in *oppose-judgment* conditions were told to indicate which of the alternatives they opposed. Thus, these participants were expected to choose "not join" repeatedly in the desirable-activity questionnaire and to choose "join" repeatedly in the undesirable-activity questionnaire.

After completing this task, participants were told that the experimenter was interested in their ability to remember numbers and, on this pretense, were asked to remember either a 2 digit number (30) or a 12 digit number (307232843129). They were told to keep the number in mind until they were asked to write it down.

Then, all participants were told that a foreign company was promoting a soft drink and that they could get free soft drink if they were willing to complete a survey. Participants were then asked to indicate whether they were interested in participating in the promotion

by circling "join" or "not join". Finally, participants were asked to write down the number they had learned, and to report how hard it was to remember it along a scale from 1 (not at all) to 7 (very much).

## Results

### *Manipulation check*

Participants indicated that it was harder to remember a 12 digit number than a 2 digit number ($M = 3.83$, $SD = 2.21$ vs. $M = 1.16$, $SD = 0.81$, respectively), $F$ (1, 209) = 136.68, $p < .001$, $\eta 2 = .40$. Our manipulation of participants' choice behavior was also successful. The number of times participants chose "join" is summarized in the top half of Table 3 as a function of cognitive load, questionnaire item type and response criterion (support vs. oppose). The interaction of the first two variables was significant, $F$ (1, 213) = 12348.9, $p < .001$, $\eta 2 = .98$; participants circled "join" more frequently when they were asked either (a) to choose the option they supported and the activities were desirable ($M = 9.93$, $SD = 0.26$) or (b) to choose the option they opposed and the activities were undesirable ($M = 10.00$, $SD = 0$) than in other conditions ($M = 0.24$, $SD = 0.90$, respectively).

### *Promotion decisions*

We expected that when participants were not under cognitive load, they would base their decision to join the promotion on the goal concept that was activated in the course of responding to these items. To this extent, they should be more willing to join the promotion if the activities were desirable than if they were undesirable. When participants were under cognitive load, however, we expected their choice to be based on a production that was activated by the motor responses they had made in the questionnaire independently of the evaluative implications of these responses. That is, they should be more willing to join the promotion if they had responded "join" repeatedly than if they had responded "not join" repeatedly in the course of completing the questionnaire regardless of the type of item to which their responses pertained.

The proportion of participants who chose to participate was summarized in the bottom half of Table 3. The three-way interaction of item type (desirable vs. undesirable), response criterion (support vs. oppose) and cognitive load was significant (*Wald* $\chi^2 = 4.81$, $p < .05$) and of the form we expected. When participants were not under cognitive load, they were more likely to choose to participate in the promotion when the activities they had considered in the questionnaire were desirable (69%) than when they were undesirable (45%), *Wald* $\chi^2 = 5.59$, $p < .05$, and this difference was virtually identical regardless of whether participants had indicated which option (to join vs. not to join) they supported (70% vs. 46%) or which they opposed (67% vs. 44%).

When participants were under cognitive load, however, they were more likely to join in the promotion in the two conditions in which they had made "join" responses in the questionnaire than in the two conditions in which they had made "not join" responses (63% vs. 32%, respectively), *Wald* $\chi^2 = 10.64$, $p < .001$, and this difference was evident regardless of whether the activities they had considered earlier were desirable (64% vs. 25%) or undesirable (61% vs. 38%).

**Table 3**
Choice behavior (SD) and the likelihood of joining the promotion as a function of questionnaire item type, the response criterion and cognitive load — Experiment 4.

| | Low cognitive load | | High cognitive load | |
|---|---|---|---|---|
| | Desirable activities | Undesirable activities | Desirable activities | Undesirable activities |
| Number of "join" responses | | | | |
| Support judgment | 10.00 (0) | 0.23 (0.43) | 9.86 (0.36) | 0.07 (0.26) |
| Oppose judgment | 0.33 (1.63) | 10.00 (0) | 0.36 (0.78) | 10.00 (0) |
| Likelihood of joining promotion | | | | |
| Support judgment | 70% | 46% | 64% | 38% |
| Oppose judgment | 67% | 44% | 25% | 61% |

## Discussion

Experiment 4 confirmed the results of the first three experiments in a quite different research paradigm and extended their implications. That is, individuals may often base their behavioral decisions on the desirability of a relevant goal concept that is activated by their past behavior. If a behavior-relevant goal is not salient, however, their behavior is guided by a production, as Experiments 1–3 indicate. Moreover, as the present experiment indicates, this is *also* true if a relevant goal is salient but participants do not have the cognitive resources available to think about the implications of their behavior for this goal. More generally, productions may be applied as a default when individuals are either unable or unmotivated to engage in deliberative goal-directed activity.

## General Discussion

Four experiments provided converging evidence that both deliberate and automatic processes can govern the effect of past behavior on later behavior. The relative impact of these processes can depend on both (a) the salience of the goal concept to which the behavior is relevant and (b) participants' ability to devote cognitive resources to a consideration of their behavior's goal-relevant implications. When individuals' past behavior has activated a goal concept, they may consciously decide whether to engage in behavior that exemplifies this concept, and their decision may depend on the desirability of the goal in question. In this case, features of the past situation that affect participants' perceptions of the goal's desirability are likely to influence their conscious behavioral decision. However, when individuals either do not have a goal in mind (as in Experiments 2 and 3) or are distracted from thinking about the implications of their behavior (as in Experiment 4), this is not the case. Rather, their behavior is governed by a production that is activated by behavior concepts that were made accessible in the course of performing the behavior in the earlier situation and is applied automatically, without awareness and independently of the desirability of the goal with which the behavior is associated.

### *The Role of Affect in Automatic Processing*

Previous research provides evidence of the unconscious effect of past behavior on future behavior (for summaries, see Wyer et al., 2012, in press). However, the present studies are among the first to demonstrate the deliberative and automatic influences of past behavior in the same study and to articulate the different processes that mediate these influences. In doing so, they clarify and extend other research on the unconscious influence of goal-directed activity. The different roles that affective reactions can play in automatic and goal-directed processing are particularly provocative. As noted earlier, Custers and Aarts (2007) found that subliminally priming the concept of a goal while participants were exposed to positively or negatively valenced words affected the desirability of the goal and, therefore, the effort that participants later expended in attaining it. In their study, however, the goal concepts that influenced participants' activities were directly primed rather than being activated by their past behavior. Consistent with their results, we also found that if affect becomes associated with goal concepts, it can influence behavior in a later situation to which these concepts are relevant. When the goal relevance of individuals' behavior in the later situation

is not salient to them, however, the influence of their past behavior does not depend on the affect associated with it.

In some cases, the affect that participants experienced when they perform a task might become associated with a behavior concept as well as a goal concept. As we noted earlier, however, this was unlikely in the conditions we investigated. In participants' past experience, doing things quickly (or slowly) was likely to have been both desirable and undesirable, depending on the situation at hand. Consequently, a general concept of this behavior is unlikely to have become systematically associated with affect-related features and so these features are unlikely to be contained in the precondition of a production that elicits the behavior automatically.

Of course, some behaviors *do* differ in their intrinsic desirability. However, productions are normally acquired in the process of frequently repeating behaviors in the course of deliberate goal-directed activity. Behaviors that are intrinsically aversive may not be repeated with sufficient frequency to lead a production to be formed. To this extent, desirable behaviors are more likely to be governed by a production than undesirable ones. (There may be exceptions, of course. An individual who is learning to type on a word processor, for example, may repeatedly make errors and the effects of "practicing" these errors can be hard to overcome in the absence of conscious deliberation.).

### *The Deliberative-Automatic Interface*

Our conceptualization is consistent with other dual-processing formulations of social information processing (Strack & Deutsch, 2004; see also Chaiken & Trope, 1999). However, it more clearly specifies the manner in which the processes interface. Both deliberate goal-directed processing and automatic processing are theoretically activated by concepts that happen to be accessible in memory at the time. However, the concepts that govern the two types of processing differ. Specifically, our conceptualization distinguishes between (a) goal concepts that provide the basis for conscious decisions about whether and how to pursue a specific objective and (b) behavior concepts that are descriptive in nature but are included in the precondition of a production. However, goal concepts vary in desirability and can influence the motivation to attain the goal they specify, whereas behavior concepts are descriptive and do not in themselves have motivational implications. Performing a behavior in conscious pursuit of a specific objective is likely to activate both types of concepts. However, the concepts enter into subsequent information processing in different ways.

### *Unconscious Goal Activation*

As we indicated in the introduction, the assumption that individuals are often unaware of the features that compose the precondition of a production can potentially account for unconscious effects of goal activation (e.g., Chartrand & Bargh, 1996). In a study by Aarts, Gollwitzer, and Hassin (2004), for example, paid participants read a story that activated concepts associated with making money. Then, they performed an unrelated task in which they could ostensibly increase the pay they received by completing it. The effort that participants expended on the task was a joint function of the accessibility of goal-related concepts and participants' self-reported need for money. It seems reasonable to suppose that participants with a need for money had previously formed a production whose precondition contained money-related concepts and elicited behavior associated with working hard. Consequently, priming these concepts activated the production and led them to expend more effort on the target task. In contrast, participants with little need for money were less likely to have formed such a production and so priming money-related concepts had little effect.

In a series of studies by Dijksterhuis (2004), participants received information about several apartments, one of which had predominantly favorable attributes and another of which had predominantly unfavorable features. Then, participants evaluated the apartments either (a) immediately, (b) after thinking about them for 3 minutes, or (c) after performing a cognitively demanding unrelated task. Participants were more accurate in identifying the best apartment in the third condition than in either of the others. In this condition, a well-learned production-based strategy for making evaluations was apparently applied automatically, without awareness. However, more deliberative cognitive activity, involving the application of criteria that were idiosyncratic to the stimulus materials presented, interfered with its effectiveness.

### *Alternative Conceptualizations*

The consistency of our results with the conceptualization we propose does not necessarily invalidate other possible interpretations of the findings. A formulation of unconscious goal activation by Custers and Aarts (2010), for example, assumes a single goal-relevant mental representation consisting in part of a "preparation to act." This predisposition can be primed subliminally, and can combine with affective and situational features in a later situation to stimulate goal-directed behavior without awareness of the factors that led the predisposition to be activated. To this extent, the "preparation to act" construct postulated by Custers and Aarts (2010) has many of the properties of a production as conceptualized in the present article.

Custers and Aarts's (2010) formulation can easily account for the effects of goal-directed behavior and the affect associated with it on later activity when participants are aware of a goal to which the latter activity is relevant. However, their single-representation conceptualization does not distinguish between behavior concepts and goal concepts. Consequently, it may have some difficulty accounting for the effects of past goal-directed behavior that are independent of the affect that is associated with this goal (see Experiments 2 and 3). It may also have difficulty accounting for the effect of past affect-related behavior on future behavior under cognitive load, which is also independent of affect (see Experiment 4). By assuming that the behavior concepts contained in the precondition of a production differ from the goal concepts that are represented as part of the cognitive procedures stored as part of declarative knowledge, the present conceptualization can more easily account for these contingencies.

Our conceptualization is also worth considering in the context of earlier studies that have distinguished between the effects of goal-directed and goal-unrelated processes (Dijksterhuis et al., 2007; Sela & Shiv, 2009). For example, goal-directed behavior can persist or even increase in intensity over time if the goal to which it is relevant has not been satisfied and a concept of this goal remains in memory during the interim (Fitzsimons, Chartrand, & Fitzsimons, 2008; Förster, Liberman, & Friedman, 2007; Förster, Liberman, & Higgins, 2005). In the absence of a goal to which it is relevant, the behavior concept may become less accessible in memory as time goes on and so the likelihood of the behavior's occurrence may decrease (Dijksterhuis et al., 2007). These findings make salient the desirability of investigating the persistence of the phenomena we identified and of determining the extent to which the relative impact of deliberative and production-elicited influences of past behavior changes over time.

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