Do Habits Depend on Goals?

Perceived versus Actual Role of Goals in Habit Performance

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Abstract

Across four studies, we compared people's inferences about the causes of their habits with the actual mechanisms that guide habit performance. Suggesting that people believe that the actions they perform frequently are diagnostic of their motivating dispositions, habit strength for various behaviors was consistently associated with stronger beliefs (Study 1 & 2) and faster inferences that goals motivate behavior (Study 2). However, measures of implicit associative knowledge suggested that habits are triggered directly—without dependence on goals—by the context cues that consistently accompanied past performance (Study 2). This direct cuing was confirmed in a laboratory experiment on speech habits (Study 3) and a field experiment on eating habits (Study 4). We propose that direct cuing is a core attribute of habits that accounts for a central challenge of behavior change whereby changing people's behavioral goals rarely engenders habit change.

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Philosophers and psychologists have long observed that people often overestimate the extent to which their behavior is the product of willful, intentional control (Ryle, 1944; Wegner & Wheatley, 1999). People err in understanding the causes of their behavior in part because they have limited introspective access to the mechanisms that actually generate behavior and thus look to salient stimuli and a priori causal theories to explain their actions (Nisbett & Wilson, 1977). This idea was a cornerstone of self-perception theory (Bem, 1972), which holds that people often infer dispositional motives to account for their behavior, even when it has been triggered by external factors.

The present research extends this reasoning to encompass people's accounts of their habitual behavior. Habits are guided by associative knowledge that operates largely outside of awareness (Wood & Neal, 2007). Because access to the internal states guiding habits is "weak, ambiguous, or uninterpretable," people are functionally in the same position as an external observer and tend to infer dispositional motives from observing their own habitual behavior (Bem, 1972, p. 2). This inference process is likely to be influenced by the simple frequency of habit performance. By virtue of being performed frequently, habits can seem to be diagnostic of goals and other dispositional motives. Thus, a person may infer a strong liking for brown bread partly from observing that he or she has so frequently eaten it in the past.

The inferences that people make about the causes of their habits do not necessarily correspond with the implicit associative mechanisms that actually guide habit performance. What are the psychological mechanisms that underlie habits? Behavior prediction research with humans and instrumental learning research with animals suggests that habits may be triggered

directly by the context cues (e.g., performance locations, preceding actions) that consistently covaried with past performance (Verplanken, Walker, Davis, & Jurasek, 2008; Packard, 1999; see Wood & Neal, 2007). Findings from these diverse research paradigms suggest that habits are triggered by associated cues in a manner that does not depend on currently holding a goal that motivates performance.

In the present article, we explore this hypothesized paradox by which people perceive their habits to be guided by dispositional motives despite that these behaviors actually are triggered by the context cues accompanying past performance. We present four studies that test the inference processes by which we understand our own habitual behavior along with the actual mechanisms that guide habit performance.

Habits and Goal Inferences

People have only limited introspective access to internal cues that guide their habitual behavior. In evidence, Beilock and Carr (2001) found that people have impoverished episodic recall of the specific sequences that make up skilled, habit-like responses. Also, habit knowledge, by virtue of being encoded in procedural memory, cannot be accurately accessed and reported in declarative tests (e.g., Foerde, Poldrack, & Knowlton, 2006). Thus, to explain their own habitual actions, people are forced to engage in inferences about what dispositions might be relevant. Following Bem (1972), people make such inferences for behaviors that plausibly counter their prevailing dispositions as well as for behaviors that support these dispositions. Thus, good habits and bad habits may be subject to this inference process.[1]

There is good reason to suspect that habits lend themselves to a particular kind of explanation that is grounded in dispositional motives. Specifically, behavioral frequency may function as a heuristic for inferring that strong dispositional forces are guiding behavior. In

support, the act frequency approach to personality demonstrates that people's dispositional self judgments largely reflect summary representations of the behaviors frequently performed in everyday life (Buss & Craik, 1983; Gosling, John, Craik, & Robbins, 1998). Of course, such inferences may often reflect valid insight into the origins of one's habits, even if their accuracy regarding the control of established habits is more in question. After all, people initially repeat and thereby form habits for behaviors that meet strongly desired goals or avoid strongly undesired ones. Thus, a person might accurately infer that the initial high repetition of a novel behavior like jogging is motivated by a goal to reduce stress or lose weight. It is another question, however, whether the frequent repetition of this behavior once habitual, is a valid indicator that goals are continuing to drive performance. Nonetheless, people are likely to use performance frequency as a basis for inferring dispositional motives even of established habits.

Inferences about the dispositional motives driving behavior may be generated in a relatively spontaneous and effortless way. Extending classic work on spontaneous trait inferences (see review in Uleman, Saribay, & Gonzalez, 2008), Hassin et al. (2005) found that people automatically infer goal states that are implied by brief behavioral descriptions of other people's actions. Although this work addressed inferences about other people's goals, inferences about one's own dispositional motives may proceed in a similarly spontaneous manner. Supporting this possibility, Albarracín and Wyer (2000) found that dispositional inferences regarding one's own attitudes can be influenced by self-perception processes in a fast and spontaneous manner that requires little cognitive effort.

Direct Cuing of Habits

If people make inferences about the goals that can account for their habits, then maybe they are correct—perhaps habits are directed by goals? After all, an extensive literature on

automatic and non-conscious goal pursuit has established that goals can flexibly guide behavior in ways that are inaccessible to conscious introspection (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Troetschel, 2001; Chartrand & Bargh, 1996). However, there is good reason to suspect that habits are not an example of automatic goal pursuit.

Behavior prediction research consistently has demonstrated that habits are performed even when people do not hold supporting intentions, or behavioral goals (e.g., Danner, Aarts, & de Vries, 2008; Verplanken, Aarts, van Knippenberg, & Moonen, 1998; see Ouellette & Wood, 1998). For example, Verplanken et al. (1998) found that the favorability of people's car use intentions failed to predict future car use among habitual drivers, even though intentions positively predicted car use in non-habitual drivers. Instead, habits seem to persist because they are directly cued by that contexts associated with past performance. In support, habit persistence is found primarily when people remain in the same context in which they initially formed the habit (Verplanken et al. 2008; Wood, Tam, & Guerrero Witt, 2005). Thus, habit performance seems to depend on the presence of context cues associated with past performance but not on the presence of a supporting goal.

Evidence for direct context cuing of habits also comes from classic animal learning experiments (e.g., Dickinson, Balleine, Watt, Gonzalez & Boakes, 1995; Packard, 1999). For example, reinforcer devaluation studies with rats have established that non-habitual responses (e.g., minimally practiced bar pressing) are goal dependent in that performance quickly ceases if the behavior's ostensible goal (e.g., food acquisition) is devalued or eliminated (e.g., by pairing the food with a toxin or overfeeding the rat so it is no longer hungry). In contrast, if the behavior has been practiced to the point of being habitual (e.g., extensively practiced bar pressing), performance continues even after goal devaluation. On the basis of this evidence from behavior

prediction and animal learning research, Wood and Neal's (2007) new look at habits proposed that they proceed through direct cuing by contexts.

Integrating Perceived and Actual Causes of Habits

Habitual behavior, in our description, is characterized by a paradox. People strongly infer internal dispositions motivating their habits but the actual cuing mechanism that promotes performance does not rely on people holding or activating a response-supporting goal. This divergence may explain why social psychologists have sometimes concluded that habits are dependent on goals in the sense that the automaticity driving them is triggered only when a relevant goal state has been activated.

In an apparent demonstration that habits are goal dependent, Aarts and Dijskterhuis (2000, Study 1) found that habitual bicycle riders made faster inferences than non-habitual riders regarding the appropriateness of cycling as a means to get to a given destination (e.g., mall) only if a relevant goal state had first been primed (e.g., shopping). Reinforcing this conclusion, Sheeran et al. (2005) found that habitual drinkers were more likely to choose a voucher for a free drink only after a socialization goal had been primed in an earlier task.

Because these social psychological findings rely on inferences and choices about habits, they do not necessarily conflict with the evidence of direct habit cuing from behavior prediction and animal learning research. People's inferences about their habits are, as we have argued, likely to reflect strong dispositional inferences. However, the actual implicit mechanisms guiding habit performance do not appear to invoke goals. Thus, it is possible that the social psychological data reflect the perceived role of goals in habit performance, whereas the behavior prediction and animal learning data address the actual role of goals.

The Present Research

Four studies explored the perceived and actual role of goals in guiding habit performance. Study 1 was a survey to test people's beliefs about the role that goals play in motivating their habits. Study 2 again assessed these beliefs but, in addition, evaluated whether they align with the implicit, associative mechanisms that are thought to guide habit performance. Studies 3 and 4 then expand our analysis to include performance measures of actual habitual behavior. Specifically, Study 3 manipulated the context cues that activate a behavioral habit, with the expectation that performance would hinge on the presence of appropriate cues. Study 4 manipulated the goals that people believe drive their habits, with the expectation that performance would be relatively unaffected by goal value. With these studies, we provide the first experimental tests of the direct cuing of habit performance.

In the first study, participants reported on the extent to which they perceived that various goals were important in motivating them to perform a number of everyday behaviors. We then conducted correlational analyses to compare the perceived goal-dependence of behaviors that were more or less habitual. We anticipated that behaviors performed infrequently would be judged not especially diagnostic of goals, whereas behaviors performed more frequently would be perceived as more diagnostic. Thus, the first study tested a simple hypothesis, that people believe that their habits are strongly motivated by their goals.

Study 1

Method

*Participant*s. Six hundred seventy-five undergraduate students enrolled in an undergraduate psychology class participated for course credit.

Procedure. Participants completed a survey assessing the degree to which they believed goals were important in motivating them to perform of a range of behaviors. The behaviors were

generated in an earlier open-ended pilot study (n = 32) that solicited a range of exercise (e.g., running, yoga) and study behaviors (e.g., note-taking, attending study group) along with the most commonly reported goals (e.g., weight control, graduation) that those behaviors might serve.

In the survey study, participants rated on 5-point scales the frequency (*never/almost never* to *everyday*) and context stability (*never in the same place* to *always in the same place*) with which they had performed each study and exercise behavior in the preceding six months. In line with prior research (e.g., Wood, Quinn, & Kashy, 2002; Wood et al., 2005), our measure of habit strength was the product of the behavior frequency and context stability questions (range = 0 to 16). To assess perceived goal-dependence, participants rated every behavior and goal on the following question, "How important is the following goal in motivating you to perform the behavior (5-point scale from *not at all* to *extremely*)?" The order of the habit strength and goal questions was counterbalanced across participants. No order effects emerged, so we collapsed across this factor.

Results

Mean levels of habit strength varied widely across behaviors, with writing being the most habitual behavior (M = 9.64, SD = 3.44) and swimming the least (M = 0.80, SD = 2.27). On average, study behaviors were somewhat more habitual than exercise behaviors, $t(673) = 16.22$, $p < .01$, but every behavior except yoga included participants representing the full range of the habit strength scale. Perceived goal dependence also varied widely by behavior. The behavior of writing was judged most dependent on a goal, getting good grades (M = 3.49, SD = 0.72). The behavior of swimming was judged least dependent on a goal, weight loss (M = 0.63, SD = 1.12). On average, study behaviors were perceived as slightly more goal dependent than were exercise behaviors, $t(669) = 16.37$, $p < .01$.

To test whether perceived goal dependence varied with habit strength, bivariate correlations were computed between the two variables. Table 1 presents the correlation matrix for each behavior-goal combination. Consistent with predictions, increasing habit strength was consistently and strongly associated with an increase in the perceived goal dependence of behavior.[2] The association between habit strength and perceived goal dependence varied from r = .79 (cycling and weight loss) to r = .07 (writing and enjoyment), with a mean across all behavior-goal combinations of r = .53. The mean correlation did not differ between exercise behaviors (mean r = .57) and study behaviors (mean r = .49). To ensure that this association was not driven by especially low levels of perceived goal directedness among people who never or rarely performed the behavior, we recomputed the correlations after excluding individuals who reported "never or almost never" performing each behavior. The resulting correlation matrix was identical to the full data set in terms of the direction and significance of each r value, suggesting that the observed pattern was not driven by the omitted participants.

Discussion

Study 1 demonstrated that as habit strength increases, people report progressively stronger beliefs that goals motivate their behavior. This pattern emerged with remarkable consistency across a wide range of study and exercise behaviors and a wide range of goals. Of course, Study 1 does not, by itself, allow us to determine whether these beliefs represent accurate insight into the psychological mechanisms that actually guide habit performance. The observed pattern may reflect that habits really are dependent on the recruitment of a goal to guide behavior (Aarts & Dijksterhuis, 2000). Alternatively, as we have suggested, these beliefs may reflect inferences that people generate to account for behaviors that are cued by contexts outside of

awareness, inferences that may or may not correspond to the goals that initially promoted behavioral repetition.

Study 2

In Study 2, we assessed both people's beliefs that their habits are oriented toward goal outcomes and the implicit associative knowledge underlying habits. To accomplish this, we recruited participants with strong or weak running habits and assessed each participant's idiosyncratic goals for running (if they ever did so) and the contexts in which they typically ran (if ever). We assessed the associations between contexts, goals, and running in order to tap participants' explicit inferences about their running, and we also presented this information subliminally to assess the implicit associations that underlie running habit performance.

The perceived goal dependence task, as in Study 1, involved rating how important the nominated goals were in motivating running. As an additional assessment of goal inferences, we attempted to replicate the findings from social psychological paradigms that assessed the speed with which participants made conscious inferences about whether their habits met certain goals (e.g., whether cycling is an appropriate means to get to a given destination; Aarts & Dijksterhuis, 2000). In an adaptation of this procedure, our participants made explicit, speeded inferences about whether the act of running served the idiosyncratic goals that participants had nominated. We predicted that more habitual runners would report stronger beliefs that their running is goal dependent and would be able to report these beliefs more quickly in the speeded inference task.

In addition, to assess the implicit associative mechanisms underlying habits, the study included a lexical decision task (LDT) measuring the relation between pairings of the behavior (running/jogging), context, and goal, with subliminal presentation of one of these words. Because it involved simple word/non-word judgments and because of the subliminal presentation

of one stimulus in the associative pairing, this task plausibly taps into people's implicit, associative habit knowledge. We anticipated, given research on behavior prediction and animal learning, that goals would not be implicated in implicit habit associations, and thus no associative links would be evident between the behavior and the goal in the LDT. Instead, suggesting direct cuing, habitual runners would show strong associative links between running and the context in which they typically run. Thus, we anticipated that the analysis on LTD judgments would yield an interaction between habit strength and the type of association, with habitual runners responding especially quickly to context-response associations but showing no advantage for associations involving goals.

Method

Initial recruitment measures. Sixty-five undergraduate students rated, as part of a larger battery, the frequency and context stability with which they ran/jogged over the preceding six months (using the same scale as Study 1). In addition, participants provided one word to describe the physical location/context in which they typically (or ever) ran/jogged (e.g., gym, field) and two words to describe their top two goals/motivations for running if/when they did so (e.g., weight, relax). Finally, as a measure of perceived goal dependence, participants rated on a 5-point scale how important they believed each of the two goals was in motivating them to run (*not at all important* to *extremely important*).

Main study. Fifty-three participants responded to the recruitment email and completed the main study, which supposedly assessed language processing. The main study involved (a) a LDT that incorporated subliminal priming to assess the implicit associative knowledge underlying the behavior of running and (b) an explicit speeded inference task in which participants judged

whether various behaviors (including running) served various goals (including those that participants had nominated as motivating them to run).

In the LDT task, participants made word/non-word judgments regarding 96 target stimuli (50% words, 50% non-words) after being subliminally primed with a word stimulus. Each trial proceeded as follows: (a) a row of asterisks at fixation for 2 secs, (b) forward mask (XXXXXX) for 100 ms, (c) prime word for 33 ms, (d) backward mask (XXXXXX) for 100 ms, (e) variable delay (160 ms to 240 ms), and (f) target stimulus for a maximum of 3 secs or until response. To disguise the task's purpose, 24 of the 48 word trials used filler targets and primes unrelated to exercise. Across the remaining 24 critical trials, 6 prime-target combinations were assessed, with 4 trials per combination: (a) context-behavior, (b) context-goal, (c) goal-behavior, (d) behavior-goal, (e) control word-goal, and (f) control word-behavior. Context and goal terms were participant-specific and were derived from the recruitment survey, and behavior words were "running" and "jogging" for all participants. The control trials (e and f), which provided a baseline speed of responding, used words ("monitor," "drapes," "curtain," "thermos") unrelated to exercise and matched to the average word length of participants' running contexts and goals.

Immediately following, participants completed the second task in which they made explicit, speeded inferences using the same behavior and goal terms as the LDT. Specifically, instead of making word/non-word judgments, participants were presented with a behavior and then a goal and judged if the behavior was a realistic means to attain that goal. The sequence and duration of stimuli within trials was identical to the LDT, except behaviors were presented for 200 ms (rather than 33ms), and were thus consciously visible. Four different behavior-goal combinations were assessed over a total of 12 trials: (a) running-goal, (b) control behavior-goal, (c) running–control goal, and (d) control behavior-control goal. For the control combinations (b,

c, and d), control behaviors were "copying" and "printing" and control goals were "investing" and "saving."

Results

Perceived goal dependence. Participants' ratings of how important their two nominated goals were in motivating them to run were averaged to form the measure of perceived goal dependence. Mean perceived goal dependence corresponded to a rating of "strongly important" on the 0 to 4 point scale, $M = 2.77$ ($SD = 1.36$). As in Study 1, participants with stronger running habits reported that running goals were more important in motivating them to run, $r(51) = .54$, $p < .01$.

To examine habit strength effects on the explicit speeded inference task regarding running goals, we computed a facilitation score by subtracting the mean RT on behavior-goal trials from the mean RT on control trials. Thus a higher score reflected faster inferences on trials when the word running was paired with the goals each participant nominated. Consistent with the results on perceived goal dependence, participants with stronger running habits made (marginally) faster inferences than did participants with weaker habits, $t(48) = 2.24$, $p = .06$. This pattern conceptually replicates Aarts and Dijksterhuis's (2000) findings and indicates that, as habit strength increases, inferences regarding the dispositional motives driving behavior are rendered more quickly. [3]

In sum, participants with stronger running habits more strongly believed and more quickly inferred that the act of running was motivated by their idiosyncratic goals. In these ways, habitual runners had stronger beliefs about the causal role of their running goals than did nonhabitual runners.

Implicit habit associations. Facilitation scores for the LDT were created by subtracting mean RTs for each experimental prime-target combination (i.e., context-behavior, behavior-goal, goal-behavior, context-goal) from mean RTs for control trials.[4] Thus, positive scores represent facilitated responding to a given experimental prime-target combination, relative to control trials. We did not have differentiated predictions about the three prime-target associations that involved goals (i.e., behavior-goal, goal-behavior, context-goal), and preliminary analyses on each judgment separately revealed that they yielded identical effects. Thus, for simplicity in reporting the findings, facilitation scores for these three judgments were averaged to form a composite measure of goal facilitation ($\alpha = .78$).

Context-behavior facilitation scores and composite goal facilitation scores were analyzed using the General Linear Model (GLM) multivariate repeated measures procedure, with association type (context-behavior associations versus goal associations) as the repeated measures factor and habit strength as the continuous predictor. The only significant effect was the predicted interaction between habit strength and association type, $F(1, 51) = 4.30$, $p = .04$. Figure 1 depicts the interaction using unstandardized predicted scores for each association type as a function of habit strength. Consistent with expectations, stronger habit strength for running was associated with faster recognition of "running" and "jogging" after priming with participants' idiosyncratic context terms, $B = 3.50$, $SE = 1.75$, $t(51) = 2.00$, $p = .05$. Critically, there was no corresponding association between increasing habit strength and faster reactions on the composite goal measure, $B = 0.72$, $SE = 1.60$, $t(51) = 0.45$, *ns.*

Correlations between implicit goal associations and explicit goal inferences. We tested whether participants' explicit ratings of the goal dependence of running were linked with their implicit associative knowledge regarding running goals. Perceived goal dependence ratings were

essentially uncorrelated with the RT facilitation scores on the composite goal trials of the LDT, $r(51) = .07$, *ns*, indicating that those who strongly believed their running was goal dependent did not respond any faster to the implicit goal-behavior, behavior-goal, and context-goal trials assessments in the LDT. Similarly, speeded explicit inference scores were uncorrelated with the implicit goal assessments in the LDT, $r(51) = .07$, *ns*.

Discussion

Are people accurate in believing that their habits are goal dependent? Study 2 addressed this question by evaluating the strength and speed of people's explicit beliefs and inferences that goals motivate their running habits and comparing these with the speed of the implicit associations that plausibly underlie habits. When we compared the role of goals across these judgments, the answer is a clear, "no."

The second study replicated the first in demonstrating that habitual runners believed more strongly than non-habitual runners that their running depended on an internal goal state. Thus, like Study 1, habit strength was positively correlated with the perceived goal dependence of behavior. Also, Study 2 showed that participants with stronger habits gave faster judgments that their behavior served their idiosyncratic goals. Our speeded inference task aligns conceptually with Aarts and Dijksterhuis's (2000) finding that habitual cyclers were faster at judging whether cycling represented a suitable means to get to given destination, but only if a relevant goal had first been primed. Thus, people's goals are strongly tied to their habits at the level of the inferences and beliefs they hold about those behaviors.

Study 2 also assessed the implicit associative knowledge underlying habit performance. As we anticipated, these associations did not involve goals. When the goals participants believed motivated them to run were presented as subliminal primes or targets in the LDT, habitual

runners were no faster in responding than non-habitual runners. In fact, habitual runners were indistinguishable from non-habitual runners across every goal link examined (i.e., context-goal, goal-behavior, behavior-goal). Also as predicted, habitual runners nonetheless responded significantly faster than non-habitual runners to the context-behavior trials in the LDT task. Consistent with the direct cuing account then, participants' running habits were marked by a direct associative binding of context and behavior in the absence of any associative links involving the goals that participants believed motivated the behavior.

In summary, the pattern of associations evident in Study 2 suggests that people strongly believe and rapidly infer that their habits are performed in the service of goals. However, these goals do not feature in the implicit associative knowledge underlying habits. This discontinuity between inferences and implicit knowledge was also evident in that participants' explicit inferences about their goals were consistently uncorrelated with their implicit goal associations evaluated in the LDT. Thus, people's beliefs and speeded inferences regarding the goal dependence of their habits do not necessarily represent valid insight into the implicit, associative knowledge underlying those habits.

Readers might wonder whether the implicit context-response associations actually reflect the mechanisms that control habit performance. Because this experiment (along with the earlier social psychological research on which it was based) was limited to measures of cognitive associations, it did not directly test habitual behavior. Studies 3 and 4 remedied this limitation by assessing the role of context cues and goals in actual habit performance. In Study 3, we experimentally manipulate the presence of context cues associated with a habitual behavior, with the expectation that performance would depend on the presence these cues. In Study 4, we experimentally manipulate whether a real-world behavior successfully meets its ostensible goal,

with the expectation that habits will tend to persist even when they are not meeting the goals that people believe motivate them.

Study 3

In Study 3, we selected a simple habit that would be amenable to study in the laboratory. We reasoned that people who frequently and consistently attend sports stadiums have acquired a habitual tendency to increase the volume of their speech in that context. Thus, we primed participants with the experimental context of sports stadiums or the control context of kitchens and then assessed changes in their speech volume, relative to a pre-priming baseline level. We predicted that incidental exposure to images of stadiums would elicit loud speech in participants who habitually attended sports stadiums. This pattern would be reflected in a significant interaction between the primed context and habit strength on loudness of speech. We also measured changes in people's arousal and their loudness-related goals and motivations, and we predicted that the behavioral effects would not be linked to any changes in participants' arousal or goals related to the loudness of their speech.

Method

Participants. 118 undergraduate students (60 male, 58 female) participated for course credit. Data from four additional participants were removed for suspicion regarding the cover story.

Procedure. Participants completed individually in cubicles two ostensibly distinct studies, a "visual search study" and a "networked communication study." As part of the communication study, they first recorded a brief self-description that provided a baseline measure of speech volume intensity, and this ostensibly was evaluated later by other participants in nearby rooms.

While apparently waiting for others' introductions to be taped, participants performed the visual search task that comprised the priming manipulation. On each of seven trials, they said "boot" into the microphone upon locating a boot hidden in a photograph presented on the computer screen. The background context in the photo involved either kitchens or sports stadiums, manipulated between participants. Speech volume was assessed via mean intensity [*db* using PRAAT software for phonetic analysis, Boersma, 2001], adjusted for an individual's baseline intensity. Immediately after, participants' arousal was measured using three semantic differential scales (*calm-excited, tired-energetic, sedate-aroused).* These were averaged to form an arousal index ($\alpha = .73$).

Participants immediately resumed the networked communication study and heard the recorded self-descriptions of two confederates matched to the participant's sex. The goal measures were embedded in this task. One recording was quiet/reserved and the other was loud/ebullient, and participants were instructed to choose as a representative in a subsequent interaction the person "who can best convey and represent you as you currently are." When conscious or non-conscious goals are activated, people tend to evaluate others who serve those goals more positively, draw closer to them, and approach them more readily (Fitzsimons & Shah, 2008). Thus, participants' loudness goals should manifest as a preference for the loud confederate and a desire to be represented by the loud confederate who could help them accomplish that goal. Accordingly, participants rated each confederate's (a) ability to convey the participant's personality and (b) likely evaluation by others. Ratings for the quiet speaker were subtracted from those for the loud speaker such that higher scores reflect a preference for the loud representative.

As an additional measure of loudness goal activation, participants were then given bogus feedback indicating that they were perceived as shy and reserved. Given that hallmarks of both conscious and non-conscious goal pursuit are persistence over time until met (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001) and negative moods in response to goal failure (Chartrand, 2008), participants with heighted goals to speak loudly should evaluate the goal-inconsistent feedback negatively. Accordingly, participants rated the bogus feedback on 5-point scales representing (a) how satisfied they were (reversed), (b) how troubled they were, (c) how accurate the feedback was (reversed), and (d) how well others understood them (reversed). All six goal measures were then combined to form a single measure of loudness goal activation (α = .71).[5]

To ensure that our goal measure could reliably detect changes in loudness-related goals, we included a *stadium-goal-priming control c*ondition.[6] Immediately following the stadium priming visual search task, these participants completed a scrambled sentence task designed to prime loudness goals. They composed meaningful four-word sentences from 14 sets of five scrambled words, with six sets including a synonym of loud (e.g., *boisterous*). Verifying the loudness goal measure, scores on the 6-item loudness scale were significantly heightened by the goal priming manipulation compared with the other conditions, $t(110) = 2.70$, $p < .01$.

Finally, to assess habit strength associated with loud speech in sports stadiums, participants indicated on 4-point scales (a) how frequently they had been to each context in the past six months and, (b) whether they visited different (i.e., non Duke) stadiums or the same (i.e., Duke) stadiums represented in the priming task. We measured habit strength in this manner because pilot testing indicated that people uniformly reported speaking loudly in the sports stadium context. Following prior work (e.g., Wood et al., 2002; Wood et al., 2005), habit

strength was computed by multiplying behavior frequency and context stability (range was 1 to 16).

Results

Our primary hypotheses were tested with regression models in which the predictors were context (kitchen prime vs. stadium prime), habit strength for sports stadium visits (centered), and the interaction.

Habit effects on goal activation. In analyses predicting goal activation levels, no main effects or interactions approached significance. Thus, the context priming manipulation had no effect on the activation of loudness goals, either independently or in interaction with habit strength.

Habit effects on speech volume. In analyses predicting baseline-adjusted voice intensity, participants' mean reaction time (RT) to detect the boot was included as a control variable. The analysis yielded a main effect for context ($p < .05$), which was qualified by the predicted Context x Stadium Habit Strength interaction, $B = 1.15$, $t(50) = 2.00$, $p < .05$. Figure 2 presents the simple slopes analysis for this interaction. As indicated by the relatively flat slope for those primed with kitchen contexts, speech intensity did not vary as a function of habit strength to visit sports stadiums (*simple slope* = -0.05, *ns*). However, for those primed with sports stadiums, habit strength was positively related to speech volume (*simple slope* = 1.01, $p < .05$).

To verify that this effect was not a function of arousal or RT in the search task, we constructed regression models predicting arousal ratings and mean RT from context (kitchen prime vs. stadium prime), habit strength, and their interaction. No effects or interactions emerged in the analyses on arousal (all *p*s > .10). For RT, only an unanticipated main effect emerged for context, $B = 5.10$, $t(50) = 5.40$, $p < .01$, reflecting faster responses in the kitchen condition,

perhaps because the kitchen images were somewhat simpler than the stadium images. The lack of main effects or interactions involving habit strength indicates, however, that neither arousal nor faster responding could account for the greater speech intensity of participants with stronger habits after priming with sports stadiums.

Discussion

Study 3 demonstrates that the pattern of direct context cuing evident in Study 2 applies not just to people's implicit associative habit knowledge but also to the performance of their actual habitual behavior. Subtly exposing participants to a context associated with loud speech led them to speak more loudly, but only if they had a behavioral history of frequently and consistently attending that context in the preceding six months. Importantly, supporting the hypothesis that habits are directly cued, this effect did not depend upon the context activating a goal state that motivated participants to speak more loudly. Indeed, the context priming procedure had no impact on loudness goals (independently or in interaction with habit strength), despite a pilot test demonstrating the ability of this measure to detect changes even in implicit loudness-related goals/motivations.

The results of Study 3 also help to distinguish the nature of habit cuing from somewhat similar effects reported previously for situationally-activated norms. In a study that provided the methodological inspiration for the present one, Aarts and Dijskterhuis (2003) tested whether exposing people to images of libraries activated a situational norm to speak more quietly, thereby inducing actual decrements in speech intensity. In purely behavioral terms, their results mirrored the current results: Library priming led to a significant reduction in speech volume. Their situational norm effects, however, were subject to a very different pattern of moderation than our habit cuing effects. First, the effects of library priming on speech volume only emerged when

participants were given a goal of visiting a library after the experiment. Our participants were given no such goal, and no evidence for altered levels of goal activation was obtained in our study. Second, unlike our stadium priming effects, Aarts and Dijksterhuis's (2003) library priming effects did not vary as a function of how frequently participants had visited that context in the recent past. Thus, integrating across these sets of findings suggests that habits and situational norms both can be triggered automatically by exposure to relevant context cues. However, habit effects require a history of frequent, consistent repetition, whereas situational norm effects can be instigated without such a history. Conversely, situation norm effects require the activation of a facilitating goal state, whereas habit effects are directly cued.

Study 4

In Study 4, we test the idea that people will persist in performing habits even when these behaviors are no longer meeting the goals that people report as motivating performance. Such a finding would converge with Study 3 in demonstrating that habitual responses are directly cued, independently of people's explicit or implicit goals.

Study 4 tested this question in a field experiment conducted at a campus theater. We reasoned that eating popcorn at movie cinemas is a behavior that is highly habitual for some people but not others. To identify people's goals for eating popcorn at the movies, we conducted a pilot test ($N = 22$) in which participants provided open-ended responses about why they performed this behavior. Taste was almost universally reported as the goal/motivation for eating popcorn, with 19 out of 22 participants providing the word *taste* or a close synonym, such as *flavor*. We reasoned that if popcorn consumption does in fact depend on the goal of taste, then people should cease eating it when the popcorn is stale, because the behavior then has ceased to serve the goal. Conversely, if popcorn consumption is directly cued by the theater context, then

people should readily persist in eating even when given stale popcorn. In line with the results of the prior studies, we predicted that it would specifically be those individuals who habitually eat popcorn at cinemas who would persist in eating stale popcorn. This prediction would emerge in an interaction between the staleness of the popcorn and participants' habit strength for eating popcorn in the theater.

Method

Participants. One hundred five (47 male, 58 female) movie viewers were paid $6 for participating in a survey ostensibly studying personality differences in movie preferences.

Procedure. The experiment was conducted in a 200-person movie theatre on Duke campus, immediately prior to the showing of a scheduled movie. Groups of 15 to 30 individuals participated.

Before entering the theatre, participants were given a 591 ml bottle of water and a box of popcorn. Four participants declined the popcorn and so were excluded from the analyses. The procedure was adapted from Wansink and Kim (2005). Participants were randomly assigned either to receive popcorn that was fresh (popped 1 hour before the session) or stale (popped 7 days before the session). Each box was discreetly numbered at the base so that it could be matched to participants' survey responses. Boxes were pre-weighed using a digital scale and averaged 61.73 grams (SD = 6.74).

Participants entered the theatre with their popcorn and water and were instructed to maximize their seating distance from other participants. The lights were immediately dimmed and a series of six movie trailers for unreleased films was shown, totaling 15 minutes of viewing time. All popcorn boxes and water containers were collected immediately after the final trailer. Participants then moved to the theatre foyer and completed the survey, which, to maintain the

cover story, first assessed their interest in seeing each film and the Ten Item Personality Inventory (Gosling, Rentfrow, & Swann, 2003). These filler items were followed by the critical measures: Participants rated their liking for the popcorn on a 5-point scale ("very bad" to "very good"). Participants indicated the strength of their habits to consume popcorn in movie theatres on a 7-point scale ("always" to "never," reverse scored).

Following the session, popcorn boxes were weighed again and the main dependent variable—percentage of popcorn consumed—was computed.

Results

Our primary hypotheses were tested with regression models using predictors of freshness condition (stale vs. fresh), habit strength to eat popcorn in theaters, and the interaction.

Liking for popcorn. In the analysis on participants' reported liking for the study popcorn, a main effect emerged for freshness, $B = 0.91$, $t(96) = 4.54$, $p < .01$, reflecting that participants liked the stale popcorn significantly less than the fresh popcorn. The main effect for habit strength was non-significant, $B = 0.12$, $t(96) = 1.51$, $p > .10$, as was the interaction term ($t < 1$). In sum, this pattern indicated that the freshness manipulation successfully reduced liking and that this reduction did not vary significantly across levels of habit strength.

Percentage of popcorn consumed. On average, participants ate 50% (31.64 grams) of the popcorn they were given. In the analysis testing our hypotheses about the amount of popcorn consumed, participant sex and ratings of liking for the popcorn were included as control variables. The analysis revealed significant main effects for sex (men ate more) and liking. The predicted Freshness X Habit Strength interaction also emerged, $B = -6.15$, $t(94) = 2.00$, $p < .05$. To interpret the interaction, we calculated simple regression slopes between habit strength and percent popcorn consumed in the stale and fresh popcorn conditions. Following the

recommendations of Cohen et al. (2003), separate slopes were computed for those with weak (mean -1 *SD*), moderate (mean levels), and strong (mean + 1 *SD*) popcorn consumption habits. Figure 3 presents the results of the simple slopes analysis. As predicted, among participants who infrequently ate popcorn at cinemas, the percentage of popcorn consumed declined significantly in the stale versus fresh conditions, $B = 23.18$, $t(96) = 2.77$, $p < .01$. For those with moderately strong popcorn consumption habits, the percent consumed declined marginally, $B = 11.96$, $t(96) = 1.93$, $p = .06$. Finally, for those with strong popcorn consumption habits in cinemas, the percent consumed remained unchanged across the stale and fresh conditions ($t < 1$).

Discussion

The results of Study 4 confirmed our prediction that habitual popcorn consumers would continue indulging in their eating habit even when the popcorn was stale and no longer served its purported goal. Strikingly, those with strong consumption habits actually ate the same amount of popcorn regardless of whether it was freshly prepared or seven days old. In contrast, those with weak popcorn consumption habits were sensitive to the freshness of the popcorn, eating significantly more popcorn when it was fresh than stale. These effects emerged despite that strong and weak habit participants uniformly reported liking the stale popcorn less than the fresh. Additionally, when we included rated liking in the analysis so as to control for the degree to which participants liked the popcorn, the predicted effects continued to emerge. Thus, we can rule out the alternative explanation that habitual eaters persisted in eating because stale popcorn is less aversive to them than it is to non-habitual eaters.

The obtained pattern of results suggests that the responses of habitual eaters were cued directly by the viewing and eating context. So long as they remained in that context, they continued to eat at rates that were not dependent on whether the behavior served its ostensible

goal. Given that the current study was a field experiment, it was not possible to isolate the specific context cues driving the behavior. It is plausible that the setting of the cinema itself becomes mentally linked with the behavior of popcorn consumption, through frequent past co-activation. Alternatively, each handful of popcorn may trigger the next, as with chunked motor sequences that run off in a ballistic or self-propagating manner (Graybiel, 1998).

These findings expand upon prior work conducted by Wansink and colleagues (e.g., Sobal & Wansink, 2007; Wansink & Kim, 2005). In field studies similar to the present one, they have found that the quantity of food people consume can be influenced by simple manipulations of environmental cues such as plate and serving size even when the outcome value of eating (e.g., food quality, hunger) is held constant. In a sense, our findings reverse the logic of these studies by holding the environment constant and showing that context-cued eating patterns will persist even when the outcome value of eating is significantly devalued. Our results offer additional insight, however, by suggesting that these effects are associated with a behavioral history of frequent and consistent prior repetition that leads to the formation of context-cued eating habits.

It is also interesting to speculate whether the current results suggest that habit formation plays a specific role in explaining Schachter's (1968) externality hypothesis, which stipulates that obese individuals are more driven by external cues (e.g., serving size) and less by internal cues (e.g., satiety) than are non-obese individuals (see also, Wansink, Payne, & Chandon, 2007). Obesity has been linked to distinct profile of eating patterns that tend to be repeated consistently at particular times of day (e.g., nocturnal snacking; Berg et al. 2009). The current results suggest that such eating habits are likely directly cued by context in a manner that proceeds autonomously from internal cues like hunger. Accordingly, obese individuals may be subject to

two mutually reinforcing effects. Compared with non-obese individuals, they are both engaging in more unhealthful eating behaviors and also repeating these behaviors in a manner that makes them more habitual and hence less amenable to influence from internal cues and other outcome oriented states.

Discussion

When you habitually drag yourself to the gym each morning, has the behavior been motivated by your ardent hope of fitting back into your favorite jeans, or has it been directly primed by the myriad context cues that compose your morning routine? The results of 4 studies suggest that people strongly believe and rapidly infer that goals drive their habits, but that these behaviors are, in reality, directly cued by the context cues that consistently covaried with past performance.

Study 1 demonstrated across a broad range of study and exercise behaviors that, as habit strength increases, so too does the strength of people's belief that goals motivate them to perform the behaviors in question. Studies 2 through 4 then demonstrated that these beliefs do not correspond with the direct cuing mechanisms that actually guide habit performance.

Building from self-perception theory (Bem, 1967), we reasoned that, given people's limited introspective access to the psychological mechanisms governing habits, their inferences about the causes for their own actions are just that—inferences. The linking of strong habits and strong goals may reflect the belief that frequently performed actions are diagnostic of the self and thus strongly reflect one's goals.

Study 2 supported our reasoning by demonstrating that goals operate very differently in people's inferences about their habits versus in measures of their implicit, associative habit knowledge. Specifically, habitual runners were faster than non-habitual runners at making

inferences about the goals that motivated them to run, even though an implicit measure (a lexical decision task paired with subliminal priming) indicated that those goals were not cognitively associated with running any more strongly as habit strength increased. Instead, habit strength was associated with an increasing association between the behavior of running and the context in which that behavior was routinely performed. Thus, implicit associative habit knowledge is encompassed in direct context-response associations.

Studies 3 and 4 demonstrated direct cuing with actual performance of habits. Study 3 manipulated the contexts that activate habits and demonstrated that habit performance depends on perceived cues. Specifically, among participants who had frequently visited sports stadiums in the past, incidental exposure to images of sports stadiums cued the response of speaking loudly that had, through past experience, become associated with the context. This cuing did not occur for participants who had not frequently visited stadiums. Critical to Study 3's findings, the context-cuing of speech habits did not depend on the activation of a goal to speak loudly. That is, participants with strong habits spoke loudly despite displaying no changes in goals related to loudness of their speech.

Study 4 reversed the logic of Study 3 by holding context stable and manipulating the value of the outcome participants believed motivated their behavior. When people were in a context associated with an eating habit, they continued to eat essentially the same amount of food irrespective of whether it served the goal of providing a desirable taste. Importantly, non-habitual eaters were highly sensitive to outcome value suggesting that their behavior was not context cued and was, instead, goal dependent.

Self-Regulatory Implications of the Direct Cuing of Habits

In highlighting the power of context directly to trigger habitual responses, the present findings help to explain a central problem confronted in behavior change interventions: Why does changing people's goals and intentions have only limited impact on their habits? Demonstrating the intractability of this problem, Webb and Sheeran (2006) conducted a meta-analysis of 47 studies using persuasive appeals and other interventions to change people's behavioral goals. The central question was whether the interventions, which were selected because they had significant impact on behavioral goals, would also change behavior. The answer depended on the habit strength of the behavior. Interventions targeting behaviors conducive to habit formation, in that they could be performed frequently in stable contexts (e.g., seat belt use), yielded only minimal behavior change ($d = 0.22$, $k = 35$). However, interventions targeting behaviors that were not conducive to habit formation (e.g., course enrollment) yielded more substantial behavior change ($d = 0.74$, $k = 12$).

The present studies suggest that goal- and intention-oriented interventions gain little traction over habits because they are targeting psychological constructs that no longer mediate the execution of those behaviors. Instead, interventions targeting habits should focus on environmental re-engineering (e.g., Verplanken & Wood, 2006) and stimulus control techniques that involve reducing exposure to habit-relevant contextual triggers (Sobal & Wansink, 2007). Another promising approach involves a hybrid of both context change and goals/intentions. In this vein, Verplanken et al. (2008) recently tested the *habit discontinuity* idea in which changes in a person's context (e.g., moving house) create a window of opportunity for goals and intentions to gain control of highly habitual behaviors. In support, Verplanken and colleagues found that people high in environmental concern drove their cars significantly less after moving

house, thus presumably disrupting their exposure to the context cues associated with their driving habits.

A second promising category of self-regulatory strategies centers on altering people's attentional orientation towards the context features that directly cue their undesired habits. Using a diary methodology, Quinn, Pascoe, Wood, and Neal (2009) found that everyday attempts to control unwanted habits were most successful when pursued through a strategy of *vigilant monitoring* of habit cues. A subsequent experiment using Jacoby's process dissociation procedure (Jacoby, 1991) confirmed the value of vigilant monitoring, and further demonstrated that this strategy promoted success specifically by increasing participants' controlled, intentional processing of the cues that triggered their unwanted habits.

Habits' Goal Dependence May Be Illusory, But Is It Useful?

Our results suggest that people's beliefs and inferences about their habits likely are not reliable indicators of the causal mechanisms generating those behaviors. This does not mean, however, that these beliefs and inferences serve no useful function in habit regulation. One intriguing possibility is that post hoc goal inferences provide a make-shift route through which habits can, to a limited degree, be monitored for consistency with goals (see Wood & Neal, 2007). To the extent that people engage in metacognitive monitoring (see Schooler, 2002) of their habits, they may consistently be able to infer goals that then function as comparison standards in monitoring habit performance. Put differently, even though goals may not function at the front-end, driving habits, they may be inferred after habit performance and allow people to detect when their habits are producing undesired outcomes. The inferred goal may or may not be the one that originally motivated the behavior prior to habit formation, and so such inferences may ironically lead people to adopt new goals. For example, a student with a habit to do

homework on the computer after dinner may infer that the behavior reflects his or her strong academic achievement goals, rather than a habit formed through the influence of a persistent parent. Once inferred, the goal can then be used as a comparison standard in testing for goal-inconsistent outcomes, such as surfing the Web.

Differentiating Habits from Other Forms of Automaticity

The recognition that habits are a specific form of directly cued, goal-autonomous automaticity has important implications for distinguishing habits from other automatic dispositions that can drive behavior. Thus, we see the current results as building on decompositional models of automaticity that allow automatic processes to exhibit multiple separable features that can be present in various combinations (Bargh, 1994; Moors & De Houwer, 2006). In the language of these approaches, habits can be categorized as a *goal-independent* form of automaticity, given that habit performance "does not depend on a goal for its occurrence" (Moors & De Houwer, 2006, p. 305). In terms of taxonomies then, habits are perhaps most closely related to the learned, non-motivated ideomotor priming effects demonstrated by Bargh and colleagues (e.g., Bargh et al., 1994).

The unique attributes that emerged in the present studies also help further differentiate habits from other forms of automaticity that sometimes yield similar effects on behavior. For example, unlike implicit goals and implementation intentions that are acted on flexibly depending on people's explicit goals (e.g., Sheeran, Webb, & Gollwitzer, 2005), habits are not dependent on holding behavior-consistent explicit goals. Moreover, unlike situational norm effects (Arts & Dijksterhuis, 2003), and mimicry effects (Chartrand & Bargh, 1999), that are elicited with little or no practice, the habits documented in our studies only emerged among participants who had frequently engaged in the relevant behavior in the same, stable context.

Conclusion

The current research adds habits to a long list of human activities that afford limited introspective access (Nisbett & Wilson, 1977). Moreover, people's belief that these behaviors are strongly goal dependent belies that they are, in reality, the product of direct context cuing from the environments and preceding actions with which they consistently covaried during past performance. The idea that much of everyday life is cued by external factors may seem to be a depressing commentary on human agency. Although habits clearly do undermine choice and goal-pursuit on occasion, there is good reason to think that their net influence on agency is positive (Pascoe, Neal, Toner, & Wood, 2009). Because so much of what we need to do in the future is what we have done before, habits provide a highly efficient and economical mechanism for distilling the wisdom of past behavior and preserving our limited resources for the moments in life when it is really needed.

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Authors' Note

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Table 1. Bivariate Correlations between Habit Strength and Perceived Goal Dependence of the Habit: Study 1

		Exercise goals				**Study goals**				
		Weight	Health	Stress reduction/ relaxation	Muscle tone	Grades	Future Employment	Enjoyment	Achieve/ succeed	Grad school entry
Exercise behaviors	*Running*	0.26	0.40	0.33	0.44					
	Cycling	0.79	0.67	0.77	0.60					
	Swimming	0.45	0.62	0.50	0.55					
	Other cardio	0.61	0.62	0.58	0.60					
	Weights	0.46	0.63	0.56	0.67					
	Group fitness	0.56	0.66	0.66	0.61					
	Yoga/Pilates	0.52	0.63	0.62	0.64					
Study \behaviors	*Writing*					0.65	0.22	0.07[a]	0.40	0.15
	Lit. searches					0.49	0.40	0.41	0.49	0.44
	Flash cards					0.62	0.43	0.40	0.62	0.49
	Study groups					0.35	0.67	0.77	0.55	0.70

N=690. Ssuperscripts [a] denote non-significant effect; All others, *p*s < .01.

Figure 1.

Decomposition of 2-way interaction predicting reaction time facilitation scores (ms) in the lexical decision task. Simple slopes represent facilitation scores as a function of association type (context-behavior trials vs. composite goal trials) and running habit strength. Positive scores reflect faster responding to the relevant association type relative to baseline reaction time on control trials: Study 2.

Figure 2.

Decomposition of 2-way interaction predicting baseline adjusted speech volume (db) in the visual search task. Simpls slopes represent speech volume as a function of context priming condition (kitchen versus sports stadium) and the strength of participants' habits to visit sports stadiums in the preceding 6 months. Slopes control for participants' reaction time in detecting boot: Study 3.

Figure 3.

Decomposition of 2-way interaction predicting percentage of popcorn eaten during 15 minutes of movie trailers. Simple slopes depict percent consumed of stale and fresh popcorn for those with strong (mean + 1SD), moderate (mean), and weak (mean - 1SD) habits for eating popcorn at cinemas. Slopes control for sex and liking for the popcorn: Study 4

Figure 1

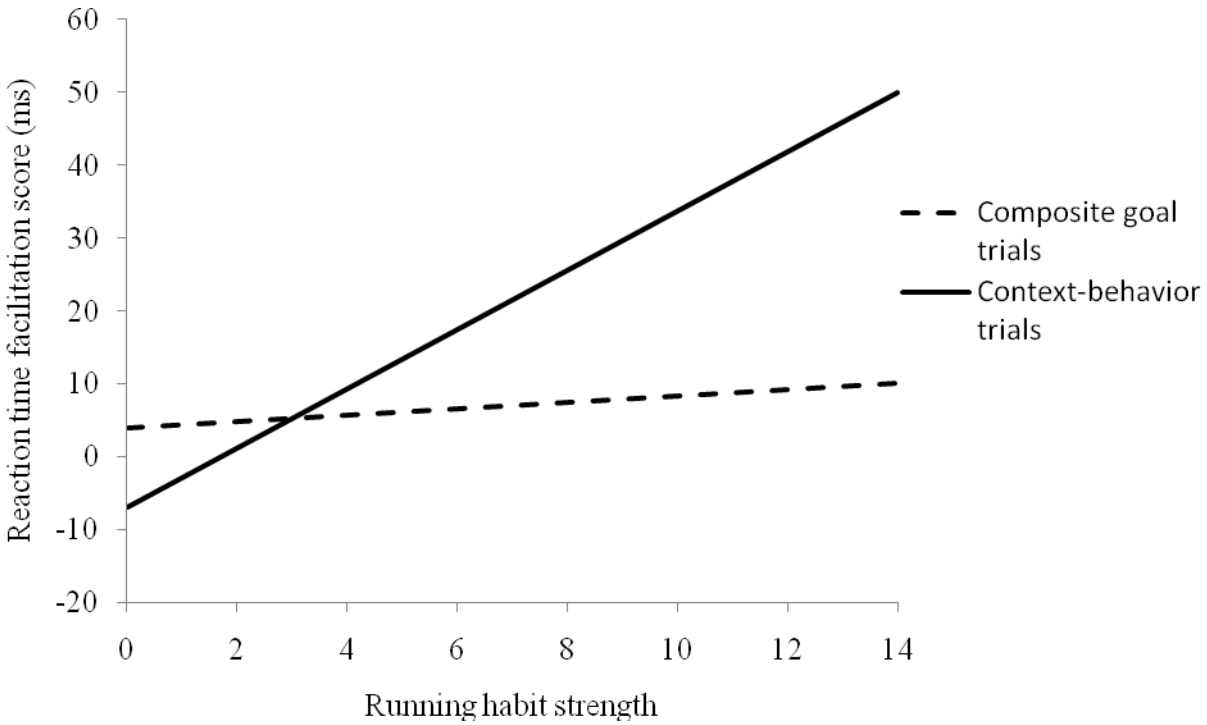

60
50
40
30
20
10
0
-10
-20
Reaction time facilitation score (ms)
0
2
4
6
8
10
12
14
Running habit strength
Composite goal trials
Context-behavior trials

Figure 2

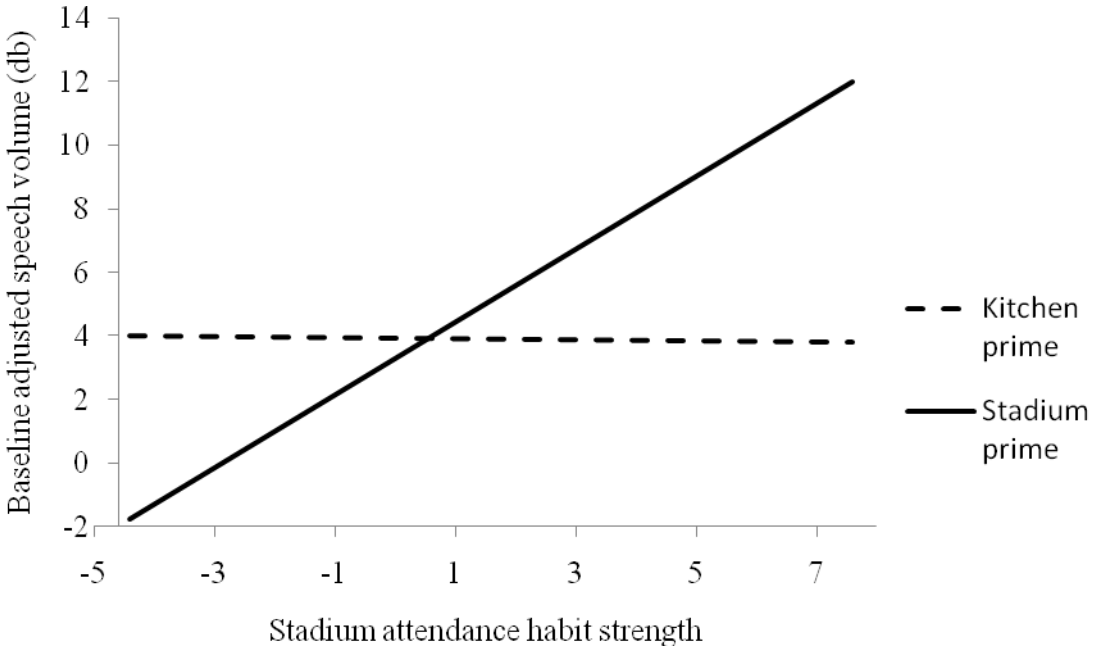
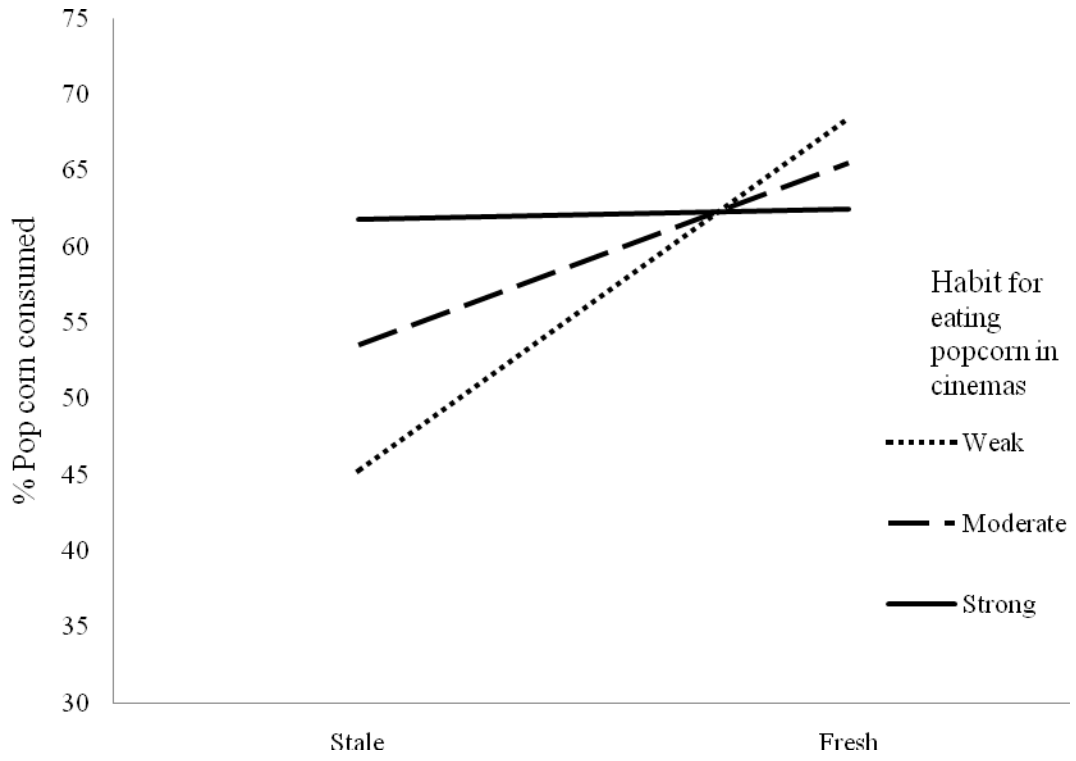

Baseline adjusted speech volume (db)
14
12
10
8
6
4
2
0
-2
-5
-3
-1
1
3
5
7
Stadium attendance habit strength
Kitchen prime
Stadium prime

Figure 3


75
70
65
60
55
50
45
40
35
30
% Pop corn consumed
Stale
Fresh
Habit for eating popcorn in cinemas
Weak
Moderate
Strong

Footnotes

[1] Although we focus largely on good habits in the present research, it is interesting to speculate about inferences that people make for bad habits. Bad habits represent behaviors that people wish not to perform but do anyway. Inferences about such habits might provide especially strong evidence of our inference argument. We suspect that people follow the augmentation principle in which a dispositional cause (e.g., liking to eat) is perceived as an especially strong motivator of a habit (e.g., eating dessert) that one continues to perform despite intentions to do otherwise.

[2] The single exception to this pattern was the link between writing and the goal of enjoyment, where increasing habit strength was uncorrelated with levels of perceived goal dependence. One explanation is that our student participants perceived themselves to have less free choice over the frequency of their writing than the frequency of any other behavior tested, and thus this reflects a sort of discounting in which the external pressures or incentives for writing (e.g., looming paper deadlines) decrease the plausibility of the dispositional cause (i.e., liking).

[3] Further demonstrating consistency across studies, we computed effect sizes in terms of the standardized mean difference, and the effect of $d = 0.55$ for our study aligned nicely with the *ds* = 0.86 and 0.55, respectively, for Studies 1 and 3 of Aarts and Dijksterhuis (2000).

[4] Incorrect responses and responses exceeding 2 secs were excluded (2% of trials). Remaining data were Winsorized by trimming values to 2 standard deviations from a participants' mean RT if they exceeded that value (less than 1% of trials, Wilcox, 1997).

[5] We did not include in the goal measure ratings of speaker likeability and social appropriateness because these global assessments did not cohere with the other, more direct measures of participants' impression goals and reactions to others' impressions. When we conducted analyses on all of the item in the goal measure, the results were highly similar to the results reported in the text.

[6] We also included a *stadium-no-voice control condition,* in which participants responded in the visual search task by pressing a key instead of speaking when they identified the boot. This condition ensured that the predicted null effects on the goal measures were not due to the fact that goals were in fact activated by stadium priming, but then extinguished by allowing participants to speak loudly. Refuting this alternate explanation, loudness goals were not significantly different in the stadium-no-voice control condition compared with either the kitchen- or stadium-primed conditions (both *t*s < 1).