Habit in Personality and Social Psychology

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Abstract

Habits are largely absent from modern social and personality psychology. This is due to outdated perspectives that placed habits in conflict with goals. In modern theorizing, habits are represented in memory as implicit context–response associations, and they guide responding in conjunction with goals. Habits thus have important implications for our field. Emerging research shows that habits are an important mechanism by which people self-regulate and achieve long-term goals. Habits also can hinder people's attempts to change their behavior or can ensure that desired behaviors persist. I speculate that understanding of habits also holds promise for reducing intergroup discrimination and for understanding lay theories of the causes for action. In short, by recognizing habit, the field gains understanding of a central mechanism by which actions persist in daily life.

Keywords

automatic/implicit processes, self-regulation, social cognition, lay theories, intergroup relations, social influence/power

"Habit" is largely missing from modern social and personality psychology. If you scan the index of modern social psychology texts or handbooks, you will find few, if any, references to the term. But there are signs of change. Psychology more broadly is showing a resurgence of interest in habit. In this article, I argue that understanding of habits holds significant promise for social and personality psychology.

To an outsider, it might seem obvious that our field should study habit. People hold strong beliefs about their own habits, and these lay beliefs are worth investigating in their own right. As a psychological construct, habit is one of many *acquired behavioral dispositions* (Campbell, 1963). Like attitudes, goals, personality traits, and stereotypes, habits reflect "residues of experience of such a nature as to guide, bias, or otherwise influence later behavior" (p. 97). Over 50 years ago, when Campbell was writing, it made sense to integrate these diverse constructs under a single rubric attitude. He argued for this way forward.[AQ: 2]

Research has, however, progressed to reveal the complex, multifaceted nature of human cognitive and motivational processes. It is becoming clear that the construct, habit, provides unique insight into explaining, predicting, and controlling repeated actions.

Habits are implicit associations between contexts and responses that develop through repeated reward learning (Wood & Rünger, 2016). When people act out of habit, the response is automatically triggered by perception of relevant context cues. As outlined in this article, habits differ in important features from goals and attitudes. When acting on a goal, people are driven by a desire to achieve a particular "object or aim" (Locke & Latham, 2002, p. 705). When acting on attitudes, people express positive or negative evaluations toward a particular entity (Eagly & Chaiken, 1993).[AQ: 3][AQ: 4]

The limited research on habit in social and personality psychology can be traced to a number of sources, including our preference for experimental methods. Habits and other slow-to-change dispositions are not amenable to experimental designs that test immediate consequences of a manipulation (see Bless & Burger, 2016). More specific to habit, in the history of psychological research, habits and goals have been treated as alternative ways to explain behavior. I first provide a brief account of this history, and then explain how modern analyses are beginning to recognize habit along with goals and attitudes. The article goes on to identify new insights about social behavior that emerge from this understanding. These insights illuminate self-regulation in daily life, success of behavior change interventions, interactions between members of social groups, and self-inferences about behavior.

A Brief History of Habit

In the history of psychology, ideas of habit competed with theories of goal pursuit. William James (1890) believed that "habit covers a very large part of life" (p. 3). He imbued habits with metaphoric power, as "the enormous flywheel of society, its most precious conservative agent. It alone is what keeps us all within the bounds of ordinance, and saves the children of fortune from the envious uprisings of the poor." Along with this extravagant description, James acknowledged that habit is

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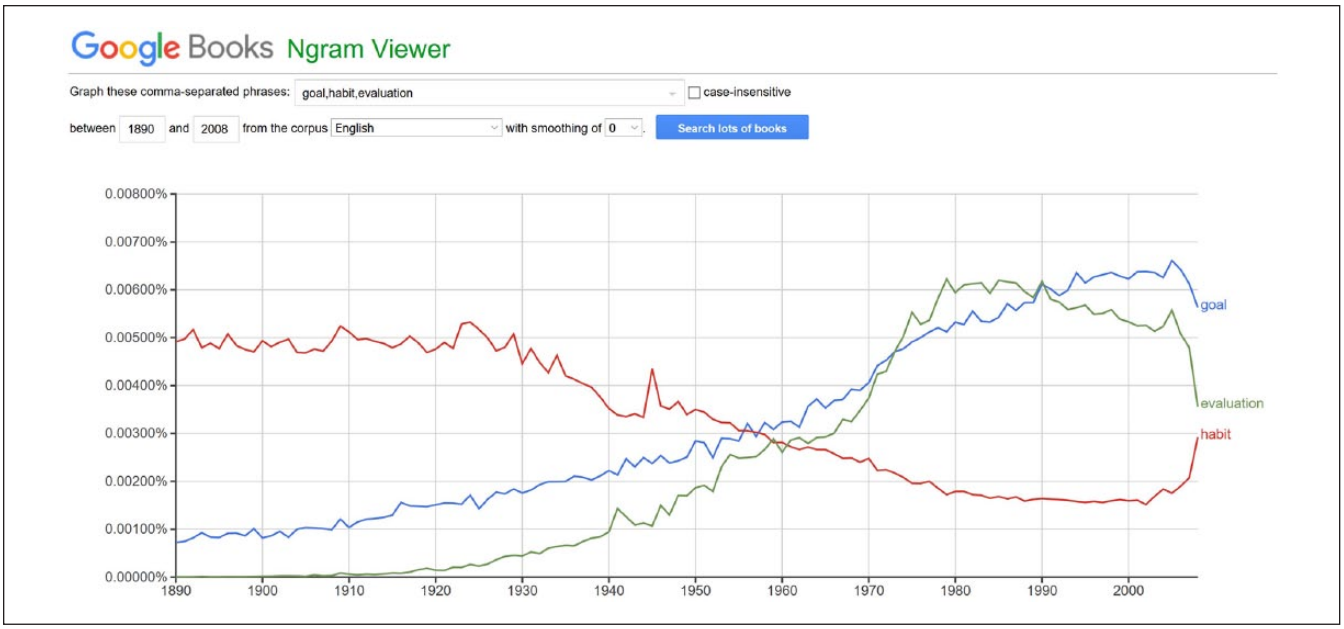

Figure 1. Frequency of use of the words "habit" and "goal" in all books in Google Books archive published from 1890 to 2008.

an ambiguous concept, and that psychology needs to "define clearly just what its limits are" (p. 4).

The field rapidly complied. Researchers proposed a variety of reinforcement-based models of habit. For example, Thorndike's (1911) laws highlighted learning through rewards and response repetition. Skinner's (1938) analysis of operant conditioning further emphasized reward contingencies in the environment, and Hull's (1943) formalized drive theory treated habit strength as a function of prior conditioning. In these analyses, human action is largely driven by external contingencies.

This early reliance on habits in psychology was mirrored in reading materials of the times (see Figure 1). The corpus of text in Google Books reveals that the term *habit* was used frequently by authors of popular and scientific books until the middle of the last century. In contrast, the terms *goal* and *evaluation* were used less often.

On the scientific front, psychologists were quick to oppose the limited conceptions of personal agency in reinforcement models of habit. In an ironic twist of history, some of the biggest objections came from a researcher who studied rats in mazes. Tolman (1948) believed that the rats in his research acquired internal representations and formed cognitive maps. It was a short step to recognizing these capabilities in people. In an attempt to eradicate the habit construct altogether, Miller, Gallanter, and Pribram (1960) proposed that cognitive models and plans should replace what they considered, "nickel-in-the-slot, stimulus-response conceptions" (p. 2) of people. Typical of this approach, Campbell (1963) folded behaviorist and phenomenological accounts of social behavior into the single construct of attitudes.

The cognitive revolution, as we all now know, was a rousing success. This achievement was evident even in the books of the time (see Figure 1). To describe people acting with purpose, book authors increased use of goal and evaluation, and abandoned the term *habit*. Interesting to note, only goal and evaluation were opposed to habit in this way across history (i.e., not attitude, trait, motive, personality, intention).

The idea that people act with a purpose made sense to the field of social and personality psychology, which derived in part from Gestalt perspectives emphasizing social meaning and perception. Thus, attitudes, goals, and personality traits became the coins of our scientific realm.

A few social psychologists, however, sporadically acknowledged habit-like processes. Reflecting his training in radical behaviorism, Bem (1972) developed self-perception theory to explain the inferences that people make about their actions when internal cues are weak, ambiguous, or uninterpretable. Also, early studies on operant conditioning showed that attitudes form through rewards (e.g., Insko, 1965). More directly relevant, Triandis's (1977) theory of interpersonal behavior incorporated habit into an information-processing framework. As people repeat actions in the same context, the influence of habit increases and intention decreases (Ouellette & Wood, 1998). In addition, an inventive series of studies by Verplanken, Aarts, and colleagues demonstrated that strong habits reduce deliberation and narrow information search about future actions (Aarts, Verplanken, & Van Knippenberg, 1997; Verplanken, Aarts, & Van Knippenberg, 1997).

In recent years, the Google Books database shows a promising shift for habit research. Since 2000, the frequency of use of habit has increased (Figure 1). Unfortunately, goals and evaluations declined, suggesting a continued competitive relation. Authors are overlooking the interface between habits and goals/evaluations, and treating them as alternatives. Also worth noting is the accelerating rate of change

evident in the figure, reflecting perhaps the speed-up in science and faster shift in conceptual frameworks in recent years.

Consistent with this shifting Zeitgeist, the present article carves out a scientific role for habit in social and personality psychology. Despite social and personality psychologists' limited interest in habit (exceptions noted above), understanding of habitual responses continued to develop in cognitive neuroscience and studies of reinforcement learning. A synthesis of sorts has been forming in the other research areas.[AQ: 5]

At a neural level, habits are a type of implicit memory (Squire & Zola-Morgan, 1991). Habit performance has a characteristic profile of neural activation involving lesser activation in prefrontal areas involved in decision making (e.g., mPFC) and increased activation in basal ganglia circuits involving the putamen and dorsal striatum (Yin & Knowlton, 2006).[AQ: 6] Furthermore, behavioral compulsions of addiction are in part tied to response habits and a neural pattern of activation in relevant basal ganglia circuits (Ersche et al., 2016; Sjoerds, Luigjes, Van Den Brink, Denys, & Yücel, 2014).

At a cognitive level, habits are aligned with automatic responses (Shiffrin & Schneider, 1977). Some dual-process theories address how deliberative decisions integrate with habit as a particular System 1 process (Evans, 2008; Sherman, Gawronski, & Trope, 2014). In these analyses, habit is a specific implicit memory system with characteristic means of acquisition, extinction, and behavioral expression (Amodio & Ratner, 2011).

Drawing on these insights from cognitive neuroscience, automaticity, and dual processes, recent reviews consider how habits interface with goals in social and health psychology (Cushman & Morris, 2015; Gardner, 2015; Wood & Rünger, 2016). Despite differing in specific details, these analyses recognize the importance of habits in guiding behavior. The present article furthers these perspectives by showing how habitual, cue-driven responses (a) sustain self-regulation, (b) persist despite behavior change interventions, (c) contribute to cross-group discrimination, and (d) are inferred to be volitional choices that reflect goals and plans.

Habit Learning and Performance

Habits develop as people repeat an action for a reward. Through instrumental learning, implicit cognitive associations form between recurring features of the performance context and the rewarded response. Simple contiguity between contexts and responses also contributes to learning of habits (i.e., Hebbian learning). As habits strengthen, the response automatically comes to mind on perception of relevant context cues.

More intuitively, habits reflect a sort of behavioral shortcut to get rewards. Cues in the performance context trigger the response most likely to be rewarded; that is, the one that was rewarded in the past. In any one instance, the reward might not occur. In fact, a common test of habit formation is whether people continue to respond habitually when the reward is no longer expected or valued (see Wood & Rünger, 2016).

Rewards for Habits

Social psychology offers a rich understanding of intrinsic and extrinsic rewards, spanning personal and social benefits such as social acceptance and self-esteem. For simplicity, we treat rewards and valued goals as equivalent, in that both reflect desired action outcomes. Especially during initial learning, people form intentions, or behavioral goals, about what actions to perform to attain rewarding outcomes. With repetition and habit formation, however, rewards become less important in activating responses.

The reduced impact of rewards reflects the way that midbrain dopamine systems support instrumental learning. Dopamine signals are triggered largely by an unexpected reward (i.e., *reward prediction error*). They act as a teaching signal for habit learning in the striatum by retroactively stamping in associations between (a) the still-active memory traces of the response and (b) cues in the performance context (Balleine & O'Doherty, 2010; Wise, 2004). However, dopamine signals become less active as habits form and the reward becomes expected (i.e., decreased prediction errors; Wickens, Horvitz, Costa, & Killcross, 2007).

Triandis (1977) recognized early on that as habits strength, people's intentions (i.e., behavioral goals) have less impact in guiding responses. Numerous experiments have shown that habits become insensitive to reward outcomes (see review in Wood & Rünger, 2016). To illustrate, a field experiment in a cinema provided moviegoers with a bag of stale or fresh popcorn (Neal, Wood, Wu, & Kurlander, 2011). Some participants in the study had strong habits to eat popcorn, regularly eating it when in the cinema, and others did not. The stale popcorn was strongly disliked by all participants. However, only participants with weak popcorn eating habit acted on this preference. They ate more fresh than stale popcorn. Participants with strong habits consumed about the same amount, regardless of what popcorn they received. Thus, habitual eaters continued to eat the popcorn even without the usual reward (crispy, pleasant taste).

The decreasing impact of rewards with repetition might seem surprising. It seems to contradict the classic finding that people become more certain of their preferences with more experience, so that attitudes become more predictive of behavior (Fazio & Zanna, 1981). One way to reconcile this conflict comes from a study of blood donors that revealed a curvilinear relation between intentions and behavior given increasing experience (Sheeran, Godin, Conner, & Germain, in press). When people first started donating, the more experience they got, the stronger the impact of their intentions on behavior. However, once a veteran donator, people's

intentions had less and less impact, suggesting that donation had become habitual.

If habit formation involves reduced sensitivity to rewards, then people who deliberate about how to achieve a certain outcome may fail to form habits. Perhaps, this is why email reminders to perform a behavior can hinder habit formation (Austin & Kwapisz, 2016; Stawarz, Cox, & Blandford, 2015). A reminder can keep the goals for an action salient and impede context–response associations in memory. Additional evidence that goal pursuit can interfere with habit formation comes from Gillan, Otto, Phelps, and Daw's (2015) repeated decision-making task. During learning, some participants chose to solve the task by estimating outcome values. Habits failed to form when participants reasoned about the outcomes of their choices in this way.

To more directly test the effects of deliberate goal pursuit on habit formation, Labrecque and Wood (2017) instructed some participants to learn a sequential task (making sushi in a computer game) by memorizing its steps, so that they could complete it later without guidance. These instructions had no effect on their motivation or perceived task difficulty, and instructions even improved performance early in practice. However, the long-term effect was to impede learning of context–response (habit) associations. Deliberation seemed to keep learning explicit. Interestingly, participants were largely unaware of their habit formation. The more practice, the more participants reported the task became automatic, regardless of whether they actually formed habits.

In summary, habit formation emerges through reward learning. As habits strengthen, people naturally become less sensitive to rewards. Conversely, deliberating that keeps rewards salient can hinder habit formation.

Context Cues for Habits

Once habit associations form in memory, the response is activated by context cues. When triggering conditions are met, people usually act on the habit in mind. Following William James's (1890) *ideomotor action*, activating a behavior increases the likelihood of engaging in it. That is, "every representation of a movement awakens in some degree the actual movement which is its object" (p. 526).

The context cues that activate habits range from simple elements of the environment that covary with the response—including physical locations, other people, internal states, and preceding actions in a sequence—to complex conjunctions involving multiple such factors. As with routine action, responses are triggered by a current internal state in conjunction with the state of the environment (Botvinick & Plaut, 2004). For example, a breakfast routine might involve getting a cup of coffee and sitting down at the kitchen counter. These, in conjunction with morning bleariness, might cue skimming news reports.

A variety of psychological mechanisms contribute to cuing of responses by contexts. Attention is automatically captured by features of performance contexts (e.g., coffee pot) that in the past guided actions and rewards (Anderson, 2016). With increasing experience, actions are not tied to a specific cue in a specific time and place (e.g., kitchen counter) but to other, similar cues (e.g., kitchen table) associated with rewards. In addition, alternative responses may become less accessible as habits are repeatedly activated. The accessibility of a given response decreases with repeated retrieval of alternatives (e.g., McCulloch, Aarts, Fujita, & Bargh, 2008). Also contributing to habit performance, people may confer intentionality onto their habits, misattributing externally cued cognitions to their own internal preferences and desires (Loersch & Payne, 2011). Furthermore, stress, distraction, and depletion of willpower reduce the capacity to make a decision about how to act, thereby increasing reliance on habits (Neal, Wood, & Drolet, 2013).

Evidence of this means of action control, in which habit responses are brought to mind by context cues, comes from a lexical decision task with runners (Neal, Wood, Labrecque, & Lally, 2012; Study 1). Habitual runners were faster to recognize the words, *running* and *jogging*, after subliminal priming of the locations in which participants typically ran. Habitual responses appeared to be linked with performance contexts in memory. However, running was not activated similarly by participants' personal goals for running (e.g., weight, relax). Goals only activated running for participants who were still developing running habits. Presumably, they had to think about these goals to motivate themselves to get out and exercise.

In summary, habitual responses become associated with contexts, such that perception of the cue automatically activates the response. Habits are then executed as people carry out that response.

Habit Automaticity

The term *habit* is sometimes used interchangeably with automaticity. More accurately, habits possess a specific subset of features associated with automaticity (De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009), including activation by recurring context cues and insensitivity to goals (i.e., not goal dependent).[AQ: 7] Habits may also be performed quickly, efficiently, and in a rigid manner, involving limited thoughts and reflecting chunked sequences of responses executed as a unit (Smith & Graybiel, 2016).[AQ: 8]

In contrast with habits, the automaticity typically studied in social psychology involves implicit activation of concepts or goals. Even so-called behavioral priming tests how memory activation of a general construct (e.g., elderly) or goal (e.g., food) influences semantically related behavioral responses (Weingarten et al., 2016). Unlike habits, concept and goal priming do not necessarily activate any particular well-practiced response. Specifically, priming a concept (a) activates a rich, complex array of associated constructs in memory (Wheeler & DeMarree, 2009) that (b) biases

interpretation of a variety of situational factors to provide answers to current concerns (Loersch & Payne, 2011). In this way, concept priming activates a range of potential responses. Goal priming occurs when environmental cues activate a particular need along with various means of need-fulfillment. Even strongly desired goals that stably characterize people's motives yield a strategic orientation and not necessarily repetition of a specific behavioral means (Kruglanski et al., 2002).

Implicit concepts and goals also depend on semantic and motivational factors in ways unlike habits. The effect of implicit motivational states is often contingent on people's current goals and plans. For example, Fishbach and Shah (2006) found that implicit approach to current goal opportunities (e.g., fitness) and implicit avoidance of temptations (e.g., food) depended on the extent to which people held a relevant overarching goal (e.g., dieting). Explicit goals also proved to moderate automatic goal pursuit in studies of *implementation intentions* (i.e., if–then plans). Specifically, students who had earlier formed implementation intentions to study acted on these intentions only if they had goal intentions to study (Sheeran, Webb, & Gollwitzer, 2005). Echoing this dependence on explicit goals, implementation intentions to use dental floss increased the perceived automaticity of flossing only to the extent that people explicitly intended to floss (Orbell & Verplanken, 2010). In these ways, consciously endorsed goals influence implicit goal pursuit.

Expression of habit is less sensitive to attitudes and intentions (Ouellette & Wood, 1998). In correlational tests, people often acted on strong habits even if they did not intend to do so (Gardner, de Bruijn, & Lally, 2011). In an experimental test, participants acted on habits to speak loudly in sports stadiums when primed with the stadium context, regardless of their explicit or implicit goals (Neal et al., 2012; Study 2). Especially noteworthy, this experiment demonstrated habit insensitivity to goals in a paradigm originally developed to show that people act on implicit norms only given supporting explicit goals (Aarts & Dijksterhuis, 2003).

In summary, a stumbling block to progress in habit research has been differentiating habit effects from implicit goals and attitudes. Although habits are built on mental associations, much like semantic and goal associations, habits develop through repeated reward learning and are expressed as a specific response triggered by particular context cues. Along with these features, habit performance appears to be relatively insensitive to the influence of implicit or explicit goals.

Habit strength has been assessed in various ways in this research. Each captures particular aspects of habit expression. Reaction times tasks to associate contexts and responses directly test the cognitive associations guiding habit performance (Labrecque & Wood, 2017; Neal et al., 2012). Alternatively, self-report scales of behavioral automaticity assess the experience of acting without thinking (Verplanken & Orbell, 2004). These measures reflect feelings of fluency and self-efficacy along with habit, and do not always predict behavior separately from goals (Labrecque & Wood, 2015). The classic measure of habit is frequency of past behavior in a given context (e.g., Galla & Duckworth, 2015). An assumption with this measure is that habit formation is almost inevitable, given sufficient repetition and stable environments. However, the point at which habits form with repetition is not clear and might emerge later for complex actions (Lally, Van Jaarsveld, Potts, & Wardle, 2010).[AQ: 9]

It is worth keeping in mind that a dualist comparison between acting on habit versus on deliberate thought is overly simplistic. Many behaviors studied in social and personality psychology are complex and probably draw on both memory systems (and potentially others, for example, Pavlovian conditioning). Additional nuance comes from gradations of habit strength, recognizing the continuum from stronger to weaker habits. Nonetheless, for simplicity, responses are described here as habitual or more thoughtful.

In the remainder of the article, I identify four research areas that have made significant progress from a modern understanding of habit or are positioned to do so in the near future. Such gains help demonstrate that the construct of habit is not just a relabeling of an existing construct. A new construct should allow us to predict previously overlooked phenomena or increase the efficiency of explanations of existing phenomena. As argued below, these gains in knowledge are already evident in research on self-regulation and behavior change. Significant, but as of yet largely unrealized, gains are also possible in research on intergroup discrimination and lay explanations of one's own habits.

Habits and Self-Regulation

Habit mechanisms, it turns out, are central to self-regulation. Habits were once considered to be regulatory challenges. Drinking too much, eating too much, procrastinating—all can be habitual responses that need to be controlled. This emphasis is understandable given the potential for bad habits to threaten health, happiness, and financial well-being.

It is becoming increasingly clear, however, that habits also provide a means of effective self-regulation. People can act habitually in ways that aid goal pursuit. This section describes how habit plays each of these roles in self-regulation.

Habit Inhibition

In traditional models of self-regulation, people pursue goals by inhibiting habits and other unwanted responses (e.g., Green & Myerson, 2004; Metcalfe & Mischel, 1999; Muraven & Baumeister, 2000). Self-control itself is often defined in terms of inhibition.

Bad habits present significant inhibitory challenges. Experience sampling studies in which participants reported each time they tried to inhibit an emotion, thought, or behavior revealed that around 12% were attempts to control

unwanted habits, or responses performed almost daily in the same context (Quinn, Pascoe, Wood, & Neal, 2010). A separate 38% involved temptations that would provide immediate gratification despite longer term regret. Only about 3% of responses were categorized as both habits and temptations. The minimal overlap is consistent with the current analysis separating habits from goals. Bad habits are not short-term indulgences.

In general, habits proved more challenging to control than responses to temptations. Success was lower for habit control. Different strategies were effective. Although stimulus control—removing a stimulus or limiting exposure to it—helped control unwanted responses to temptations, this strategy yielded little traction over habits. Presumably, habit cues, unlike tempting stimuli, are not easily recognized in daily life. Instead, habitual responses were most successfully controlled through vigilant monitoring of the behavior to prevent cues from triggering the unwanted response. The effectiveness of this strategy was validated in a subsequent experiment with a word association task, which showed that vigilance outperformed other strategies of habit control (Quinn et al., 2010; Study 2). However, vigilance has the disadvantage of being highly effortful. Even using this strategy, participants were only moderately successful at suppressing unwanted habit responses.

In summary, as a threat to self-regulation, habit responses differ from temptations. Habits are more difficult to control, and effortful monitoring and inhibition were the only successful strategies.[AQ: 10]

Habit Self-Regulation

Despite the classic focus on control of bad habits, most everyday habits are compatible with goals (Ouellette & Wood, 1998). This compatibility makes sense, given that habits form as people repeat rewarded behaviors. The regulatory benefits of acting habitually are clear: Habits efficiently attain (past) rewarding outcomes and can thereby meet regulatory goals. Acting on habit also frees up cognitive resources to tackle other challenging life tasks. Furthermore, habits are highly reliable, providing a ready response when people are depleted, distracted, stressed, or otherwise unable to make decisions about what to do (Neal et al., 2013).

In evidence of this regulatory role, beneficial habits are a key means of goal attainment among high self-control individuals (Gillebaart, Schneider, & De Ridder, 2015). Participants higher in trait self-control had weaker habits to snack on unhealthy foods (Adriaanse, Kroese, Gillebaart, & De Ridder, 2014) and stronger habits to exercise, eat healthy snacks, get adequate sleep, and do homework (Galla & Duckworth, 2015). In an especially convincing longitudinal study, adolescents with higher trait self-control, as measured before a 5-day mindfulness meditation retreat, had more goal-congruent meditation habits as assessed in a follow-up survey 3 months later (Galla & Duckworth, 2015). Thus, high self-control is instrumental for developing good habits, and these habits then reliably promoted desired outcomes.

It might seem surprising that chronically high self-control is linked to habit performance. Standard scales of self-control were designed to capture people's ability to achieve goals through active inhibition. For example, Tangney, Baumeister, and Boone's (2004) often-used scale was designed to assess "the ability to override or change one's inner responses, as well as to interrupt undesired behavioral tendencies (such as impulses) and refrain from acting on them" (p. 274). One explanation for this puzzle is that people have limited insight into the automated ways in which they meet life goals and challenges. Given a lack of conscious awareness of habit automaticity, people might complete self-control scales by reporting on their success at self-control outcomes but overlooking the habits by which they are produced. In fact, many items from Tangney et al.'s (2004) scale tap outcomes and not mechanisms of self-control (e.g., "I eat healthy foods"; "I am always on time"). Another possibility is that active inhibition is involved in the early stages of habit formation but not as habits strengthen with repetition. In this account, people complete self-control scales by reporting on their experiences early in goal pursuit, overlooking what happens after habits have formed.

By relying on beneficial habits, high self-control individuals skirt active inhibition. In research using experience sampling designs as well as experiments, participants with high chronic self-control experienced less motivational conflict and reported less often having to resist their desires (Gillebaart et al., 2015; Hofmann, Baumeister, Förster, & Vohs, 2012). In other studies, high self-control participants reported less effortful inhibition of temptations that ran counter to beneficial goals such as eating a healthy diet, exercising, and getting good grades in school (Galla & Duckworth, 2015; Imhoff, Schmidt, & Gerstenberg, 2014). Directly indicating that reduced motivational conflict of those high in self-control comes from acting habitually, habit strength of beneficial behaviors mediated the link between chronic self-control and the experience of temptations (Galla & Duckworth, 2015). Thus, people with good self-control have developed many adaptive habits and as a result struggle with few problematic desires.

Causal evidence that habits protect against succumbing to temptations comes from a series of computerized experiments on food choice (Lin, Wood, & Monterosso, 2016). Specifically, hungry participants were trained to choose carrots when a picture cue was presented. After habits formed, participants continued to choose carrots on trials presenting the picture cue, even when another desirable treat, M&Ms, became available. However, the habit formation task did not affect participants' explicit liking for the foods or their implicit attitudes, as assessed by the affect misattribution procedure (Payne, Cheng, Govorun, & Stewart, 2005). Most importantly, habits guided food choices independent of implicit or explicit liking for the food. For participants with

stronger carrot-choice habits, the habit cue apparently brought that choice to mind, and participants acted on it despite their implicit or explicit food preferences. In this way, the choice between carrots and M&Ms was biased toward the healthy choice, at least when the relevant cue was displayed.

Self-Regulation Processes

Research has yet to fully uncover the psychological mechanisms by which acting habitually enables self-regulation. Attentional processes are likely involved. In cognitive tasks, distractors that were previously associated with rewards captured attention despite participants' attempts to focus elsewhere (Anderson, 2016). Given the past repeated rewards, habit cues should be especially compelling. Narrowed attention onto habit cues was evident in multiattribute decision-making tasks in which people with strong habits made decisions after attending to only a limited set of information (Verplanken et al., 1997). In these ways, attentional biases may increase response to habit cues.

Another possibility was suggested by a meta-analysis of task performance in which high trait self-control was advantageous for performing tasks that could be done automatically (e.g., habitual snacking) over those that required more executive control (e.g., making coping plans; de Ridder et al., 2012). The advantage held for both desired and undesired behaviors. In other words, people with strong self-control excelled at developing habits. High levels of self-control plausibly enable the kinds of consistent performance that creates habit. Supporting this idea, people high in conscientiousness appear especially adept at habit formation at work tasks, such as emails (Vishwanath, 2015). It may be that the behavioral consistency of people high in self-control and conscientiousness facilitates habit formation.

Also relevant is the way people shape and select their environments. Self-control extends beyond intrapsychic struggles to include situational strategies by which people intentionally or unintentionally manipulate their surroundings (Duckworth, Gendler, & Gross, 2016). Situational strategies work *upstream*, prior to performing a behavior, and thereby avert the need for active inhibitory control *downstream* during performance (Verplanken & Wood, 2006). This is a simple-minded notion: People wanting to drink less should spend less time in bars. Illustrating situational strategies, people high in self-control reported avoiding tempting situations (e.g., "I avoid situations in which I might be tempted to act immorally"), were willing to wait for a solitary lab room over a busy lounge to complete a task, and were more likely to select a boring, nondistracting version of a test than a more entertaining one (Ent, Baumeister, & Tice, 2015).

In daily life, people control situations by selecting into contexts that facilitate desired behaviors, and thereby promote beneficial habits. For example, healthy people appear to choose their homes in part based on opportunities to exercise, and these environments in turn promote healthy behaviors (Plantinga & Bernell, 2007). Thus, homebuyers with lower body mass index (BMI) were more likely to prefer to move to a walkable neighborhood, and moving to a more walkable neighborhood tended to protect against weight gain (Eid, Overman, Puga, & Turner, 2008). Individuals with lower BMIs were also more likely to own a dog, especially one that they walked themselves (Coleman et al., 2008).

Situational control also involves structuring living environments. For example, the homes of normal weight (vs. obese) preschoolers provided more opportunities to act in healthful ways (e.g., accessible fresh vegetables, physical activity options, children's bedrooms without TVs; Boles, Scharf, Filigno, Saelens, & Stark, 2013). In other evidence, patrons with lower BMIs at all-you-can eat Chinese buffets limited consumption by using chopsticks, putting napkins on their laps, and sitting with their sides or backs to the buffet (Wansink & Payne, 2008). By shaping the contexts in which they live, people automate behaviors that lead to desired outcomes.

In summary, habits are a central means of self-regulation. Beneficial habits automate the behavioral means of goal pursuit, so that the desired action is triggered by everyday environments. People chronically high in self-control are especially likely to repeatedly act in beneficial ways. Future research will identify the exact psychological mechanisms by which such people form beneficial habits. Possibilities include attentional processes, a side effect of behavioral consistency, and decisions to select or change living situations.

Changing Habits and Other Behaviors

Dual-process models provide a powerful means to predict and explain persuasion through thoughtful or more heuristic, peripheral processes (Sherman, Gawronski, & Trope, 2014). These models typically address judgments and attitudes, and less often consider behavioral intentions or behavior. Nonetheless, a dual-process framework can be applied to behavior change, treating habits as a low-effort (System 1) alternative to deliberately acting on intentions (Wood, Labrecque, Lin, & Rünger, 2014).[AQ: 11]

The standard dual-process analysis assumes that people use low-effort strategies unless sufficiently motivated and able to intervene (i.e., *default-interventionist* model; Evans & Stanovich, 2013). Consistent with this idea, when highly motivated by incentives or achievement primes, participants tried to actively control their behavior even when acting habitually would be more effective (Carden, Wood, Neal, & Pascoe, 2017). This preference reflects the lack of conscious awareness of habit as well as a belief in the efficacy of effortful control.

Dual-process models allow for multiple effects of behavior change interventions. Consider, for example, the 1991 public health campaign by the National Cancer Institute,

"5-A-Day-Program for Better Health." This intervention successfully informed Americans that they should eat more fruits and vegetables. In 1991, only 7% believed that they should eat at least five servings per day, but that number had jumped to almost 30% by 1997 (Stables et al., 2002). Despite successfully increasing knowledge, 5-A-Day had essentially no effect on actual consumption. Only 11% of Americans consumed five servings a day during 1988-1994, and this percentage had not changed by 1999-2002 (Casagrande, Wang, Anderson, & Gary, 2007; Stables et al., 2002). This intervention thus altered beliefs and knowledge but had little traction over eating, a behavior that is largely habitual (Khare & Inman, 2006).

Experimental demonstrations unpack these effects, showing that persuasive appeals that change explicit attitudes do not alter habitual behaviors. For example, after reading a health appeal to consume less sugar, recipients reported more negative attitudes toward sugar but did not consume less sugared soda in a subsequent taste test (Itzchakov, Uziel, & Wood, 2017). Behavioral compliance was especially low among participants with strong behavioral habits who reported automatically drinking sugared sodas in daily life.

Social influences also have limited impact on strong habits. In a recent experiment, we stopped students at the campus dining commons and assessed their mimicry of an experimenter during a short interview (Mazar, Park, & Wood, 2017). Some experimenters drank water frequently, and others only rarely. Students with strong habits to drink water in the commons, who did so frequently in the past or reported doing so automatically, repeated their habit and failed to mimic the experimenter. Only students with weak habits were influenced by the experimenter's drinking. These effects maintained despite participants' rated thirst or the time elapsed since they drank last.

The limited effects of health knowledge and social influences on habits encourage researchers to explore other factors that can be successful at propelling behavior change. One approach is to target the cues that activate habit performance (Wood & Neal, 2016).

Implementation intentions (Gollwitzer & Sheeran, 2006), or if–then plans, identify cues in advance to act on an intention (e.g., After lunch, I'll eat an apple). However, implementation plans had limited impact on strong habits in several studies (Maher & Conroy, 2015; Webb, Sheeran, & Luszcynska, 2009). Furthermore, plans to *not* perform a habitual behavior backfired by increasing its cognitive accessibility and its performance (Adriaanse, van Oosten, de Ridder, de Wit, & Evers, 2011). Implementation plans are more successful when they integrate a new, desired action into ongoing habit performance (Labrecque, Wood, Neal, & Harrington, 2017). A common example is putting medications by the bedside, so that taking pills can be triggered automatically by habits of going to bed at night or waking in the morning.

In a more direct demonstration of habit cue effects, *habit discontinuity* research identifies changes in life contexts. Changes such as moving house, starting a new job, or closing transport routes can alter everyday habit cues, disrupt habit performance, and increase decision making about behavior. As a result, such changes provide a sort of window of opportunity to act on intentions (Verplanken, Walker, Davis, & Jurasek, 2008). For example, students transferring to a new university changed their habits to read the newspaper, exercise, and watch TV to the extent that performance contexts for these behaviors altered with the move (Wood, Tam, & Witt, 2005). When contexts changed, the students were freed up to carry out their intentions at the new university. When contexts remained stable, the habit persisted.

What is the psychology behind dual processes in which habits persist despite conflicting knowledge, implementation plans, and social mimicry? One answer is the slow rate of change of habit learning. Thus, a longitudinal study of former U.K. car commuters revealed that automaticity decayed only slowly (Walker, Thomas, & Verplanken, 2015). Four weeks after starting to take the train, former drivers reported that car commuting was still somewhat automatic for them. A related answer is the accessibility of habitual responses. In the sequential learning task by Labrecque and Wood (2017) mentioned earlier, some participants had formed strong context–response (habit) associations after 10 times practicing a computer task to make sushi. When later trying to alter the task, stronger context–response associations in memory impeded change. With the practiced response activated in memory, participants tended to carry it out even when they had highly favorable, stable intentions to do something else.

In summary, a dual-process model of behavior change recognizes habits' slow, incremental learning and ready accessibility in mind. Habits are relatively insensitive to behavior change interventions that involve goal-directed actions and flexible responding. However, when habit cues are controlled or changed, people no longer have a ready response and are freed up to respond more deliberately.

Habits of Cross-Group Interaction

Habits shed new light on the question that has sparked much research on intergroup relations: How can people express intergroup acceptance but practice segregation and discrimination? A common answer is that implicit factors guide people's behavior but not their explicit evaluations. In this spirit, research has examined implicit prejudice, or unfavorable affect toward individuals or groups that holders may not recognize or endorse (Lai, Hoffman, & Nosek, 2013).

Less well studied are the habits of cross-group and same-group interaction that can guide behavior. Intergroup relations researchers have not completely overlooked habits. Devine and colleagues described group stereotypes as habits (e.g., Carnes et al., 2015; Devine, 1989), and Greenwald and Banaji (1995) linked implicit attitudes with early habit research. It is possible that intergroup habits and prejudice work together to bias actions separately from people's overt expressions of intergroup acceptance.

Intergroup settings are prime for habit formation. Other people can serve as cues that trigger everyday habits (Wood et al., 2005). In intergroup settings, others' features are perceived and categorized (Kawakami, Amodio, & Hugenberg, 2017), potentially enabling thoughtful as well as more automated responses. Rewards arise from the good and bad feelings (e.g., anxiety) people experience when interacting with cross-group as opposed to same-group others (Page-Gould, Mendoza-Denton, & Tropp, 2008). Other rewards come from expressions of social approval or disapproval for interaction partners (Bell & Hastings, 2015; Kawabata & Crick, 2011). Given these feature cues, rewards, and potentially repeated contact, cross-group interaction provides rich opportunities for habit formation.

The possibility that people form social interaction habits that are separate from their trait impressions comes from an inventive study by Hackel, Doll, and Amodio (2015). Participants made repeated choices to interact or not with four targets who were supposedly prior participants. The targets had made decisions to share portions of the points they had won in the study, and these were displayed following participants' choices. Participants could gauge targets' generosity by how much of their winnings they shared. At the end of the study, each participant chose a partner for a later, unrelated interaction. Participants preferred targets who had been more generous in the first task. However, independent of apparent generosity, participants also selected targets who provided more total reward money. The separate effects of generosity and reward suggested that participants were forming trait impressions as well as responding to reward values, potentially forming interaction habits. This kind of repeated interaction paradigm will be very revealing as we learn more about intergroup habit formation.

The study of intergroup habits is important because it offers promising new avenues for reducing discrimination. As Lai et al. (2013) noted, "For practical purposes, changing implicit prejudice is just a means to mitigate its presumed consequence—discrimination" (p. 323). However, diversity training programs and interventions to increase group harmony have yet to show that reducing implicit prejudice affects subsequent intergroup behavior. One explanation is that discrimination is often habitual. If discrimination in ongoing interaction reflects habitual choices to favor same-group over cross-group others, then these choices will be insensitive to interventions that reduce prejudice (see Wood & Neal, 2016).

A few diversity interventions have recognized the importance of repeated "practice of new behaviors until they become habitual" (Carnes et al., 2015, p. 221; see also Devine, Forscher, Austin, & Cox, 2012). In practice, however, these interventions focused mostly on awareness of discrimination and motivation to change. Similarly, interventions to increase readiness to take action on gender biases in science have addressed mostly approach feelings (Moss-Racusin et al., 2016) and intentions to confront others (Pietri et al., 2016). Even intergroup contact, which demonstrably changes beliefs and evaluations (cf. Pettigrew & Tropp, 2006), may not affect ongoing interaction choices (e.g., White, Abu-Rayya, & Weitzel, 2014). As outlined in the prior section on behavior change, a habit-based intervention would break existing habits, perhaps through disrupting the cues that activate automatic discrimination, and create new, nondiscriminatory habits through reward learning of cue (e.g., skin color)–response (e.g., exclusion) pairings.[AQ: 12]

Research on interaction habits requires new measures to tap habit strength of discrimination and choice of same- over cross-group others in particular social contexts. Relevant self-report scales assess the frequency of interactions varying in social distance (see Bogardus, 1959) and the quantity and quality of cross-group contact (e.g., Turner, Hewstone, & Voci, 2007). With judicious selection, items from these scales could be used to assess behavioral components of discrimination. Especially when combined with measures of perceived automaticity (Verplanken & Orbell, 2003) or past frequency in given contexts (e.g., employment settings), these scales could provide new tools to assess habitual interaction. In so doing, they could enable future research to capture habits of discrimination separable from implicit and explicit prejudice.

In summary, the possibility that social interaction habits develop separately from implicit and explicit prejudice raises new questions for the study of intergroup relations. A habit framework generally shifts research focus away from prejudice onto discriminatory behaviors and the mechanisms that perpetuate them in everyday life. Understanding of habit opens up new avenues for designing effective antibias interventions, through practice and learning of positive cross-group interaction habits, along with new ways to assess intervention effects, through automaticity of relevant behaviors. In these ways, understanding of habits can be leveraged to reduce discrimination.

Self-Inferences About Habit

The study of habits brings to the fore a classic issue in social psychology: The "tried-and-true psychological principle that our attitudes and beliefs often follow from our behaviors, rather than precede them" (Wilson, 2012). When people explain their habitual behaviors, their accounts are relatively uncontaminated by the psychological processes that actually generated the response. That is, although people are often aware of repeated responses, such as the route they take to work or what they ate for breakfast, they have limited introspective access into the underlying cuing mechanisms. With habit, deliberation about performance occurs largely downstream, after a behavior is performed, instead of upstream, as a guide to action.[AQ: 13]

Social and personality psychology have a long history of studying action explanations (e.g., Bem's, 1972, self-perception theory). However, relatively little current research assesses behavior (Baumeister, Vohs, & Funder,

2007). As part of this trend, even less research in our field investigates people's explanations for their actions. A recent analysis of studies in the 2014-2015 issues of the *Journal of Personality and Social Psychology* revealed that slightly less than 5% of all studies evaluated behavior as an input variable (Wood, Carden, & But, 2016).[1] With a few notable exceptions (e.g., Bar-Anan, Wilson, & Hassin, 2010), current research on action explanations does not appear in our top journals. Research on this topic currently emphasizes lower level processes of motor control and sensorimotor experience (e.g., Yoshie & Haggard, 2013) instead of higher level dispositional inferences.

People may often have to make after-the-fact inferences about what caused their behavior. Given the simple prevalence of habits in daily life (Wood, Quinn, & Kashy, 2002), people are often responding automatically with little conscious deliberation. As I explain, inferences about what caused such actions tend to overlook environmental instigators of action and overweight personal volition (i.e., active pursuit of goals).

A variety of everyday habits are explained in volitional terms. For example, participants with stronger habits to watch TV news, purchase fast food, and run/jog were more certain about their behavioral intentions and perceived the behavior as guided more by their goals (Ji & Wood, 2007; Neal et al., 2012). However, actual behavior prediction in these studies revealed that the opposite was true. Participants' intentions and goals were poor predictors of strongly habitual behaviors. They only predicted future behavior for participants with weak habits. Thus, people were largely inaccurate in volitional explanations for habit performance.

Inferences that habits were goal directed also emerged in Armitage's (2005) longitudinal study of members of a newly opened gym. The more often participants went to the gym during the initial 3 months of membership, the more their intentions increased in favorability (holding initial intentions constant). However, after the fifth week of the study, intentions did not predict gym attendance. Instead, gym going was predicted by the habits participants had formed during the first few weeks of joining the gym. Thus, increased gym attendance strengthened habits along with people's inferences of personal agency, although only habits predicted behavior.

Habitual action has a number of features that contribute to these volitional inferences. The simple frequency of performance is likely to suggest goals. People might plausibly reason that if they are repeating an action, they must intend to perform it. Also contributing to beliefs about personal causation is the tie between volition and the sensory experience of action (Haggard, 2017). People infer volition if they can retrospectively generate a feeling of doing for performance. In addition, people are likely to infer volition for actions, like habits, that have predictable consequences (Wegner & Wheatley, 1999). Furthermore, the uncontrolled, inaccessible nature of habit performance could lead people to infer that such actions provide insight into the self and reveal one's true self (see Morewedge, Giblin, & Norton, 2014). Finally, it is possible that volitional inferences about habits are accurate in an historical sense. That is, people may remember the goals that initially guided performance as they formed a habit.

Self-inferences about volition are further sparked by the positive affect associated with many habits. This favorable evaluation may be rational and reflect ease of performance in comparison with more novel behaviors. In illustration, consumers preferred using existing computer software to new products in part because of the difficulty of mastering new skills (Murray & Häubl, 2007). Habits are also likely to be viewed positively due to the fluency, or speed and ease of processing, associated with frequently performed behaviors. The positivity arising from feelings of familiarity and processing success may generalize to current activities (Labrecque & Wood, 2017; Reber, Schwarz, & Winkielman, 2004). In addition to favorability, the feeling of fluency from smooth action selection and execution enhances people's feeling of control over a behavior and leads to inferences of personal volition (Chambon & Haggard, 2012). Habit inferences thus exploit a psychological calculus that favors what feels easy because it is well practiced over what feels more difficult because it is new. Being favorably disposed toward habits for these reasons, people might plausibly infer that they must have decided to act habitually to achieve goals and plans.

People may not, however, make volitional inferences for habits that generate negative outcomes. Extenuating circumstances may be blamed for automatic responses that violate a personal or social standard (see *explanatory vacuum*; Parks-Stamm, Oettingen, & Gollwitzer, 2010). For example, dieting participants who had been primed to eat chocolate felt bad and attributed their eating to task demands (Adriaanse, Weijers, De Ridder, De Witt Huberts, & Evers, 2014). Thus, people may be sensitive to situational influences for unwanted habits.

Volitional beliefs about habits have a variety of implications. Such inferences potentially contribute to self-regulation by keeping goals and behavior aligned (Yoshie & Haggard, 2013). Although this view is backward of the standard idea of self-regulation in which behavior is adjusted to meet goals, regulatory success also can be achieved by aligning goals with actions. Volitional inferences about habit may furthermore contribute to well-being. For example, repeated behaviors, such as students' choice of the same seat in a classroom, heightened their feelings of comfort, confidence, and control, despite the fact that these choices initially might have been largely random (Avni-Babad, 2011). In addition, Heintzelman and King (2014) argued that habit performance promotes coherence or comprehensibility of experiences, and thereby enhances meaning in life.

In summary, people often overweight volition and overlook situational triggers in explaining habit performance.

Such beliefs arise from frequent, fluent performance, predictability of outcomes, and experience of positive affect. Inferences of volitional control are correct in the sense that people can always decide not to perform the activated response. However, they are incorrect in terms of psychological process, given that habitual responses are relatively insensitive to intentions and desires.

Conclusion

Predicting where science will go is risky. I feel pretty confident, however, predicting that our field will start to focus more on habits. The historical trends in scientific and popular books (shown in Figure 1) already show a renewed interest. Thus far, trends in psychology have fluctuated along with the books in the Google database more broadly.

It seems plausible that science is driving the popular Zeitgeist on habits and goals evident in the book field. However, science also responds to these trends. For example, it was only well into last century's decline in the use of habit that Campbell (1963) published his foundational chapter subsuming habit into the construct social attitudes. Research in our field is also influenced by activity in other areas of psychology. Cognitive and behavioral neuroscience researchers are already highly engaged in habit research (e.g., Graybiel, 2008).

It is not as easy to predict the specific focus of habit research in social and personality psychology. As I argued in this article, research on habit has already led to significant progress in understanding of self-regulation and behavior change. As of yet, more promise than tangible result accompanies research on habits in cross-group interaction and self-inference. Understanding of habit may end up illuminating other areas in our field not addressed in this article. For example, theory of mind includes ideas of habit as well as goal pursuit, so that people spontaneously assume that others act out of habit (Gershman, Gerstenberg, Baker, & Cushman, 2016). Habits are also a component of close relationships. When relationships are diagrammed as behavioral exchanges, they reveal how everyday social interactions between close partners reflect "norms, interaction habits, and understandings" (Kelley et al., 1983, p. 67). I am guessing that we can learn a great deal from studying relationship habits and the ways one partner cues another's responses.

In the future, methodological developments, especially in sensor technology, are likely to yield significant progress in the study of habit. Although current habit formation apps are uninformed by science and thus largely fail to develop habits (Renfree, Harrison, Marshall, Stawarz, & Cox, 2016; Stawarz et al., 2015), context-aware sensing devices have exciting potential for habit measurement and for behavior change (Chen, Ding, Huang, Ye, & Zhang, 2015). New measures of habit strength that move beyond self-reports of automaticity or past behavior frequency will be a major step forward in studying lifestyle and social interaction habits.

The developments outlined in this article are possible given that embracing modern theories of habit does not involve rejecting the highly sophisticated understanding of cognition and motivation developed in our field in the last few decades. Although habits are not themselves motivated, habit performance in daily life continues to interface with people's goals and desires. This central point emerged from slightly different forms in each of the research domains discussed in this article. Instead of replacing goals, habits are formed in part through goal pursuit, accomplish goal-congruent outcomes (along with incongruent ones), and provide input into the inferences we make about our goals.

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Note

1. Behavior was coded using Baumeister, Vohs, and Funder's (2007) broad definition of overt movements that could be observed and interpreted by the self and others, and thereby have social and physical impact (e.g., taking a test, making a choice). We excluded questionnaire ratings, reactive outputs, and reflections of inner states (e.g., reaction times, eye movements).

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