Health and goal-directed behavior: The nonconscious regulation and motivation of goals and their pursuit

HENK AARTS

Department of Psychology, Utrecht University, PO Box 80140, 3508 TC, Utrecht, The Netherlands

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Abstract
Modern research in the domain of health psychology considers goals to play a pivotal role in shaping, changing and maintaining behaviors related to health. Whereas the common view on this topic assumes that goal pursuit is governed by a conscious intentional process, recent research indicates that goal pursuit can emerge without involvement of conscious intent. This paper discusses key findings of this research on nonconscious goal pursuit, and attempts to promote a more comprehensive understanding and examination of the role of goals in human behavior, self-regulation and health. Specifically, it addresses (1) the role of habits and planning; (2) the human capacity to go beyond habits nonconsciously by regulating goals without awareness of the activation and operation of the goal; and (3) the fundamental role of affect in nonconsciously modulating the motivation of goals and their pursuit.

Keywords: Goal pursuit and health, automatic processes, unconscious goals, implicit motivation, self-regulation, executive control, affect

Introduction
This paper is concerned with the way people pursue and attain goals. Goals and their pursuit play a pivotal role in behaviors related to health. Sometimes, people pursue goals that explicitly improve their health, for example when one wants to eat fruit for lunch or to exercise after coming home from work. On other occasions, health outcomes are rather a side-effect of our goal pursuits, for instance when we take the bicycle instead of the car in order to go to work (improving health via enhanced physical exercise and decreased environmental
pollution). Whereas goal-directed behavior can be associated with positive health outcomes, our goal pursuits may also threaten our health and well-being. For example, when pursuing the goal of socializing and going out, people, especially young people, sometimes engage in binge drinking or unsafe sex. In the realm of work, individuals may become excessively occupied with the goal of making money or gaining status without noticing the possible unhealthy symptoms (e.g., stress) that may accompany their pursuits. The study of goal pursuit, then, provides insight into how our health and well-being is determined by the motivation and regulation of goal-directed behavior in response to the situation at hand.

In the last three decades or so, considerable progress has been made in understanding and predicting the pursuit of goal-directed behavior (theory of reasoned action, Fishbein & Ajzen, 1975; theory of planned behavior, Ajzen, 1991; goal-setting theory, Locke & Latham, 1990; self-determination theory, Deci & Ryan, 1985; self-efficacy theory, Bandura, 1986; to mention a few), and especially individuals’ decision to behave in a healthy way (health belief model, Janz & Becker, 1984; protection motivation theory, Rogers, 1983). Also, models of behavior change and maintenance have been proposed and empirically tested for a variety of health behaviors (Prochaska, 1994). Importantly, in most of these models and theories, people’s goal pursuit is assumed to be governed by a kind of “self” or some other inner agent, such as “consciousness” or “the will”. There is common agreement that goal setting is characterized by a conscious reflection process, and that goal pursuit is associated with conscious intent. However, the focus on goal pursuit as a conscious and intentional self-regulatory process may lead modern scientific research on goal-directed behavior and health to ignore some of the most intriguing and fundamental issues on the topic: though we might be conscious of our goals, it is not always clear what causes us to pursue a goal. Specifically, as our thinking and doing are produced by mental processes that are not open to introspection, we are often unconscious of the processes underlying our thoughts and motivated behaviors (Blackmore, 2003; Nisbett & Wilson, 1977; Nørretranders, 1991). This raises the intriguing possibility that human goal pursuits can be directly triggered by environmental cues, and are guided by nonconscious processes.

In the present paper, I discuss social cognition research that examines the possibility that human goal pursuit emerges in the absence of conscious intent and without awareness of the cause of the goal pursuit. This research is driven by the discovery that human functioning (attention and encoding, memory use, evaluation, inferences, social perception and judgment) is largely rooted in automatic processes and does not require conscious control (for overviews, e.g., Aarts, Dijksterhuis, & Dik, in press; Moskowitz, Li, & Kirk, 2004; Wegner & Bargh, 1998). Although research on nonconscious goal pursuit is still in its infancy, several recent findings suggest that people can pursue and attain goals without being aware of the activation and operation of the goal. This paper discusses key findings of this research, and attempts to offer a more comprehensive understanding and examination of the role of goals in human behavior in
This paper is organized around three themes. First, I will discuss research that analyses nonconscious goal pursuit as automated goal-directed behaviors resulting from well-established habits, and the potential role of willful planning in interrupting and breaking habits. Second, I will discuss the issue of whether nonconscious goal pursuit can go beyond habits, and may be flexible and adaptive without an act of conscious will. Therefore, I examine whether people are capable of regulating their personal goals without being aware of the activation and operation of the goal. Third, I will discuss recent work on the fundamental role of affect in nonconsciously modulating the motivation of goals and their pursuit; an issue that may demystify the nonconscious source of our goal pursuit. Before I discuss this work in more detail, however, I will briefly address some general issues pertaining to the conceptualization of nonconscious goal pursuit.

The concept of nonconscious goal pursuit

At first glance, the notion that goal pursuit is instigated by the environment brings us back to behaviorism (Skinner, 1953; Watson, 1925). However, the modern conceptualization of nonconscious goal pursuit (e.g., Aarts & Dijksterhuis, 2000a; Bargh, 1990) is different in one important way. Specifically, it follows previous research that analyzes the involvement of mental processes and the role of knowledge in nonconscious associative learning and environmental control over behavior. For instance, several studies examining the role of reinforcement in classical and instrumental conditioning have stressed the importance of incentives or goals in motivating and directing behavior of animals, humans included, in the absence of conscious awareness (Berridge, 2001). Furthermore, basic and applied work on preference learning suggest that humans implicitly form mental representations of rewarding goal-objects by merely associating these objects with affective stimuli that co-occur with them (De Houwer, Thomas, & Baeyens, 2001). In addition, people have been shown to learn rules that predict the occurrence of complex sequences of stimuli and responses without the ability to consciously verbalize these rules (Reber, 1993). Accordingly, the notorious black box has been replaced by a tool-box of cognitive constructs, such as mental representations, mental accessibility and mental associations. These tools together with experimental methods, such as priming procedures, allow current research to build on behaviorism (Bargh & Ferguson, 2000) by scrutinizing the mental processes that underlie nonconscious goal pursuit.

Analogous to research on conscious goal pursuit, the idea of nonconscious goal pursuit begins by assuming that goals are mentally represented as desired states pertaining to behaviors (e.g., consuming fruit, performing well, socializing) or outcomes (e.g., owning money, being proud, see summaries by Carver & Scheier, 1998; Gollwitzer & Moskowitz, 1996). Different from research on conscious goal pursuit, however, is the explicit assumption that goals can be nonconsciously activated because these goals pre-exist in the actor’s mind. Furthermore, these
pre-existing personal goals are assumed to be part of knowledge structures including the context, the goal itself, and actions as well as opportunities that may aid goal pursuit, and these are shaped by direct experience and other types of learning (Aarts & Dijksterhuis, 2000a, 2003; Bargh & Gollwitzer, 1994; Kruglanski et al., 2002). For example, the goal of consuming fruit may be related to eating a banana while having lunch in the university cafeteria. Or, a visit to an exclusive restaurant or bar may be connected to interacting with good friends and the desire to socialize and go out. These associative knowledge structures enable people to act on goals without intentional control or forming explicit expectancies. According to the concept of nonconscious goal pursuit, then, the direction and motivation of people’s thinking and doing can start and operate outside of conscious awareness because one can directly rely on an accessible goal representation that is primed by contextual as well as behavioral information.

One of the first empirical demonstrations of this notion comes from the research program of Bargh, Gollwitzer, Lee Chai, Barndollar, and Trötschel (2001), addressing goal priming effects on achievement. In one of their studies, they unobtrusively exposed participants to words, such as “strive” and “succeed”, to prime the goal of achievement, and then gave them the opportunity to perform well (finding as many words as possible in an anagram puzzle task). Results indicated that participants primed with the achievement goal outperformed those who were not primed with the goal. Bargh et al. (2001) also demonstrated that such goal priming leads to qualities associated with motivational states, such as persistence in working for the goal. These findings indicate that the mere activation of a goal representation is sufficient to motivate people to work on the primed goal without conscious thought and intent.

The work alluded to above shows that goal pursuit can be automatically triggered if the representation of the goal is directly primed. Recently, researchers have started to identify the specific aspects in the social environment that may cause people to automatically set and pursue goals. There is research to suggest that goal pursuit is automatically triggered when goals are inferred from the behavior of others, an effect termed goal contagion (Aarts, Gollwitzer, & Hassin, 2004; Dik & Aarts, in press). For instance, Aarts et al. (2004) demonstrated that participants who observed another person’s behavior that implied the goal of making money were more motivated to make money themselves by engaging in a task that gave access to a lottery. Furthermore, goals and their pursuit seem to be activated in the presence of important others, as was illustrated in a study by Fitzimons and Bargh (2003). They showed that subliminal priming of the name of one’s parents triggers the motivation to achieve, and that exposure to names of good friend primes the goal and resultant behavior of helping (see also Shah, 2003). In a recent line of experimentation, we (Aarts et al., 2005; Custers, Maas, Wildenbeest, & Aarts, 2006) replicated and extended these goal priming effects in the realm of social stereotypes. Specifically, it was tested and confirmed that priming members of social groups that contain the representation of a goal that is believed to be held by that group causes people to automatically pursue the goals,
such as the goal of helping or making money that are stereotypical for nurses and stockbrokers, respectively.

While divergent, these findings have a common theme. They suggest that an appreciation of the goals motivating other people we interact with, allows one to entertain similar goals and to try to attain them oneself. It promotes successful pursuit of one’s own needs, desires and goals. Furthermore, by pursuing the goals of others, people may become more similar in what they desire and strive for, and hence in their plans for the future (Aarts et al., in press). Given this compelling and pervasive social influence on goal priming and pursuit, I will now discuss how these goals are automatically translated into overt behavior.

Habits

For goal activation to have the desired effects, behavior representations and resultant actions need to be activated that represent appropriate means to attain the goal. Or, in other words, the desired behavior representations should be accessed in order to guide the motor system (e.g., Jeannerod, 1997; Prinz, 1997). Under some circumstances, this is very straightforward, such as when there is only one behavior that can satisfy the goal. Here, a goal also has a unique, one-to-one relation with behavior, simply because there is only one way to attain the goal (e.g., pushing a button to ring a doorbell). However, usually there is no one-to-one relation between goals and behaviors; there are often multiple means to attain a goal.

Habits and goal-means relations

One of the most common perspectives on nonconscious goal pursuit deals with habit formation processes (e.g., Aarts & Dijksterhuis, 2000a,b; Bargh, 1990; Moskowitz et al., 2004). Specifically, for goal enactment to become automatized, one needs to practice the selection and execution of the most effective means in the goal-relevant situation. This way, idiosyncratically learned goal-means links in memory gain strength. As a consequence, priming these goals automatically activates the behavior representation and resultant action according to an “if-then” rule, enabling the goal-directed behavior to occur directly and independent of conscious intentions (e.g., Aarts, Verplanken, & Van Knippenberg, 1998; Bargh, 1990; Ouellette & Wood, 1998).

Aarts and Dijksterhuis (2000a,b) directly tested the habitual goal-means link in the realm of travel behavior. In one set of studies, they employed a response latency paradigm to demonstrate that habitual bicycle users respond faster to the means “bicycle” after priming the goal of traveling to a certain destination. For example, habitual and non-habitual bikers were unobtrusively primed with the goal to travel to the university or not. A subsequent reaction time task measured the accessibility of the concept of bicycle. Results showed that the travel goal facilitated access to the concept of bicycle, but only for those persons who
regularly used a bicycle for this trip, suggesting that cycling was automatically activated by the goal of traveling to the university for those persons.

Sheeran et al. (2005) recently established that this habitual goal-means activation process also pertains to (overt) health behavior. They capitalized on the observation that socializing goals are strongly associated with drinking among UK university students (Senchak, Leonard, & Green, 1998; Treise, Wohburg, & Otnes, 1999), and showed that in this population, habitual drinkers were more inclined to actually drink alcohol after priming the goal “socializing” than non-habitual drinkers. These effects were obtained without participants’ awareness of the priming of the goal. These findings further illustrate the important point that automatic goal pursuit can be based on the dominant goal-directed response in the situation at hand.

Previous work has focused particularly on the enhanced mental accessibility and selection of the habitual means for goal attainment to examine the cognitive processes underlying goal-directed habits. Often, however, people can select one means from a set of alternatives to attain their goal. However, the fate of the mental accessibility of alternatives when people habitually select a means from the consideration set, has received little theoretical and empirical attention. In a recent series of studies, Danner, Aarts, and De Vries (2006a) studied this issue by examining the formation of goal-directed habits in a multiple means context. They reasoned that goal instigation (e.g., having dessert after dinner) initially causes all associated means from the consideration set (e.g., ice-cream and fruit-salad) to become accessible, and a choice is made that suits the attainment of the goal (e.g., ordering ice-cream). On subsequent instigation of the goal, all associated means will be activated, but competing means (e.g., fruit-salad) will interfere with the retrieval of the target means previously selected. To resolve this interference, the alternative means are inhibited via their established lateral connection with the target means (see also, Shah, Friedman, & Kruglanski, 2002).

To simulate the process of habit formation, participants in Danner and coworkers’ experiments first studied goal-means combinations, and then practiced the selection of certain means to attain the goals in a retrieval paradigm (see also, Anderson & Spellman, 1995). Next, the mental accessibility of the means were assessed in a reaction time task. In line with expectations, results showed that the competing means were not inhibited after a single selection, but only after repeated selection. Interestingly, they showed that three times selection of the same means caused inhibited access to alternatives, and that the inhibition did not vanish with more practice (after nine selections). This sustained inhibition suggests that alternatives remain associated to the goal, and, thus, remain part of the goal-means network during habit formation. In other words, the consideration set containing means that once potentially served one’s goals may remain cognitively available. An important implication of this line of reasoning is that habitual goal-directed behaviors may be difficult to control by intentions toward the use of alternative means, possibly because the representation of the competing means is inhibited when the goal is triggered and the habitual means is selected.
Habit, intention and future behavior

The role of habits in automatically guiding goal-directed behavior has also been examined in the context of attitude-behavior models. An important contribution in this field was made by Bentler and Speckart (1979), who investigated students’ consumption of alcohol and marijuana. They suggested that such actions become habitual over time, and importantly, that these actions can be instigated without mediation of intentions. Indeed, the results of their study clearly showed that a measure of habit (obtained by self-reported frequency of behavior in the past 2 weeks) does predict future behavior directly, indicating that such behavior is initiated automatically, that is, without much deliberation and thought.

The work of Bentler and Speckart (1979) has been replicated by many other investigators in a wide variety of behavioral domains, such as students’ class attendance, drinking milk, eating chips and other junk-food, physical exercise, condom use, drug use and seat belt use (see e.g., Ouellette & Wood, 1998, for a meta-analysis). The direct influence of frequency of past behavior on future behavior also underscores the behaviorists’ maxim that behavior is largely influenced by habit. However, the direct relation between past and future action is not really informative in understanding the interplay between intentions and habits in guiding goal-directed behavior. That is, it tells us that we simply do the things as we did them before. Furthermore, the predictive utility of frequency of past behavior has been criticized on grounds of measurement concerns (e.g., Verplanken & Aarts 1999).

In a more sophisticated attempt to conceptualize the relationship between habitual and intentional control of goal-directed behavior, Triandis (1980) proposed a model suggesting that habit and intention interact in their prediction of later behavior – instead of predicting behavior over and above a measure of intention. In fact, Triandis hypothesized that because the same behavior is more frequently executed in the past and increases in habit strength, and is less guided by intentions to perform that behavior. Habit strength thus may moderate the relationship between reason-based concepts (intentions) and subsequent goal-directed behavior (see also Ronis, Yates, & Kirscht, 1989).

Whereas the moderating role of habits in the intention-behavior relationship offers a promising perspective on testing the habitual, automatic nature of goal-directed behavior, there are only a few studies that report this effect. In one of the first studies on this issue, Verplanken and colleagues (Verplanken, Aarts, Van Knippenberg, & Van Knippenberg, 1994; Verplanken, Aarts, Van Knippenberg, & Moonen, 1998) investigated people’s travel mode behavior – a behavior that can be quite repetitive. In their studies, they developed a method to assess a generalized measure of habit strength by counting the number of times a specific mode of transport comes to mind under time pressure in response to several travel destinations. The basic idea behind this measure is that when, for example, the car has been frequently used in the past to travel, and thus car-use has becomes habitual, this mode should come to mind first upon priming the goal to “travel” (hence, the measure correlates fairly high with frequency of past
behavior; Aarts, Verplanken, & van Knippenberg, 1997). Verplanken et al. showed that this response frequency measure of habit indeed interacts with intentions in the prediction of future travel behavior: when habit was strong intentions did not predict future behavior, whereas behavior was predicted by intentions when habit was weak.

In another line of research, Ouellette and Wood (1998) and Wood, Tam, and Guerrero-Witt (2005) argued that frequency of past behavior may not be an optimal (or the sole) indication of habit strength. Following a central feature of behaviorist approaches to learning theory (Skinner, 1953; Watson, 1925), Ouellette and Wood proposed that habit strength should reflect the extent to which behavior is performed both frequently and in stable contexts. This line of argument suggests that a measure of frequency of past behavior is more likely to moderate the intention–behavior relationship when the stability aspect is taken into account. In a recent set of studies, Danner, Aarts, and De Vries (2006b) explicitly tested this idea. They collected self-reported measures of intentions, frequency of past behavior and stability of contexts for several behaviors (e.g., eating junk-food at the cafeteria; drinking milk for lunch; drinking alcohol when going out). Subsequently, respondents were revisited 4 weeks later and their actual behavior was assessed. Analysis showed that frequency of past behavior and intention were both predictors of behavior (albeit the weight of the two components differed across the behaviors). Importantly, the frequency measure did not interact with the intention in the prediction of behavior, showing that frequency of past behavior is not an optimal measure to disentangle the habitual and intentional control of behavior. However, further analyses revealed that frequency of past behavior moderated the intention-behavior relationship when the stability measure was taken into account. Specifically, only under conditions of high frequency and stability, the intention–behavior relation was absent.

To recap, experimental as well as correlational studies indicate that habits play an important role in the automation of goal pursuit. Goal-directed behavior that is repeatedly and consistently performed in the same context is more likely to automatically come to mind upon the activation of a goal, and hence, is capable of guiding behavior directly. Moreover, alternative means tend to be inhibited upon the activation of the habitual goal-directed means. Once a habit is formed, then, behavior is no longer guided by intentions, and is difficult to alter by changing intentions in order to deviate from one’s habitual means. Research that is concerned with health, goals, and behavior, thus should take the role of habits into account.

Not all goals are habitual in the sense of being preceded by extensive practice of selecting the same means to reach the same goals in the same situations. Yet, even when goals are not habitual, people may be able to automatically access behavior representations and execute actions in a goal-relevant situation. I briefly discuss one important way in which this may occur – a way that may be effective in breaking old habits and even creating new ones.
Contemporary views on how nonhabitually pursued goals may be automatically translated into behaviors pertain to the role of opportunities in triggering associated goal-directed action. For instance, work on prospective memory suggests that people make effective use of cues that are appropriate for goal attainment (Brandimonte, Einstein, & McDaniel, 1996). This work shows that people readily execute an intended action in response to a specified cue (e.g., pressing the space bar when a fruit item appears on the screen), when the action-cue is encountered later during ongoing activity. According to McDaniel, Robinson-Riegler, and Einstein (1998), the enactment of such pending intentions is supported by the medial-temporal/hippocampal module—a reflexive associative memory system (see, Moscovitch, 1994). This module supports the retrieval of a goal-directed action when a target event is perceived by automatically produced interactions between the event and memory traces previously associated with the event. Only if there is sufficient interaction between the target event and the memory trace of the goal-directed action will the action be accessed rapidly, obligatorily, and with few attentional resources (see also, Van den Berg, Aarts, Midden, & Verplanken, 2004). This way, goal-directed actions can be efficiently executed in relatively new situations and task conditions.

The role of opportunities has also been explored in research on self-regulation and goal pursuit. In this research, links between situations, goals, means and opportunities have been shown to directly become operational as a result of willful planning. Specifically, forming implementation intentions as to when, where, and how one will enact the intended behavior to attain a goal enhances the probability of successful goal pursuit in everyday life (Gollwitzer, 1993, 1999). These intentions connect a goal-directed behavior to an anticipated situational context. Such intentions take the format of “I will do y when situation z is encountered”, and can be strategically formed by the individual to promote the initiation and successful execution of goal-directed actions when having to interrupt or deviate from habitual, mundane behaviors. For instance, when intending to drive a different route to work because of a previously announced road obstruction or when wanting to order fruit-salad instead of the usual junk-food when having lunch in the cafeteria, actively planning these actions increases the probability of successful goal completion.

The formation of implementation intentions brings about two effects. First, action initiation is facilitated as the formation of implementation intentions leads to strong mental associations between situations and behavior. Second, increased accessibility of the environmental context in memory enhances the probability of goal completion because the mere perception of specified environmental features is capable of bringing the previously planned action into mind (and hence the activation of the resulting action itself; see Gollwitzer, 1993). There are a host of studies conducted in several domains, including work, education and health, demonstrating that goal completion is more successful when goals are furnished with implementation intentions, and, moreover, that the enactment of
implementation intentions occurs rather automatically (for a review, see Gollwitzer & Sheeran, 2006). Instead of summarizing this research here again, I discuss two studies to illustrate that implementation intentions may break habits and even turn them into new ones.

Aarts, Dijksterhuis, and Midden (1999) tested the assumption that the formation of implementation intentions are effective in goal completion because they enhance the mental accessibility of environmental cues where the intended actions have to be initiated. Hence, perception of these cues triggers the intended action, and, thus, interrupts ongoing routine behavior. In their study, all participants were given the same goal (collecting a coupon at a specified location near swing-doors and a fire-hose halfway down the corridor from the laboratory to the department cafeteria). Later, they were instructed to perform a routine behavior (walking from the laboratory to the department cafeteria; an activity they engage in almost everyday). Two different planning procedures were designed. Participants in the experimental condition were instructed to plan the collection of the coupon, while participants in the control condition were required to plan a different act, namely to spend the coupon. This procedure aimed to prevent the goal of collecting the coupon being more desirable and accessible for one group than for the other. Next, Aarts et al. assessed the accessibility of specified cues (e.g., swing-doors, fire-hose) related to the intended action by measuring the speed of responding to these situational cues in a lexical decision task. Finally, they observed whether participants collected the coupon or not on their way to the cafeteria. Results showed that participants who formed implementation intentions were more effective in goal pursuit than the control group. Importantly, the effects of planning on goal completion were mediated by the heightened mental accessibility of environmental cues related to the goal completion task. These findings suggest that implementation intentions can interrupt habitual actions through a process of perceptual readiness for the cues that turns the alternative intended action into operation.

In a more direct test of the power of implementation intentions in breaking old habits and creating new ones, we recently conducted a field-experiment on repetitive behavior in the domain of recycling among employees of a Dutch telecompany (Holland, Aarts, & Langendam, 2006). In this study, recycling behavior of the participants was observed by the actual amount of paper and the number of plastic cups in their personal wastebasket located in their office. The new target action was that participants planned to attain their goal of disposing of their daily office waste, and throwing the old paper and plastic cups in large recycle boxes located in the corridor near their offices instead of in their personal wastebasket. Following a pre-measure, some participants furnished their new goal of recycling with implementation intentions, others did not. Results showed that recycling behavior was substantially improved in the implementation intention condition in week 1 and week 2, and 2 months after the manipulation. Importantly, the influence of frequency of past behavior (i.e., habitually throwing paper and cups in the personal wastebasket) completely vanished in the implementation intention condition. These data support the hypothesis that
implementation intentions (via planning) are capable of breaking down unwanted habits and creating new habits to attain personal goals.

In sum, the findings discussed above indicate that the establishment of cognitive links between situations, goals, means and opportunities by the act of planning directly become operational in a similar way as those formed by habits (Aarts & Dijksterhuis, 2000a; Gollwitzer, 1999; Orbell, Hodgkins, & Sheeran, 1997), and, moreover, that implementation intentions may help to overcome habitually performed goal-directed behavior. One might wonder, though, how implementation intentions win this “battle”? There are at least three possibilities. First, the representation of the new action becomes more accessible in the specified situation than the habitual action, because the implementation intention may install (albeit temporarily) stronger mental associations between the goal-situation and the new action. Second, the representation of the new action itself may be more accessible than the habitual one, because it was more recently activated and prepared. According to treatments of action control, the most accessible behavior representation ultimately “wins” the fight for dominance and guides behavior (Logan, 1989; Moskowitz, 2001; Norman & Shallice, 1986). A third possibility is that, as a result of forming an implementation intention, the habitual action may be actively inhibited, because it interferes with the planned action. An interesting avenue for further research is to investigate these processes in more detail to fully understand and appreciate the way in which planning is capable of overruling habits.

**Beyond habits: Nonconscious goal pursuit and executive processes**

Thus far, nonconscious goal pursuit was mainly analyzed and studied as habits-reflexive processes that, once the goal is activated by the situation, follow a well-practiced route to completion. Sometimes, however, the situation does not allow direct execution of habitual means, or imposes a different approach to attain our goals. In that case, we may need to postpone our nonconsciously activated goals, shield them from distracting cues, and act on opportunities to attain these goals. For example, a person who frequently pursues the goal of being popular may need to adjust his behavior to the context at hand to successfully attain the goal (e.g., telling sexually explicit jokes in the pub, but hooking on to a gossip about the Minister of Education during lunch with colleagues). Also, one may switch to alternatives when one discovers that the cafeteria is currently out of apples, in order to eat healthy food.

An important issue, then, is how nonconscious goal pursuit goes beyond habits. The traditional answer would be that it does not: nonconscious goal pursuit, like every other automatic process, is limited to circumstances in which habits can be applied successfully. If they cannot be applied successfully, then nonconscious goal pursuit is bound to fail, and conscious processes are called to the fore. It is this episode of awareness that is said to typify a shift from habitual to intentional control (e.g., James, 1890; Louis & Sutton, 1991; Norman & Shallice, 1986). Although tempting, this suggestion is psychologically questionable. Given the
acknowledged limitations of conscious attention on the one hand (Kahneman, 1973), and the dynamic nature of our world on the other (Powers, 1973), it seems that we should be able to go beyond routines to efficiently adapt to the environment, even during nonconscious goal pursuit (see also, Wilson, 2002). This assumption led us (Aarts & Hassin, 2005; Custers & Aarts, 2005a; Hassin, Aarts, Eitam, Custers, & Kleinman, in press) to suggest that nonconscious goals operate via cognitive processes that follow principles of executive control: the ability to guide cognition and action in accord with goals, thus rendering behavior flexible and adaptive in the situation at hand.

The mental mechanism that is perhaps most associated with executive control is working memory (WM), the workspace of the mind. According to Alan Baddeley, one of the masterminds of WM (Baddeley & Hitch, 1974), working memory allows “...humans to comprehend and mentally represent their immediate environment, to retain information about their immediate past experience, to support the acquisition of new knowledge, to solve problems and to formulate, relate and act on current goals” (Baddeley & Logie, 1999, p. 28). Baddeley’s classic WM-model is composed of a central executive component and two slave systems. The two slave systems are the phonological loop and the visuospatial sketchpad – two specialized, temporary memory systems that actively maintain information (verbally coded information and visual and/or spatial information, respectively) via rehearsal that otherwise would decay rapidly in short-term memory. The executive is involved in the control and regulation of WM, and performs such tasks as allocating mental resources, coordinating the two slave systems, and activating relevant items in long-term memory.

Research on executive processes and WM has flourished in the last decade. Despite the different theoretical conceptions that exist in the literature, reviews of the major models and findings (Hassin et al., in press; Miyake & Shah, 1999) reveal that adaptive cognition and behavior depends on: (1) active maintenance of ordered information via rehearsal; (2) attention to task-relevant information and inhibition of task-irrelevant information; and (3) monitoring and feedback processing. These characteristics concur with the following functions underlying goal-directed thought and action: (1) holding goals active in mind for a critical period of time; (2) keeping focused and shielding them from interfering information; and (3) checking-up the current state of goal pursuit, and supporting progress of goal-attainment by taking advantage of opportunities and adapting to the situation at hand.

WM, executive control, and conscious awareness are thought to be closely intertwined. Some researchers adhere to what Kintsch, Healy, Hegarety, Pennington, & Salthouse (1999) refer to as the “subset relationship”: only a subset of the information that people are able to keep active in working memory is that of which they are aware or conscious of. Baddeley who, historically, was reluctant to explore the relations between working memory and consciousness (Baddeley, 1992), suggested that conscious awareness may be one of the functions of the executive component (Baddeley, 1993). Taking this position
one step further, Baars and Franklin (2003, p. 170) argued that “all active components of classical working memory are conscious: input, rehearsal, visuospatial operations, recall and report”. Despite these seemingly divergent views, they also do converge by stressing the conscious nature of executive control and WM in goal-directed behavior. This emphasis, however, may be the result of the nature of the typical tasks that researchers have used to investigate WM-in most tasks, participants are *explicitly* asked to manipulate (e.g., they are instructed to rehearse, monitor, etc.). Hence, the current view that executive processes involve conscious goals is confounded by the use of conscious tasks and instructions.

The work on nonconscious goal pursuit, however, may offer a different perspective on the matter. This work suggests that people do not have conscious access to *everything* that goes on within WM. For example, we may well have no conscious access to the processes that underlie our ability to rehearse or monitor goals. Furthermore, goal representations may not be in the focus of our attention, yet may well impact our behavior. Accordingly, executive processes supporting goal pursuit can operate in the absence of awareness of the activation and operation of the goal. While this may be a controversial proposition, I will briefly discuss research suggesting that people are capable of nonconsciously rehearsing, shielding and monitoring goals.

**Nonconscious rehearsal**

Recent investigations into goal-directed cognition provide clues as to the dynamic status of goal-related material in memory upon the nonconscious instigation of a goal. Specifically, it is demonstrated that a nonconsciously activated goal causes active maintenance of the goal representation in memory – in comparison to the activation of semantic knowledge, which shows a rapid decay of activation in memory over very short periods of time, usually within a couple of seconds (Baddeley & Logie, 1999; Higgins, Bargh, & Lombardi, 1985; Mckone, 1995; Wyer & Srull, 1986). For instance, Aarts, Custers, and Holland (2007) examined how the mental accessibility of a goal after a short interval changes as a function of subliminally priming the goal. In one of their studies, participants were either primed with the goal to socialize or not, and were 2.5 min later tested for accessibility of the goal in a lexical decision task. Results showed that the representation of the goal of socializing maintained accessible when participants were primed to attain the goal. This finding suggests that when a goal is activated nonconsciously, that particular goal is mentally updated or rehearsed to keep it at a heightened level of accessibility, thereby increasing the probability of acting on it when encountering goal-relevant opportunities (e.g., asking a friend to meet up later in the bar).

Apart from goal priming effects on mental accessibility, a couple of studies also examined persistent goal activation effects on behavioral level. Bargh et al. (2001) suggested that goal-directed action tendencies maintain active (rather than decrease) over time until the goal is attained. To test this, they primed
participants with an achievement goal via exposure to words related to the concept, and asked them to solve anagrams immediately or after a 5-min filler task. They established goal priming effects on actual performance directly after the priming event, and these effects even increased over a period of 5 min (Bargh et al., 2001; Experiment 3). In another recent program of research, Aarts et al. (2004) replicated and extended these persistent goal activation effects on behavior in the realm of goal contagion and seeking casual sex. They exposed heterosexual male students to another male person’s actions that were implied to be caused by the goal to seek casual sex, and asked them to help a female fellow-student either immediately or 5 min after the exposure to the goal-implying behavior information. Previous findings showed that heterosexual men know that offering help can be instrumental in attaining (casual) sex with women, and that men behave accordingly (Buss, 1988; Canary & Emmers-Sommer, 1997). Indeed, male participants exerted more effort in helping the female student in the sex goal condition than in the control condition, even after a 5-min delay.

In short, studies on persistent activation effects suggest that some kind of updating or rehearsal process (unconsciously) maintains the activation of goal-relevant information. These studies suggest that nonconsciously triggered goals can remain accessible and responsible for goal-directed action over time.

Nonconscious inhibition of competing goal information

In reality, people are rarely free of concerns and environmental triggers that may distract them from ongoing goal pursuit, even habitual ones. Hence, the mental system sometimes has to deal with a conflict between competing information to effectively guide cognition and behavior. Whereas this self-regulation process is commonly conceived of as requiring conscious control (see, e.g., the work on delay of gratification, Mischel, Shoda, & Rodriguez, 1989), recent work has started to explore whether humans can stay tuned and keep track of their current goals in a nonconscious manner by inhibiting competing goal information.

For instance, Shah et al. (2002) examined how the activation of a given goal inhibits the representation of alternative accessible goals that compete for attentional resources. In one of their studies, they asked their participants to nominate behavioral goals they aim to attain (e.g., jogging, cycling). Next, participants were given a verification task, requiring them to indicate as fast as possible whether a target represented a personal attribute or not. Among these targets were one of the nominated goals (e.g., jogging), and this goal was preceded by very short flashes (50 msec) of another goal (e.g., cycling) they listed before. Thus, the rationale here is that if the goal of cycling competes with the goal of jogging, then this goal should interfere with the goal of cycling. As a consequence, the goal of jogging is inhibited upon the subsequent instigation (or priming) of the goal of cycling, especially when these two goals serve an overarching purpose (e.g., getting exercise). Shah et al. obtained exactly this pattern of results (see Aarts et al., 2007, for a conceptual replication of this
effect), which suggests the nonconscious operation of an attention/inhibition mechanism that shields goals from distracting thoughts. Shah et al. speculated that these goal-shielding effects require extensive practice. Recent studies by Danner et al. (2006a), however, indicate that the inhibitory effects in goal-directed behavior may kick in rather rapidly — that is, after a few practice trials.

The previous findings indicate that people are effective in nonconsciously shielding a current goal from competing goals that serve the same overall purpose as the current goal. Recent work on restraint eating behavior suggests that things may work a little different for the resistance of temptations, such as eating palatable food (Papies, Stroebe, & Aarts, in press; Stroebe, Mensink, Aarts, Shut, & Kruglanski, in press). In their research program, Stroebe et al. assume that in order to succeed in their pursuit of the weight control goal, restrained eaters normally devalue explicit thoughts about eating palatable food (cf. Fishbach, Shah, & Kruglanski, 2004). However, on an implicit level, restrained eaters are supposed to have a strong desire of wanting to eat these food items. Consequently, the perception of palatable food automatically triggers hedonic feelings and initiates an eating goal (Papies et al. in press). Because this eating goal is incompatible with the weight control goal — that is, one cannot eat palatable food and restrain from eating it at the same time — priming of palatable food inhibits the weight control goal, thus paving the way for eating the “forbidden” food. A series of experiments, in which restrained and unrestrained eaters were subliminally primed with palatable food and tested for mental accessibility of the dieting goal, corroborate this notion.

Importantly, whereas the Stroebe et al. data show that the perception of temptations may nonconsciously down-regulate restrained eaters’ goal to diet, recent work by Fishbach, Friedman, and Kruglanski (2003) suggests that these effects are less likely to emerge for individuals who report to be successful in dieting. Fishbach et al. showed that temptations directly prime the goal to diet in successful dieters. Whereas these findings are intriguing, and at the same time, promising from a health-promotion perspective, the exact mechanism by which successful dieters learn to automatically activate dieting goals upon exposure to palatable food remains to be established.

Nonconscious monitoring and feedback processing

Human goal pursuit often starts with the detection of a discrepancy between the desired goal-state and actual state. That is to say, the person wants something they do not have. Moreover, once the process of goal pursuit is launched, people have to check-up the current state of goal pursuit, and keep an eye out to identify opportunities that reduce the discrepancies, in case the selected (dominant or habitual) means does not work out or goal completion needs to be postponed. In other words, they engage in monitoring and feedback processing. Although most theories on goal pursuit recognize and emphasize that discrepancy-detection and reduction plays an essential role in attaining and maintaining desired
goal-states (e.g., Carver & Scheier, 1998; Lewin, 1936; Miller, Galanter, & Pribam, 1960; Powers, 1973), they rarely make reference to the issue of whether this process requires conscious awareness of the goal that is pursued (Moskowitz et al. 2004).

Research on nonconscious goal pursuit has opened the possibility that monitoring and feedback processing can emerge in the absence of conscious awareness. Generally speaking, previous research failed to examine the question of monitoring during nonconscious goal pursuit for one of two reasons. First, studies that looked into the role of discrepancy (Fein & Spencer, 1997; Koole, Smeets, van Knippenberg, & Dijksterhuis, 1999; Moskowitz, 2002) manipulated it explicitly, hence leading to awareness of the goal itself. Second, studies on goal priming usually employed a context in which goal discrepancy is inherent, that is – environments in which one’s relevant goal is yet to be achieved (see Custers & Aarts, 2005a). This possible confound makes it difficult to determine whether the resulting behavior resulted from “simple” goal priming, or whether it involved a reaction to detected discrepancy.

In an attempt to solve this issue, Custers and Aarts (2007a) examined responses to discrepancies that pertain to situations where an actual state that first matched a goal state is forced away from that state, motivating people to restore their goal state. In their study, they used the goal of looking well-groomed, a goal which typically needs to be maintained over time, and was highly desirable to their participants. To test the effect of discrepancy detection, they employed a probe-recognition paradigm (Hassin, Aarts, & Ferguson, 2005; McKoon & Ratcliff, 1986; Uleman, Hon, Roman, & Moskowitz, 1996). In this paradigm, sentences that appear on the screen are immediately followed by probe words. Participants’ task is to indicate, as quickly as possible, whether the probe appeared in the preceding sentence or not. Probes that are rendered more accessible during the reading of a sentence – without actually appearing in it – should lead to longer reaction times. This is the case because while the correct response to these probes is negative, their heightened accessibility suggests a positive response, thus slowing down the correct (negative) response. Custers and Aarts used sentences were either goal-discrepant (e.g., “The shoes you put on look dirty”) or control (e.g., “The shoes you put on have laces”) that were followed by a probe word representing an action that may reduce discrepancy (e.g., polishing). If discrepancy detection leads to the automatic activation of appropriate means for goal achievement, they reasoned, probes that appear after goal-discrepant sentences should take longer to react to than probes after control sentences.

A first study examined individual differences between people who were chronic well-groomers (i.e., those pursuing the goal frequently), and people who were not. Results showed that, for chronic well-groomers, responses to probes were slower when they were preceded by a goal-discrepant sentence compared to a control sentence. This effect was not present for people who did not frequently pursue the goal. These results suggest that perceived discrepancy automatically facilitates access to discrepancy-reducing actions, and importantly, that this effect
of discrepancy requires an active goal – but not necessarily a conscious one. In a subsequent study, they experimentally manipulated the accessibility of the goal by way of subliminal priming. Just before the onset of the goal-discrepant sentence, the (Dutch) word for “well-groomed” was flashed in the fixation point. The results showed that subliminal priming produced the same effect as the chronic goal – it facilitated access to representations of instrumental actions (cf. Bargh, Lombardi, & Higgins, 1988). Together, these studies suggest that people can automatically react to goal-discrepant situations with the spontaneous activation of means for goal achievement. Note that this spontaneous activation of means only occurs if the goal is accessible. Furthermore, this effect occurs even when the goal is nonconsciously primed. This pattern suggests that enhanced accessibility of goals – whether conscious or not – leads people to monitor their environment for discrepancies. These findings, then, support the idea that nonconscious goal pursuit may involve monitoring.

In sum, several lines of research suggest that nonconscious goal pursuit is blessed with executive processes that promote effective goal pursuit. However, these processes seem to run below the threshold of consciousness. First, conscious intention is not a prerequisite of any of the processes described above: goal priming unintentionally leads to rehearsal, attention and inhibition, and monitoring and feedback processing. Second, awareness is not a prerequisite for these processes, one does not have to be aware of the primed goal or its operation.

**Nonconscious but effortful goal pursuit**

The idea that goal pursuit is supported by nonconscious executive processes raises the question whether these processes are effortful and demand mental resources. Contemporary social cognition research often assumes that nonconscious processes are efficient and do not claim mental resources. However, this “automaticity” argument may be too simplistic and hard to maintain. That is, all else being equal, the regulation of nonconscious goal pursuit has costs: the execution of the processes renders them less available for other tasks. In other words, nonconscious goal pursuit requires mental resources and is effortful, and may represent a class of mental processes in which lack of awareness and effort do not go hand in hand. While this suggestion seems to be in conflict with the present Zeitgeist, there is some evidence for it.

For instance, in their work on the regulatory functions of nonconscious “goal-shielding”, Shah et al. (2002) showed that the extent to which people inhibit competing goal information (e.g., going out) upon the nonconscious activation of another goal (e.g., studying) is positively related to goal achievement. However, further experimentation revealed that this automatic inhibition of a primed competing goal may draw resources away from the other goal, thus impairing performance on the latter goal (Shah & Kruglanski, 2002). This latter finding suggests that the nonconscious operation of the attention/inhibition mechanism of goal shielding consumes some sort of mental resources.
They reasoned that if goal priming encourages people to engage in executive processes (e.g., rehearsal and inhibition), then this should impair performance on a secondary WM-task unrelated to the goal. In their studies, they subliminally primed participants with self-described goals they wanted to attain in the short-term (e.g., going out, sporting, visiting parents), and confronted them with a WM-task that requires active rehearsal and inhibition of interfering thoughts (Smith & Jonides, 1999). Results showed that goal priming impaired performance on the task, and this impairment was stronger for participants who were more strongly motivated to attain the primed goal. These findings suggest that goal priming motivates people to deploy executive processes to support goal attainment, but that these processes usurp mental resources without people’s conscious awareness of doing so (cf. Naccache et al., 2005). Consistent with this view, recent work of Custers et al. (2006) showed that individuals are unaware of devoting extra effort in surmounting obstacles that get in the way of attaining goals that are activated outside of awareness.

The Hassin et al. findings presented above bear some resemblance to recent work on self-control and ego-depletion (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Muraven & Baumeister, 2000). In ego-depletion research, people also show impairment on a secondary task when they previously engaged in another task. These studies, however, differ from the present perspective on nonconscious goal pursuit and executive processes in two important ways. First, ego-depletion is conceptualized in terms of an act of conscious self-control that consumes energy from some limited ego-resource, leaving less energy available for a subsequent act of self-control. The view on nonconscious goal pursuit and executive control presented here takes into account the functional architecture of human information processing that does not allow concurrent processes to use the same resources or hardware (Cocchini, Logie, Della Sala, & Baddeley, 2002; Navon, 1984; Neumann, 1997; Pashler, 1998). Second, the emergence of ego-depletion is supposed to be accompanied by explicit, conscious processes that are thought to be typically involved in self-control. Accordingly, some researchers have shown that expectations about self-control and energy use moderate ego-depletion effects (Martijn, Tenbult, Merckelbach, Dreezens, & De Vries, 2002). Obviously, these processes are less likely to play a role in nonconscious goal pursuit resulting from subliminal priming procedures. The interesting issue, then, is how people allocate resources to a primed goal without being aware of the activation and operation of the goal. That is, what is the nonconscious source motivating goal pursuit? This is the issue to which I now turn.

**Implicit affect as modulator of nonconscious goal pursuit**

In essence, goal-directed behavior has two main features: it has direction (the reference point directing cognition and concrete actions), and intensity (the motivation to invest effort or resources in attaining the goal). The directional part
of goals is what we usually express in terms of what people are doing, while the motivational part is what we call wanting.

Much research on human goal pursuit has focused on goals as representations of reference points. The step from cognitive goal representations to the motivation to pursue and to invest effort or resources in attaining a given goal, however, has either been ignored or been assumed to involve an act of conscious will (Ajzen, 1991; Deci & Ryan, 1985; Golwitzer, 1993; Locke & Latham, 1990; Monsell & Driver, 2000). Research on nonconscious goal pursuit suggests that this step can be taken nonconsciously. It is assumed that one can activate mentally represented goals and their pursuit by environmental cues because these goals are there. Whereas this explanation allows one to conceptualize the source of human goal pursuit in terms of a nonconscious will (Bargh et al., 2001), implicit intention (Wood, Quinn, & Kashy, 2002), or implicit volition (Moskowitz et al., 2004); the nature of the mental process motivating people to pursue a primed goal concept in the absence of awareness is not fully understood. Accordingly, we recently started to explore this issue by examining how a primed behavioral goal concept (e.g., how the mere priming of a concept such as “making-money”, “drinking” or “socializing”) is nonconsciously translated into motivational activity, and modulates the amount of effort or resources in working on the goal by deploying executive processes (Aarts et al., in press; Custers & Aarts, 2005a,b).

Specifically, given the intimate relationship between conceptual knowledge and mental representations of goal-directed behavior (Aarts et al., in press; Vallacher & Wegner, 1987), we posit that a primed goal concept automatically provides a current reference point for directing cognition and action. The cognitive prime for goal-directed behavior, however, is more likely to operate as a motivational state if the goal-prime is immediately followed by positive affect – where affect is conceptualized in terms of a quality or valence assigned to an entity (e.g., Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Zajonc, 1980), and not a feeling state or emotion that people consciously experience (e.g., Isen & Diamond, 1989; Russell, 2003). That is, if a representation of positive affect is activated as a consequence of priming a goal, this affective valence signals the mental system that the accessible goal is worth pursuing. It puts people into a state of readiness for goal pursuit, so to speak. This implicit affective-motivational feedback process stems from associations between the representation of a goal and positive affect that are shaped by one’s history (e.g., when a person was happy when making money). In this case, the goal is said to pre-exist as a desired state in mind (Aarts et al., 2005; Bargh et al., 2001; Kruglanski et al., 2002), and priming the goal concept enhances the motivational activity to pursue it. The enhanced motivational activity, in turn, energizes the executive processes that operate on goal-relevant information to deal with the task at hand.

A recent set of studies tested this hypothesis. For instance, Custers and Aarts (2007b) subliminally primed their participants with the goal of socializing or not. Next, they performed a mouse-click task that, if sufficient time was left, was followed by a lottery in which they could win tickets for a popular student event.
It was established that participants put more effort in the instrumental task to attain the primed goal state when the goal state was more positive (as assessed by the EAST; De Houwer, 2003), but only when “socializing” was primed. Furthermore, Hassin et al. (2006) demonstrated that goal priming caused participants to allocate more resources to engage in executive processes, and, thus, impaired performance of a secondary executive process task to the extent that the goal is positive. These findings show that goal priming effects on motivated behavior and action control are conditional on the positive valence attached to the primed goal state.

However, whereas nonconscious goal pursuit may result from the activation of a preexisting desired goal that is associated with positive affect, this process can, in principle, also result from the mere co-activation of a neutral goal concept (i.e., a concept that refers to something that people could pursue as a goal but have no current desire for) and positive affect. That is, positively valenced signals that directly accompany the priming of goal concepts available in the organism’s repertoire puts the person into a state of readiness to actually pursue the goal. For example, one may become motivated to pursue the goal of making money or drinking beer by seeing someone else smile after pursuing these behavioral goals. This sensitivity towards the co-activation of goals and affective signals is thought to play a fundamental role in social learning (Miller & Dollard, 1941), and is now being considered as basic in motivational analyzes of human behavior (Cabanac, 1992; Shizgal, 1999). In line with this notion, work on incentive learning (e.g., Berridge, 2001) and the mesolimbic dopamine system—a brain structure associated with motivated behavior (e.g., O’Reilly, Braver, & Cohen, 1999; Salamone, Correa, Mingote, & Weber, 2005) – suggest that goal concepts become an immediate motivator when these concepts are activated in temporal proximity to the activation of positive affect, thereby mobilizing effort and energizing executive processes to work on the goal. Recent studies from our laboratory, in which we were able to co-activate neutral goal-states and affectively valenced information outside of conscious awareness by exploiting the evaluative conditioning paradigm (De Houwer et al., 2001), support these notions.

For instance, in one set of studies we showed that repeated pairing of the representation of a neutral behavioral goal (e.g., words such as drinking, cleaning-up) and positive affect (e.g., words such as home or nice) motivates participants to work harder on an intervening task to secure engagement in the behavioral goal (Custers & Aarts, 2005b). Furthermore, building on past research into the relation between motivation and functional perception (Bruner & Goodman, 1947; Bruner & Postman, 1948), we demonstrated that this nonconscious goal shaping treatment caused participants to perceive goal-related objects (e.g., a glass of water) as being bigger in size (Veltkamp, Aarts, & Custers, 2006). Interestingly, we also showed that co-activation of neutral goal-states and negative affect did not have these effects on the motivation measures. This finding concurs with theories arguing that affect consists of two separate dimensions – positive and negative affect – that independently contribute to motivation and behavior (Cacioppo & Berntson, 1999; Gray, 1987; Lang, 1995; Watson & Clark, 1992).
Specifically, we proposed that positive affect increases the motivation to pursue neutral goals, while negative affect decreases it to the extent that the goal is positive, and, thus, already carries potential motivation before being primed (Aarts et al., 2007). But why would this be the case? Why do people not act on a desired goal that becomes attached to negative information?

**Negative affect as demotivator**

It is known that humans show hypersensitivity to negative social and behavioral information (e.g., Dijksterhuis & Aarts, 2003; Pratto & John, 1991). Exposing people to negative goal-related cues can easily spoil the appreciation of a given goal (Aarts et al., 2004; De Houwer et al., 2001; Rozin & Royzman, 2001). Such negative goal treatment can take different forms and arise from many sources. For example, one may anticipate the danger of ending up with the usual hangover when contemplating the goal of going out and socializing; seeing how others take advantage of the poor and the sick in order to make money may render this goal less attractive. More generally, the motivation to pursue a goal rapidly decreases as a result of negative evaluations or signals upon activation of the desired goal state. At first glance, this cessation of goals suggests that negative affect dismisses the desire and operation of goals by an act of conscious will. Thus, people decide not to waste energy in keeping a goal alive, and recruit resources for goals that are no longer considered to be desirable so that they can move on to another goal (Carver, 2004; Klinger, 1975). However, it is possible that negative affect directly ceases goal pursuit by moderating the desire and operation of personal goals without conscious intervention. That is, reducing the motivation of a goal that co-activates with negative affect is adaptive in weakening the goal’s influence when potentially inappropriate, and this motivation-reduction mechanism may be especially effective when one lacks awareness of the activation and operation of one’s goals.

In a recent empirical demonstration of this idea, we (Aarts et al., 2007) used the evaluative conditioning paradigm to subliminally prime the goal of partying (a goal most of our students perceive as a desired state, see also Sheeran et al., 2005) in temporal proximity of negatively valenced words (e.g., war, trash), and tested effects of this affective shaping treatment on the motivation to work at the goal in a subsequent goal-relevant task. It was found that participants were less motivated to strive for the goal when the goal was linked to negative information (compared to conditions in which the goal was not primed or not directly linked to negative information). In their recent work on unconscious emotions, Winkielman, Berridge, and Wilbarger (2005) exposed thirsty participants having the goal of drinking to subliminal facial expressions of negative emotions and, similar to the negative valence effects obtained in the Aarts et al. (in press) study, showed a decline in the motivation to drink. These findings suggest that the incentive value of a goal decreases when the goal is co-activated with negative affect, thereby leading to nonconscious cessation of goal pursuit.
The previous findings may have important implications for the emergence of nonconsciously goal pursuit as a result of perceiving social cues in the environment. For instance, they suggest that the perception of another person’s goal-implying behaviors will not always lead to goal contagion: when the goal pursuit is perceived as negative, goal contagion may be less likely to occur. To examine this issue, Aarts et al. (2004) exposed heterosexual male students to the behavioral script implying either the goal of seeking casual sex or not. In one of the sex goal versions, it was made clear that the protagonist was already engaged in a serious relationship (this should render the goal pursuits of casual sex unacceptable, and, thus, put it in a negative light; Margolin, 1989). Participants were then given the opportunity to help a female experimenter, and the question was how much effort they would expend to help (as a mean for goal achievement). Their results indicated that goal contagion vanishes when the situation in the behavioral script renders the implied goal unacceptable. Further experimentation revealed that perceiving others’ pursuing a goal under unacceptable conditions made the goal less desirable for the perceivers.

These findings establish the important point that people do not always automatically pursue the goals they perceive in others, even though the goal is activated in the perceiver’s mind. Negative information that co-occurs with a goal is a key moderator of nonconsciously goal pursuit. Such negative information may derive from the way or context in which another person pursues the implied goal, but also from properties of that person itself – an issue that deserves future research. The bottom-line is that as soon as a nonconsciously activated goal is linked to negative affect, that goal no longer operates as an incentive or state one desires to attain, and, thus, is not capable of directly shaping goal-directed activity. As the studies presented above show, however, people do not have to be aware of these effects; the reduced motivation in itself suffices to moderate nonconsciously goal pursuit. This raises the possibility that individuals have a natural protection mechanism that makes them immune, so to speak, against acting on goals that are rendered unattractive by the context surrounding the goal. It prevents them from the possible oscillation between approaching the goal and inhibiting it (see Aarts et al., 2007, Study 2).

Conclusions

Over the last 25 years or so, several lines of experimentation have discovered that most of our behavior originates in the unconscious, and can occur in an automatic fashion. This notion does not only pertain to simple motor movements, such as flexing an index finger or pushing keys on a computer keyboard, but also to social behavior resulting from higher cognitive processes, such as our goal pursuits. Specifically, I presented research indicating that goal priming affects a wide range of relatively complex behaviors, such as transport mode choice, drinking alcohol, seeking casual sex, earning money and helping, and that people are able to initiate and regulate their goal pursuits without awareness of the activation and operation of the goal. These goal pursuits play, either directly
or indirectly, an essential role in shaping, changing and maintaining health-behaviors via motivating and guiding our thinking and doing.

I reviewed research demonstrating that human goal pursuit may result from habitual, reflexive processes in which means to attain goals are automatically selected once the goal is primed. Also, I briefly discussed research showing similar effects of forming implementation intentions. That is, implementation intentions set up cognitive processes that automatically interrupt and move us away from habits by changing the way in which we attain our personal goals. Importantly, for implementation intentions to be effective, people have to be aware of their goals and consciously plan their course of action. However, I showed that nonconscious goal pursuit can go beyond habits without planning. Several studies demonstrate the remarkable capacity of the human mental system to flexibly adapt to the environment by relying on executive processes, such as rehearsal, inhibiting competing goal information and monitoring, that support goal pursuit in the absence of conscious awareness. In other words, people are able to deviate from habitual patterns to attain their personal goals without switching to a more conscious, intentional mode of control. Whereas the causal status of consciousness in human behavior is often taken for granted, especially when routines do not work out to shape behaviors, research on nonconscious goal pursuit gives reason to suggest that people can navigate their goal-directed behavior quite adequately without a need to postulate an inner agent that offers them a conscious will (Blackmore, 2003; Wegner, 2002).

The research discussed in this paper indicates that the mental processes that render our goal pursuits flexible can operate below the threshold of consciousness but require resources (see also, Hassin et al., in press). These findings have important implications for the regulation and modification of nonconscious “selfish” goal pursuit: the nonconscious activation and operation of our personal goals may interfere with goals that need our conscious attention (such as goals related to health improvement), and consequently, these latter goals are less likely to be achieved (Shah et al., 2002; Stroebe et al., in press). Perhaps, then, willful planning may be an effective tool in interrupting “unhealthy” goal pursuits, and turn them into healthy ones – an enterprise, however, that assumes the presence of an inner agent directing conscious attention to the goal itself. Future research could shed light on this important matter by focusing not only on the question of how habitual means can be replaced by alternatives to attain a specific goal (e.g., drinking soda rather than beer when going out), but also how people may switch between different goal pursuits (e.g., studying instead of going out).

A different perspective on shaping “healthy” goal pursuits is to focus on implicit affective processes that modulate the motivation of nonconsciously activated goals. I presented recent research showing that our mental apparatus is not only capable of directly initiating motivational activity directed at goals, but also of ceasing this activity on the basis of affective information processing without conscious assistance. Whereas the common view to lure people to motivational behavior concerns the more conscious route of goal-relevant incentives, the notion that the nonconscious co-activation of representations of goals and affective information
may install similar effects provides new directions for understanding and changing people’s motivation and subsequent operation of goal pursuit. The detailed nature of such co-activations, and their relationship to affective-motivational processes and nonconscious goal pursuit, provide a challenge for future basic and applied research. For example, it is important to examine parameters that play a potential role in modifying the motivation of neutral and pre-existing goals as a result of co-activation, and how long these motivational changes last. Examples of these parameters are the type of affective information (goal-relevant vs. goal-irrelevant information) and the temporal distance of the co-activation. Another interesting avenue for further research concerns the question of how the co-activation of neutral goals and affect interacts with the activation of pre-existing goals in priming and shaping actual goal pursuit.

Importantly, the suggestion that co-activation of pre-existing goals and negative affect reduces the motivation of that goal goes against theories that consider negative affect (e.g., frustrations due to failure) to motivate conscious goal pursuit (e.g., Carver, 2004). The research reviewed here thus provides a unique perspective on the role of affect in the mental processes determining implicit motivation and regulation of goals. The study on affective processes has only just begun to reach the domain of nonconscious goal pursuit (see, e.g., Bechara, Damasio, & Damasio, 2000; Ferguson & Bargh, 2004; Winkielman & Berridge, 2004), and calls for further theoretical and empirical specification. I believe, though, that studying the changes in the affective-motivational context surrounding goal priming may open new ways to explore how the mental system regulates the motivation and operation of goal pursuit outside conscious awareness, and offers new directions in the study on the psychology of health promotion and disease prevention.

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References
Health and goal-directed behavior


