



# On the Emergence of Human Goal Pursuit: The Nonconscious Regulation and Motivation of Goals

Henk Aarts\*  
*Utrecht University*

---

## Abstract

Experimental research in social psychology has discovered that human goal pursuit can emerge in the absence of conscious awareness. Whereas these goal-priming effects are commonly explained in terms of habitual automatic processes, recent studies shed new light on the matter. Building on this recent work, this paper attempts to promote a more comprehensive understanding and examination of the potential mechanisms that enable people to pursue their goals in a nonconscious fashion. Specifically, it addresses (i) the human capacity to pursue goals without awareness of the activation and operation of the goal, even when habits are inadequate; and (ii) the fundamental role of positive affect in nonconsciously modulating the motivation of goals and their pursuit.

---

Self-reflection, and the ability to become consciously aware of oneself and one's own behavior is a uniquely human trait. This exclusive ability gives reason to assume that people's behavior is governed by 'consciousness' or some other type of inner agent such as 'the will' or 'the self'. Consciousness, it is argued, plays a pivotal role in goal setting, striving, and attainment, and should especially be important when our habits established by practice do not work to attain our goals. The concept of consciousness thus forms a core aspect of modern views on the role of motivational and cognitive processes in the regulation of social behavior.

Whereas the causal status of consciousness in human behavior is often taken for granted, over the last 25 years or so several lines of experimentation have discovered that our behavior is often the product of nonconscious cognitive processes – that is, processes that do not require conscious intention and attention in order to occur. We learned that impressions of people are influenced by contextual factors of which we are unaware (Bargh & Pietromonaco, 1982; Higgins, Rholes, & Jones, 1977; Srull & Wyer, 1979). Subsequently, we were confronted with the fact that social stereotypes that we have about others are activated automatically (Devine, 1989; Macrae, Milne, & Bodenhausen, 1994), and that these automatically

activated stereotypes change our behavior in the absence of conscious awareness (Bargh, Chen, & Burrows, 1996; Dijksterhuis & van Knippenberg, 1998). Only just recovered from that major breakthrough, we finally were presented with evidence that even our goal-directed behaviors can be under 'unconscious control' (Aarts & Dijksterhuis, 2000a; Bargh, Gollwitzer, Lee Chai, Barndollar, & Trötschel, 2001; Moskowitz, Li, & Kirk, 2004).

This large body of evidence for the occurrence of nonconscious social behavior resonates well with prevailing views on the limited role of consciousness in human functioning. According to these views, our thinking and doing is produced by brain processes that are not open to our introspection, and, hence, in essence *all* our behaviors start in the unconscious (e.g. Dennett, 2003; Libet, 1985; Nørretranders, 1991). The picture of a social agent that motivates, initiates, and directs behavior consciously and intentionally thus has been crumbling down (Bargh, 1997; Bargh & Chartrand, 1999; Wegner, 2002; Wilson, 2002). This notion not only pertains to simple motor movements and skills, such as flexing an index finger, pushing keys on a computer keyboard, or driving a car, but also to social behavior resulting from higher cognitive processes such as our goal pursuits.

The empirical study of nonconscious goal pursuit creates an ongoing debate, partly because each new piece of evidence carries potentially far-reaching implications for our understanding of consciousness and, more generally, for our views of what it is to be human (Blackmore, 2003). This paper focuses on two interrelated issues that are central in this discourse and that currently impede our understanding of the process of nonconscious goal pursuit. These issues are (i) whereas nonconscious goal pursuit is often understood in terms of habitual automatic processes, genuine goal pursuit should involve more adaptive and flexible processes; and (ii) goal-directed behavior reflects people's motivation to pursue goals, but it is rather unclear how people engage in goal pursuit without conscious will.

The present paper takes these issues into account and aims to introduce novel and challenging views and findings that offer a different scientific perspective on the mental processes involved in nonconscious goal pursuit. Specifically, to deal with the two issues it is proposed that (i) goals can be activated and pursued nonconsciously in the environment and serve adaptive functions via nonconscious cognitive processes that follow principles of self-regulation or executive control and working memory – processes that are usually conceived of as governed by consciousness; and (ii) positive affect plays a basic role in nonconsciously motivating goals and their pursuit. These two propositions may provide new insights into how the mental apparatus directs and motivates people to either pursue a goal or not in the absence of conscious will.

In what follows I will discuss how nonconscious goal pursuit may be flexible and adaptive without an act of conscious will, even when habits

are inadequate and fail to attain goals. Next, I will discuss the fundamental role of positive affect in nonconsciously modulating the motivation of goals and their pursuit, an issue that may demystify the source of our goal pursuit without conscious intervention. Before I discuss this work in more detail, however, I will address the role of habits in nonconscious goal pursuit.

### **The Role of Habits in Nonconscious Goal Pursuit**

An important assumption underlying the idea of nonconscious goal pursuit is that goals are mental representations of desired (valued) states pertaining to behaviors (e.g. solving puzzles, performing well, socializing) or outcomes (e.g. owning money, being proud) that are preexist in the actor's long-term memory. Defining goals in this way implies the ability to represent (concrete) actions in terms of their consequences or effects that allow people to direct their behavior by means of anticipating the effect (e.g. Aarts, Dijksterhuis, & Dik, forthcoming; Prinz, 1997; Vallacher & Wegner, 1987). For instance, the act of socializing can be identified as a consequence (and hence, represented as the goal) of meeting up with friends at a bar. Similarly, solving anagram puzzles can be conceived of as the result of rearranging the letters of a word. Accordingly, the cognitive representation of the goal serves as a reference point in directing lower (motor) actions. Because the goal concept designates a desired state and thus carries potential motivation, activating the goal concept motivates the person to pursue the goal.

Furthermore, preexisting goals are assumed to be part of knowledge structures, including the goal itself, actions, procedures, objects, and opportunities that may aid goal pursuit as well as situational or contextual features related to the goal (Aarts & Dijksterhuis, 2000a, 2003; Bargh & Gollwitzer, 1994; Cooper & Shallice, 2006; Kruglanski et al., 2002). For example, the goal of socializing may be related to drinking beer while meeting friends in one's favorite bar. Or, a visit to a library may be connected to the act of screening the new journals and talking softly during interactions. These knowledge structures enable people to act on goals without intentional control or forming explicit expectancies, and are shaped by direct practice and other types of indirect learning, such as normative influence communicated by important others, groups, and media. According to the concept of nonconscious goal pursuit, then, goal-directed behavior can start outside of conscious awareness, because one can directly rely on goal representations that are primed by, and interact with behavioral and contextual information.

One of the most common perspectives on nonconscious goal pursuit deals with habit-formation processes (Aarts & Dijksterhuis, 2000a, b; Bargh, 1990a; Fishbach, Friedman, & Kruglanski, 2003; Moskowitz et al., 2004; Shah, 2003). Specifically, for goal pursuit to become automatized,

one has to practice the selection and execution of the most effective action in the goal-relevant situation. When we select and perform the same actions more often and when these actions lead to goal-achievement, we become skilled in performing these actions, allowing us to execute them in an efficient manner. However, selecting and performing the same goal-directed behavior frequently and consistently has another effect: instrumental actions become more strongly associated with the goal, thus comprising habitual means to attain the goal. As a result, activation of the goals spreads automatically to the behavior representations of the associated means according to an 'if-then' rule, enabling the goal-directed behavior to occur directly and independent of conscious intentions (Aarts, Verplanken, & Van Knippenberg, 1998; Bargh, 1990a). In a sense, then, nonconscious goal-directed behavior can be seen as hierarchical mental representations in which activation of a goal leads to activation of associated habitual means and skilled procedures lower in the hierarchy. Once activated, the habitual means are controlled by feedback processes that allow for adjustments of motor actions in response to disturbances in the environment in order to have their desired effects (Aarts & Custers, forthcoming; Hommel, 2007).

The idea that nonconscious goal-directed behavior can be the result of the immediate activation of the habitual means upon the instigation of a goal has been tested in the realm of travel behavior (Aarts & Dijksterhuis, 2000a). This study 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. Thus, habitual and nonhabitual 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) replicated and extended these findings to (overt) health behavior. Building on the observation that socializing goals are strongly associated with alcohol drinking among UK students (Senchak, Leonard, & Greene, 1998; Treise, Wohburg, & Otnes, 1999) it was shown that priming of the goal of socializing enhanced habitual drinkers' inclination to drink alcohol compared to nonhabitual drinkers. Specifically, students who were habitual drinkers choose more often a voucher for a free alcoholic beverage (beer/wine) than for a free warm drink (coffee/tea) after being primed with the goal of going out and meeting friends. These effects were obtained without participants' awareness of the priming of the goal. Note that offering the free alcohol voucher served as a potential stimulus to trigger the alcohol drinking habit, and that goal priming facilitated the habitual response to the stimulus.

These findings are consistent with data obtained in studies on the practice of stimulus–response translation (i.e. the transformation of a stimulus code into an action code), showing that goals set the stage, and prepare the individual for automatic responding to stimuli (Hommel, 2000).

The studies alluded to above suggest that goals (e.g. traveling to work) can directly activate habitually selected specific means (e.g. car use) and subsequent skilled motor action (driving to one's final destination in a routinized fashion). However, other studies have tested whether goal priming facilitates the utilization of skills associated with the goal, even though these skills have not been previously applied to the task at hand. One of the first empirical demonstrations of this notion comes from Bargh et al.'s (2001) research program on how goal-priming effects on achievement. Capitalizing on the notion that people habitually recruit different skills to attain their goals to achieve and perform well, in one of their studies they exposed participants to words such as 'strive' and 'succeed' to prime the goal of achievement, and then gave them the opportunity to display their performance skills (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. Of importance, after the experiment participants indicated their conscious commitment to perform well on the task, and these conscious ratings were unrelated to the priming effects. These results indicate that achievement priming causes people to initiate and exhibit skills habitually associated with the goal to perform well without being aware of the actual goal causing the behavior.

Similar findings have been reported in other studies that identified the social triggers that repeatedly influence people to pursue goals. There is research to suggest that goal pursuit is automatically triggered when goals are inferred from behaviors of others, an effect termed goal contagion (Aarts, Gollwitzer, & Hassin, 2004; Dik & Aarts, forthcoming). 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 working faster on a skilled motor task to ensure 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 Fitzsimons 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 habitual goal and resultant concrete behavior of helping (see also Shah, 2003). A recent line of experimentation replicated and extended these subliminal goal-priming effects in the realm of social stereotypes (Aarts et al., 2005; Custers, Maas, Wildenbeest, & Aarts, forthcoming). 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 (e.g. the goal of helping or making money that are stereotypical for nurses or stockbrokers, respectively).

To recapitulate, practice and habits play an important role in the automation of goal pursuit. Actions instrumental in attaining goals that are repeatedly and consistently selected and performed in the same context become habitual and associated with the goal in the given context. Accordingly, goal-directed behavior no longer needs to be guided by conscious intentions to attain the goal, but, instead, is activated and maintained by the representation of the goal without conscious intervention. It should be noted that, in line with the behaviorists' perspective, habits have often been (and are still) conceptualized as rigid responses that are directly triggered by environmental cues, while goal-directed behaviors are exclusively seen as the result of conscious intentional processes (see, for example, Wood & Neal, forthcoming). In other words, goals are treated as inherently equivalent to intentions and, hence, the instigation of behavior to attain specific goals always relies on intentions. The present view on habits and goal-directed behavior goes beyond this conventional approach. Specifically, the observation that our goal pursuits can emerge from nonconscious cognitive processes as a result of practice and experiences suggests that intentions and goals are distinct concepts, that can operate independently from each other, served by different processes (see also Bargh 1990b; Frith, Blakemore, & Wolpert, 2000). Whereas intentions are the product of conscious deliberation to engage in a behavior or to attain a goal, goals are mental representations of desired states that have become linked to specific means or skills allowing for effective goal attainment without conscious intervention. Therefore, priming these goal representations causes the organism to recruit the associated means or skills directly, and thus goal-directed behavior is launched and guided in the situation at hand without conscious intent.

### **When Habits Fail: Nonconscious Goal Pursuit Is Flexible and Adaptive**

Thus far, nonconscious goal pursuit is mainly explored as a form of habit: automatic processes that, once the goal is activated by the situation, follow a well-practiced route to completion. Sometimes, however, the situation does not allow for a direct execution of habitual means or skills, or it 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 wait for the right moment or adjust his or her behavior to the context at hand to successfully attain the goal (e.g. telling sexually explicit jokes

when sitting in a pub with friends, but gossiping about the minister of education during lunch with colleagues). Furthermore, one may switch to alternatives when one discovers that the cafeteria is currently out of one's habitually selected bananas, in order to eat healthy food.

An important issue, then, is how nonconscious goal pursuit proceeds when habits are inadequate and fail to produce goals. The traditional answer would be that we do 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). Recently, this assumption led researchers to posit that nonconscious goals operate via cognitive processes that follow principles of self-regulation or executive control and working memory (Aarts & Hassin, 2005; Custers & Aarts, 2005a; Fitzsimons & Bargh, 2004; Hassin, Aarts, Eitam, Custers, & Kleiman, 2007). Specifically, whereas commonly conceived of as belonging to the realm of consciousness, executive processes supporting goal pursuit are proposed to operate in the absence of awareness of the activation and operation of the goal. While this may be a controversial proposition, there is some recent evidence for it.

First, it is demonstrated that a nonconsciously activated goal can be held active in short-term memory for minutes – 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 2.5 min later tested for accessibility of the goal in a lexical decision task by measuring the speed of recognizing words related to the goal as existing words. Results showed that the representation of the goal remained accessible when participants were primed to attain the goal. Similar persistent activation effects – even after 5 min of goal priming – have been obtained for behavioral measures (Aarts et al., 2004; Bargh et al., 2001), suggesting that some kind of updating or rehearsal process keeps goal-relevant information active nonconsciously. From a functional point of view, this observation makes sense: when a goal

operates as a desired state it should be kept active in mind, thereby increasing the probability of acting on it when encountering goal-relevant opportunities (e.g. when a friend asks to meet up later in the bar).

Furthermore, recent work has started to explore whether humans can keep their eyes on their ongoing goal pursuit in a nonconscious manner when competing information conflicts with these pursuits (Aarts et al., 2007; Shah, Friedman, & Kruglanski 2002). People usually engage in this type of self-regulatory process when they have to deal with interference that stems from other goals that compete for attention and behavior; a process that is commonly conceived of as requiring conscious and intentional control (see, for example, work on delay of gratification; Mischel, Shoda, & Rodriguez, 1989). However, there are studies that tell a somewhat different story. For instance, Shah et al. (2002) demonstrated that when participants are nonconsciously instigated to pursue a given goal (by subliminal exposure to words representing the goal, e.g. of studying) they inhibit competing accessible goals (e.g. going out), and moreover, this inhibition facilitated the achievement of the nonconsciously activated goal. These findings provide support for the existence of a nonconscious attention/inhibition mechanism that shields goals from distracting thoughts. Shah et al. speculated that these goal-shielding effects require extensive practice, thus arguing for a habitual and well-learned automated mechanism. Recent studies by Danner, Aarts, and De Vries (2007), however, indicate that the inhibitory effects in goal-directed behavior may kick in rather rapidly – that is, after one practice trial.

Finally, there are a few studies that tested whether situations that are discrepant with nonconsciously activated goals encourage people to exploit opportunities in novel settings without awareness of operation of the goal (Aarts et al., 2004; Custers & Aarts, 2005b, 2007a). For instance, Aarts et al. (2004) showed that priming the goal of earning money encouraged participants to engage in a lottery that gave access to money, but only when they were in need of money; that is, when the primed desired goal state was discrepant with the actual state. Participants claimed that they were not aware of the priming effects, thus showing that the detection and reduction of discrepancies may occur in the absence of conscious awareness. In another, more compelling study, Custers and Aarts (2007a) investigated the goal of looking well groomed, a goal that typically needs to be maintained over time and was highly desirable to participants. In their study, they subliminally primed the goal or not, just before participants were confronted with a situation that was discrepant with the goal (e.g. the shoes they put on were dirty). Then, they measured the speed of identifying actions that are instrumental in reducing the discrepancy (e.g. polishing). Their findings showed that subliminal priming facilitated the identification of instrumental actions. Additional studies showed that these priming effects do not emerge when the situation is not discrepant with the primed goal (Custers & Aarts, 2005b).



Together, these data suggest that nonconscious goal pursuit is supported by discrepancy detection and feedback processing.

In summary, several lines of research suggest that nonconscious goals not only run off in a habitual, automatic way, but they may serve flexible functions that operate via cognitive processes following principles of executive control and working memory (Baddeley & Hitch, 1974; Miyake & Shah, 1999). Contrary to most current views (e.g. Baars & Franklin, 2003; Baddeley, 1993; Gazzaniga, Ivry, & Mangun, 1998), however, these processes (and the information on which they operate) seem to run below the threshold of consciousness.

The idea that goal pursuit is supported by nonconscious executive processes raises the intriguing and fundamental question of 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. This view may hold when we merely consider nonconscious goal pursuit as automatic behavior that results from habitual, reflexive processes. However, this 'automaticity' argument may be too simplistic. That is, all else being equal, engaging in nonconscious goal pursuit can have costs: The execution of the processes alluded to above renders them less available for other tasks. In other words, nonconscious goal pursuit may rely on mental resources, and as such represents a class of mental processes in which lack of awareness and effort do not go hand in hand.

In a recent test of this notion, we reasoned that if priming a goal encourages people to engage in executive processes, this should impair performance on another Working Memory (WM) task unrelated to the goal (Hassin et al., 2007). In one study, we subliminally primed participants with a desired goal that they desired to attain in the short term (e.g. studying, visiting parents) and then measured performance on a goal-unrelated WM task. In an adaptation of the Sternberg task (Sternberg, 1966), the WM task required active maintenance of information in short-term memory and inhibition of previously memorized information to attend to later task-relevant information (see also Smith & Jonides, 1999). Results showed that after goal priming, participants' performance on the task was impaired. 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, in a recent study we showed that individuals devote extra effort to surmounting obstacles that get in the way of attaining goals that are activated and operate outside of awareness (Custers et al., forthcoming).

The findings discussed above raise the interesting issue of how people mobilize effort and allocate resources to pursue a primed goal without an act of conscious will. That is, what is the nonconscious (motivational) source that brings people into a state of readiness for goal pursuit? This is the issue to which we turn now.

## **Readiness for Goal Pursuit: The Role of Positive Affect as an Implicit Motivator**

In research on goal pursuit, researchers often make a distinction between two main features of goals that guide behavior toward goal attainment. First, goals have a cognitive feature, in the sense that the goal concept serves as a reference point or standard directing perception and concrete actions to reduce discrepancies with the actual state of the world. Second, goals comprise motivational value, referring to the energy a person mobilizes to invest effort or recruit resources in attaining the goal. The directional part is what we usually express in terms of what people are doing, while the energizing part is what we call motivation. Hence, current approaches to goal pursuit conceptualize goals as mentally represented desired states that direct and motivate the organism toward goal achievement (Geen, 1995; Gollwitzer & Moskowitz, 1996).

Although much research on human goal pursuit has focused on goals as representations of reference points, the step from cognitive goal representations to motivational activity has either been ignored or been assumed to involve an act of conscious intention (e.g. Ajzen, 1991; Gollwitzer, 1990; Locke & Latham, 1990; Monsell & Driver, 2000). As argued before, research on nonconscious goal pursuit suggests that goal and intention are not the same concept, and that the step from goal representation to motivated behavior can be taken nonconsciously. An important issue, though, concerns the question how this works: How do people resolve whether to invest effort or resources in attaining a given behavioral goal without involvement of conscious will?

One way to answer this question is to propose that the process of forming an intention to pursue a goal can take place outside awareness. This has resulted in the proposition of concepts such as nonconscious will (Bargh et al., 2001), implicit intention (Wood, Quinn, & Kashy, 2002), or implicit volition (Moskowitz et al., 2004). These terms undoubtedly evoke counterintuitive thoughts, but they merely stretch the applicability of inherently conscious concepts featured in existing models to the unconscious level. Although this strategy has certainly helped put the exciting notion of nonconscious goal pursuit on the scientific research agenda, it does not tell us much about how the unconscious can do what until recently was assumed to require consciousness.

Another approach is to make an inventory of what people can do unconsciously and construct an hypothesis in line with that knowledge. According to almost all models of goal pursuit, whether a goal is pursued or not depends on the value of the goal state. The best candidate for a mechanism that could determine the value of a primed goal outside conscious awareness would be one that relies on affective processes. It is known that affect play a fundamental role in motivating human action and can be evoked quite quickly without reaching conscious awareness (e.g.

Damasio, 1994; Dijksterhuis & Aarts, 2003; Fazio, 2001; LeDoux, 1996; Zajonc, 1980). For instance, in several experiments it has been shown that affective words (e.g. summer, shark) are classified in terms of their valence before participants know the meaning of the word. Furthermore, the affective tone accompanying options in a decision problem (e.g. A is good and B is bad) can be used to determine what to do without people being aware of the influence of the affective signal. Thus, if goal representations would contain an affective component that reflects the expected value of the goal, this information could be used to nonconsciously determine whether a primed goal is desired or not, which renders conscious deliberations redundant. I argue here that this component is captured by the positive valence attached to the representation of the goal.

Evidence for the idea that positive affect associated with a goal state endows it with motivational value comes from research on incentive theory. This theory grew out of several remarkable findings in different animal laboratories that shed new light on the role of reinforcement in learning processes following the stimulus–response habit paradigm (see, for a review, Berridge, 2001). According to incentive theory, it is not so much the strength of the stimulus–behavior relation that is reinforced, but that specific behaviors that are practiced under particular conditions (such as deprivation) are rendered more desirable. These incentive learning effects are assumed to occur because the positive affect aroused by, for instance, the act of eating chocolate when hungry, becomes linked to the behavior itself. As a consequence, the organism can be motivated to eat by priming cues referring to the behavior without explicitly reinforcing the behavior.

The idea that the positive affective valence attached to behavior motivates concrete actions that are instrumental in realizing that behavior has a biological foundation. That positive affect could be a powerful motivator was discovered by Olds and Milner (1956), who devised an apparatus by which rats could self-administer mild electric shocks to so-called ‘brain pleasure centers’ by means of pressing a lever. The rats pushed the lever frequently and vigorously, even when they had to cross a shock grid to get to the lever, or were hungry and could choose between food and the possibility of self-stimulate of their brain (see Spies, 1965). This demonstrates that if an originally neutral behavior (i.e. pressing a lever) becomes associated with positive affect, it becomes a desired behavioral goal for which the organism will exhibit enhanced motivation to engage in it.

In addition to these early studies, recent work in neuroscience provides insightful clues as to how positive affect may be involved in motivation. Several lines of research show that the mesolimbic dopamine system, particularly the nucleus accumbens that was targeted in the self stimulation studies of Olds and Milner, is associated with motivated behavior (Robbins & Everitt, 1996; Salamone, Correa, Mingote, & Weber, 2005; Schultz, 1998; Wightman & Robinson, 2002). The dopamine system

responds very rapidly to delivery of rewards or engaging in behaviors that evoke positive affect, such as eating food and making money. This system is also activated instantly by cues referring to desired states (e.g. seeing a candy bar or a 20 dollar note), which shows that priming goal representations sets off neurological processes that are crucial for motivated behavior. Although the exact mechanism of how dopamine produces goal-directed behavior is only partly understood, recent findings suggest that dopamine is responsible for translating cues for incentive value into motivation and energizes mental and behavioral processes supporting goal pursuit (see Berridge, 2007, for a recent debate of different functions that have been assigned to the dopamine system).

The neuroscientific work alluded to above suggests that the modulation of people's readiness to pursue a goal is 'hard-wired' in the brain. Goal pursuit emerges from nonconscious processing of affective information accompanying the activation of representations of goals or incentives in brain systems associated with motivational processes (for a recent demonstration of conscious and nonconscious activation of this system, see Pessiglione et al., 2007). This research thus gives rise to a consideration of the role of positive affect in the emergence of nonconscious goal pursuit.

Recently, we have started to directly test the idea that the positive affective valence of goal representations is involved in translating primed goals into motivated goal-directed behavior. Specifically, following the idea that people represent their actions in terms of the (perceived) effects or possible means for goals (Aarts et al.; forthcoming; Kruglanski et al., 2002; Vallacher & Wegner, 1987), we posited that priming the representation of these goals automatically provides a current reference point for cognition and action. This cognitive prime for goal-directed behavior, however, is more likely to operate as a motivational goal state if the representation of that state is associated with positive affect and, hence, this representation of positive affect is activated as a consequence of priming a goal. This affective valence, then, signals that the accessible goal is worth pursuing and puts people into a state of readiness for goal pursuit.

A recent set of studies tested this hypothesis. For instance, Custers and Aarts (2007b) subliminally primed participants or not with the goal of going out socially. 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 party. Thus, working hard (or fast) on the task can be seen as a means to get to the goal of socializing. It was established that participants put more effort into the instrumental task to attain the goal state when the goal concept of 'socializing' was primed, and that this effect was more pronounced when the goal concept was more 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.

Comparable findings have been reported in a recent study on the emergence of the egalitarianism goal (Ferguson, 2007). This study measured implicit evaluations toward the goal concept of 'being equal'. Next, participants were exposed to a large number of words which they had to explicitly evaluate. Among these words was again the goal concept of 'being equal'. Apart from implicitly measuring the affective valence of the goal concept of 'being equal' and assessing its explicit evaluation, these two tasks ensured that the goal concept of egalitarianism was rendered accessible for all participants. As a means to act on the egalitarian goal, participants were then asked whether they supported cutting the budget for Medicare (a federal program that offers aid to specific minority groups, such as the elderly). The results showed that the implicit affective valence measure predicted responses to the fairness behavior measure: the more positive the goal concept of egalitarianism, the less support for cutting Medicare.

The findings presented above indicate that nonconscious goal pursuit may result when a preexisting desired goal is activated, which, because of its association with positive affect, sets off a positive affective signal. In theory, this process could be simulated by externally triggering the affective signal just after activation of a neutral goal concept (i.e. a goal concept that provides a reference point for action but does not designate a current desired state that people are motivated to pursue). This hypothesis that mere coactivation of a neutral goal concept and positive affect produces nonconscious goal pursuit was tested in another line of research, in which we were able to pair neutral goal concepts with positively valenced information outside of conscious awareness by exploiting the evaluative conditioning paradigm (De Houwer, Thomas, & Baeyens 2001).

For instance, in one set of studies we showed that repeated pairing of the representation of a neutral goal concept (e.g. words such as drinking, cleaning-up, doing puzzles) and positive affect (e.g. words such as summer or nice) motivates participants to work harder on an intervening task to secure engagement in the behavior (Custers & Aarts, 2005b). In another study, we compared effects of linking the behavioral concept of drinking to positive affect with the deprivation of water on the amount of drinking water. The results of this study showed that deprivation increased the amount of drinking, and that shaping drinking more positive caused participants to drink more water only when they were not deprived. These findings indicate that linking neutral goal concepts to positive affect simulates effects of actual needs (Velkamp, Custers, & Aarts, forthcoming). Furthermore, extending past research into the relation between motivation and functional perception (Bruner & Goodman, 1947; Bruner & Postman, 1948), we demonstrated that the nonconscious goal shaping treatment (e.g. of drinking) affected size-perception of goal-related objects (e.g. a glass of water): participants saw them as being bigger in size (Velkamp, Aarts, & Custers, forthcoming). Moreover, these motivated functional perception effects were manifested even after a period of 3 min, suggesting

that some kind of rehearsal or active maintenance process kept the nonconsciously shaped goal alive in the mind (Aarts, Custers, & Velkamp, forthcoming). Importantly, these effects could not be attributed to initial differences in activation of the goal concept as all participants were primed with the mental representation of the goal before the dependent variables were assessed. What mattered was the fact that the goal concept was activated in temporal proximity to the activation of positive affect, and as a consequence, evoked in people a state of readiness for goal pursuit.

## **Conclusion**

The present paper examined the notion that human goal pursuit can occur in the absence of conscious awareness. Specifically, I reviewed research showing that people are capable of setting, striving, and attaining everyday goals without awareness of the activation and operation of the goals. These goal-priming effects on nonconscious goal pursuit are possible due to practice: habits that are established as a result of repeated and successful past performance of goal pursuit. However, I also illustrated that nonconscious goal pursuit may not only result from habitual, automatic processes: When habits are inadequate and may fail in goal achievement, people can still attain their goals as they are able to easily rely on self-regulatory processes that render their behavior flexible and adaptive to the situation at hand without conscious intervention.

Furthermore, there is some recent work that scrutinizes the social-cognitive causes that motivate goal pursuit in the absence of conscious awareness. Specifically, I presented evidence showing that positive affect plays a pivotal role in nonconscious goal pursuit by moderating goal-priming effects in two different ways. First, a goal that preexists as a desired state (or is already attached to positive affect) enhances the readiness for goal pursuit if the representation of the goal is primed. Second, a neutral goal concept that is co-activated with positive affective signals evoked by social stimuli mimics this process. In both cases, though, nonconscious goal pursuit emerge from interactions of goal representations and positive affect that implicitly motivate self-regulatory processes and adaptively control behavior in the service of the given goal. This new take on the emergence of human goal pursuit, then, gives reason to suggest that people can navigate their goal-directed behavior quite adequately without postulating an inner agent that motivates and guides behavior by an act of conscious will (Blackmore, 2003; Wegner, 2002).

## **Acknowledgment**

The work in this article was supported by grants from the Netherlands Organization for Scientific Research (VIDI grant 452-02-047 and VICI grant 453-06-002).

## Short Biography

Henk Aarts is trained as an experimental social psychologist at Nijmegen University where he received his PhD in 1996. After his PhD, he moved to Eindhoven University of Technology and to Leiden University. Since 2004, he has been a Full Professor in Social Psychology at Utrecht University. He is the (co)author of over 90 scientific papers and chapters, dealing with several topics related to the role of goals in social cognition and human behavior. One recent discovery in his research program concerns the notion that, in contrast with what often is assumed, conscious intentions do not play a strong causal role in behavior as well as that people infer goals from their own and others' behavior. This suggests that although goals play a pivotal role in human behavior, these goals may well operate outside of consciousness. In his research, he tries to unravel core aspects of this intriguing and important topic.

## Endnote

\* Correspondence address: Department of Psychology, Utrecht University, PO Box 80140, 3508 TC, Utrecht, the Netherlands. Email: h.aarts@uu.nl.

## References

- Aarts, H., & Custers, R. (forthcoming). Habit, action and consciousness. In W. P. Banks (Ed.), *Encyclopedia of Consciousness*. Oxford, UK: Elsevier.
- Aarts, H., & Dijksterhuis, A. (2000a). Habits as knowledge structures: Automaticity in goal-directed behavior. *Journal of Personality and Social Psychology*, **78**, 53–63.
- Aarts, H., & Dijksterhuis, A. (2000b). The automatic activation of goal-directed behaviour: The case of travel habit. *Journal of Environmental Psychology*, **20**, 75–82.
- Aarts, H., & Dijksterhuis, A. (2003). The silence of the library: Environment, situational norm and social behavior. *Journal of Personality and Social Psychology*, **84**, 18–28.
- Aarts, H., & Hassin, R. (2005). Automatic goal inferences and contagion: On pursuing goals one perceives in other people's behavior. In J. P. Forgas, D. D. Williams, & W. Von Hippel (Eds.), *Social Motivation: Conscious and Unconscious Processes* (pp. 153–167). New York: Psychology Press.
- Aarts, H., Custers, R., & Holland, R. (2007). On the cessation of nonconscious goal pursuit: When goals and negative affect are co-activated. *Journal of Personality and Social Psychology*, **92**, 165–178.
- Aarts, H., Custers, R., & Veltkamp, M. (forthcoming). Goal priming and the affective-motivational route to nonconscious goal pursuit. *Social Cognition*.
- Aarts, H., Dijksterhuis, A., & Dik, G. (forthcoming). Goal contagion: Inferring goals from other's actions – and what it leads to. In J. Y. Shah & W. L. Gardner (Eds.), *Handbook of Motivation Science*. New York: Guilford Press.
- Aarts, H., Gollwitzer, P. M., & Hassin, R. R. (2004). Goal contagion: Perceiving is for pursuing. *Journal of Personality and Social Psychology*, **87**, 23–37.
- Aarts, H., Verplanken, B., & Van Knippenberg, A. (1998). Predicting behavior from actions in the past: Repeated decision making or a matter of habit? *Journal of Applied Social Psychology*, **28**, 1355–1374.
- Aarts, H., Chartrand, T. L., Custers, R., Danner, U., Dik, G., Jefferis, V., et al. (2005). Social Stereotypes and automatic goal pursuit. *Social Cognition*, **23**, 464–489.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, **50**, 179–211.

- Baars, B. J., & Franklin, S. (2003). How conscious experience and working memory interact. *Trends in Cognitive Science*, **7** (4), 166–172.
- Baddeley, A. D. (1993). Working memory and conscious awareness. In A. Collins & S. Gathercole (Eds.), *Theories of Memory* (pp. 11–28). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Baddeley, A. D., & Hitch, G. (1974). Working memory. In G. Bower (Ed.), *The Psychology of Learning and Motivation: Advances in Research and Theory* (Vol. 8, pp. 47–89). New York: Academic Press.
- Baddeley, A. D., & Logie, R. H. (1999). Working memory: The multiple-component model. In A. Miyake & P. Shah (Eds.), *Models of Working Memory: Mechanisms of Active Maintenance and Executive Control* (pp. 28–61). New York: Cambridge University Press.
- Bargh, J. A. (1990a). Auto-motives: Preconscious determinants of social interaction. In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook of Motivation and Cognition* (Vol. 2, pp. 93–130). New York: Guilford Press.
- Bargh, J. A. (1990b). Goal not-equal-to intent: Goal-directed thought and behavior are often unintentional. *Psychological Inquiry*, **1**, 248–251.
- Bargh, J. A. (1997). The automaticity of everyday life. In R. S. Wyer (Ed.), *The Automaticity of Everyday Life: Advances in Social Cognition* (Vol. 10, pp. 1–61). Mahwah, NJ: Lawrence Erlbaum Associates.
- Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticity of being. *American Psychologist*, **54**, 462–479.
- Bargh, J. A., & Gollwitzer, P. M. (1994). Environmental control of goal-directed action: Automatic and strategic contingencies between situations and behavior. In W. D. Spaulding (Ed.), *Integrative Views of Motivation, Cognition, and Emotion. Nebraska Symposium on Motivation* (Vol. 41, pp. 71–124). Lincoln, NE: University of Nebraska Press.
- Bargh, J. A., & Pietromonaco, P. (1982). Automatic information processing and social perception: The influence of trait information presented outside of conscious awareness on impression formation. *Journal of Personality and Social Psychology*, **43**, 437–449.
- Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. *Journal of Personality and Social Psychology*, **71**, 230–244.
- Bargh, J. A., Gollwitzer, P. M., Lee Chai, A., Barndollar, K., & Trötschel, R. (2001). The automated will: Nonconscious activation and pursuit of behavioral goals. *Journal of Personality and Social Psychology*, **81**, 1014–1027.
- Berridge, K. C. (2001). Reward learning: Reinforcement, incentives, and expectations. In D. L. Medin (Ed.), *The Psychology of Learning and Motivation: Advances in Research and Theory* (Vol. 40, pp. 223–278). San Diego, CA: Academic Press.
- Berridge, K. C. (2007). The debate over dopamine's role in reward: The case for incentive salience. *Psychopharmacology*, **191**, 391–431.
- Blackmore, S. (2003). *Consciousness: An Introduction*. New York: Oxford University Press.
- Bruner, J. S., & Goodman, C. C. (1947). Value and need as organizing factors in perception. *Journal of Abnormal and Social Psychology*, **42**, 33–44.
- Bruner, J. S., & Postman, L. (1948). Symbolic value as an organizing factor in perception. *Journal of Social Psychology*, **27**, 203–208.
- Cooper, R., & Shallice, T. (2006). Hierarchical schemas and goals in the control of sequential behavior. *Psychological Review*, **113**, 887–916.
- Custers, R., & Aarts, H. (2005a). Beyond accessibility: The role of affect and goal-discrepancies in implicit processes of motivation and goal-pursuit. *European Review of Social Psychology*, **16**, 257–300.
- Custers, R., & Aarts, H. (2005b). Positive affect as implicit motivator: On the nonconscious operation of behavioral goals. *Journal of Personality and Social Psychology*, **89**, 129–142.
- Custers, R., & Aarts, H. (2007a). Goal-discrepant situations prime goal-directed actions if goals are temporarily or chronically accessible. *Personality and Social Psychology Bulletin*, **33**, 623–633.
- Custers, R., & Aarts, H. (2007b). In search of the nonconscious sources of goal pursuit: Accessibility and positive affective valence of the goal state. *Journal of Experimental Social Psychology*, **43**, 312–218.



- Custers, R., Maas, M., Wildenbeest, M., & Aarts, H. (forthcoming). *Nonconscious Goal Pursuit and the Surmounting of Physical and Social Obstacles*. Manuscript under review.
- Damasio, A. R. (1994). *Descartes' Error: Emotion Reason, and the Human Brain*. New York: Putnam.
- Danner, U. N., Aarts, H., & De Vries, N. K. (2007). Habit formation and multiple options to goal attainment: Repeated selection of targets means causes inhibited access to alternatives. *Personality and Social Psychology Bulletin*, **33**, 1367–1379.
- De Houwer, J., Thomas, S., & Baeyens, F. (2001). Association learning of likes and dislikes: A review of 25 years of research on human evaluative conditioning. *Psychological Bulletin*, **127**, 853–869.
- Dennett, D. C. (2003). *Freedom Evolves*. New York: Viking Press.
- Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology*, **56**, 5–18.
- Dijksterhuis, A., & Aarts, H. (2003). On wildebeests and humans: The preferential detection of negative stimuli. *Psychological Science*, **14**, 14–18.
- Dijksterhuis, A., & van Knippenberg, A. (1998). The relation between perception and behavior, or how to win a game of Trivial Pursuit. *Journal of Personality and Social Psychology*, **74**, 865–877.
- Dik, G., & Aarts, H. (2007). Behavioral cues to others' motivation and goal-pursuit: The perception of effort facilitates goal inference and contagion. *Journal of Experimental Social Psychology*, **43**, 727–737.
- Fazio, R. H. (2001). On the automatic activation of associated evaluations: An overview. *Cognition and Emotion*, **15**, 115–141.
- Ferguson, M. J. (2007). On the automatic evaluation of end-states. *Journal of Personality and Social Psychology*, **92**, 596–611.
- Fishbach, A., Friedman, R. S., & Kruglanski, A. W. (2003). Leading us not into temptation: Momentary allurements elicit overriding goal activation. *Journal of Personality and Social Psychology*, **84**, 296–309.
- Fitzsimons, G. M., & Bargh, J. A. (2003). Thinking of you: Nonconscious pursuit of interpersonal goals associated with relationship partners. *Journal of Personality and Social Psychology*, **84**, 148–163.
- Fitzsimons, G. M., & Bargh, J. A. (2004). Automatic self-regulation. In R. F. Baumeister & K. D. Vohs (Eds.), *Handbook of Self-regulation: Research, Theory and Applications* (pp. 151–170). New York: Guilford Press.
- Frith, C. D., Blakemore, S.-J., & Wolpert, D. M. (2000). Abnormalities in the awareness and control of action. *Philosophical Transactions of the Royal Society of London*, **355**, 1771–1788.
- Gazzaniga, M. S., Ivry, R. B., & Mangun, G. R. (1998). *Cognitive Neuroscience: The Biology of the Mind*. New York: Norton.
- Geen, R. G. (1995). *Human Motivation: A Social Psychological Approach*. Pacific Grove, CA: Brooks/Cole Publishing Company.
- Gollwitzer, P. M. (1990). Action phases and mindsets. In R. M. Sorrentino & E. T. Higgins (Eds.), *Handbook of Motivation and Cognition*. New York: Guilford Press.
- Gollwitzer, P. M., & Moskowitz, G. B. (1996). Goal effects on action and cognition. In E. Higgins & A. W. Kruglanski (Eds.), *Social Psychology: Handbook of Basic Principles* (pp. 361–399). New York: Guilford Press.
- Hassin, R. R., Aarts, H., Eitam, B., Custers, R., & Kleiman, T. (2007). Nonconscious goal-pursuit and the effortful control of behavior. In J. A. Bargh & E. Morsella (Eds.), *The Psychology of Action* (Vol 2). New York: Oxford University Press.
- Higgins, E.T., Bargh, J.A., & Lombardi, W. (1985). The nature of priming effects on categorization. *Journal of Experimental Psychology: Learning, Memory and Cognition*, **11**, 59–69.
- Higgins, E. T., Rholes, W. S., & Jones, C. R. (1977). Category accessibility and impression formation. *Journal of Experimental Social Psychology*, **13**, 141–154.
- Hommel, B. (2000). The prepared reflex: Automaticity and control in stimulus-response translation. In S. Monsell & J. Driver (Eds.), *Control of Cognitive Processes: Attention and Performance XVIII* (pp. 247–273). Cambridge, MA: MIT Press.
- Hommel, B. (2007). Consciousness and control: No identical twins. *Journal of Consciousness Studies*, **14**, 155–176.

- James, W. (1890). *The Principles of Psychology*. London: Macmillan.
- Kahneman, D. (1973). *Attention and Effort*. Englewood Cliff, NJ: Prentice Hall.
- Kruglanski, A. W., Shah, J. Y., Fishbach, A., Friedman, R., Chun, W. Y., & Sleeth-Keppler, D. (2002). A theory of goal-systems. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 34, pp. 331–378). New York: Academic Press.
- LeDoux, J. (1996). *The Emotional Brain*. New York: Simon and Schuster.
- Libet, B. (1985). Unconscious cerebral initiative and the role of conscious will in voluntary action. *Behavioural and Brain Science*, **8**, 529–566.
- Locke, E. A., & Latham, G. P. (1990). *A Theory of Goal Setting and Task Performance*. Englewood Cliffs, NJ: Prentice Hall.
- Louis, M. R., & Sutton, R. I. (1991). Switching cognitive gears: From habits of mind to active thinking. *Human Relations*, **44**, 55–76.
- Macrae, C. N., Milne, A. B., & Bodenhausen, G. V. (1994). Stereotypes as energy-saving devices: A peek inside the cognitive toolbox. *Journal of Personality and Social Psychology*, **66**, 37–47.
- Mckone, E. (1995). Short-term implicit memory for words and nonwords. *Journal of Experimental Psychology: Learning, Memory and Cognition*, **21**, 1108–1126.
- Mischel, W., Shoda, Y., & Rodriguez, M. I. (1989). Delay of gratification in children. *Science*, **244**, 933–938.
- Miyake, A., & Shah, P. (1999). *Models of Working Memory: Mechanisms of Active Maintenance and Executive Control*. New York: Cambridge University Press.
- Monsell, S., & Driver, J. (Eds.). (2000). *Control of Cognitive Processes: Attention and Performance XVIII*. Cambridge, MA: MIT Press.
- Moskowitz, G. B., Li, P., & Kirk, E. R. (2004). The implicit volition model: On the preconscious regulation of temporarily adopted goals. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 36, pp. 317–404). New York: Academic Press.
- Naccache, L., Dehaene, S., Cohen, L., Habert, M., Guichart-Gomez, E., Galanaud, D., et al. (2005). Effortless control: executive attention and conscious feeling of mental effort are dissociable. *Neuropsychologia*, **43**, 1318–1328.
- Norman, D. A., & Shallice, T. (1986). Attention and action: Willed and automatic control of behavior. In R. J. Davidson, G. E. Schwartz, & D. Shapiro (Eds.), *Consciousness and Self-Regulation: Advances in Research and Theory* (Vol. 4, pp. 1–18). New York: Plenum.
- Nørretranders, T. (1991). *The User Illusion: Cutting Consciousness Down to Size*. New York: Penguin.
- Olds, J., & Milner, P. (1956). Pleasure centers in the brain. *Scientific American*, **195**, 105–116.
- Pessiglione, M., Schmidt, L., Draganski, B., Kalisch, R., Lau, H., Dolan, R., et al. (2007). How the brain translates money into force: A neuroimaging study of subliminal motivation. *Science*, **316**, 904–906.
- Powers, W. T. (1973). *Behavior: The Control of Perception*. Chicago, IL: Aldine.
- Prinz, W. (1997). Perception and action planning. *European Journal of Cognitive Psychology*, **9**, 129–154.
- Robbins, T. W., & Everitt, B. J. (1996). Neurobehavioral mechanisms of reward and motivation. *Current Opinion in Neurobiology*, **6**, 228–236.
- Salamone, J. D., Correa, M., Mingote, S. M., & Weber, S. M. (2005). Beyond the reward hypothesis: Alternative functions of nucleus accumbens dopamine. *Current Opinion in Pharmacology*, **5**, 34–41.
- Schultz, W. (1998). Predictive reward signal of dopamine neurons. *Journal of Neurophysiology*, **80**, 1–27.
- Senchak, M., Leonard, K. E., & Greene, B. W. (1998). Alcohol use among college students as a function of their typical social drinking context. *Psychology of Addictive Behaviors*, **12**, 62–70.
- Shah, J. Y. (2003). Automatic for the people: How representations of significant others implicitly affect goal pursuit. *Journal of Personality and Social Psychology*, **84**, 661–681.
- Shah, J. Y., Friedman, R., & Kruglanski, A. W. (2002). Forgetting all else: On the antecedents and consequences of goal shielding. *Journal of Personality and Social Psychology*, **83**, 1261–1280.
- Sheeran, P., Aarts, H., Custers, R., Webb, T. L., Cooke, R., & Rivas, A. (2005). The goal-dependent automaticity of drinking habits. *British Journal of Social Psychology*, **44**, 47–63.

- Smith, E. E., & Jonides, J. (1999). Storage and executive processes in the frontal lobes. *Science*, **283**, 1657–1661.
- Spies, G. (1965). Food versus intracranial self-stimulation reinforcement in food-deprived rats. *Journal of Comparative and Physiological Psychology*, **60**, 153–157.
- Strull, T. K., & Wyer, R. S. Jr. (1979). The role of category accessibility in the interpretation of information about persons: Some determinants and implications. *Journal of Personality and Social Psychology*, **37**, 1660–1672.
- Sternberg, S. (1966). High speed scanning in human memory. *Science*, **153**, 652–654.
- Treise, D., Wohburg, J. M., & Otnes, C. C. (1999). Understanding the 'social gifts' of drinking rituals: An alternative framework for PSA developers. *Journal of Advertising*, **28**, 17–31.
- Vallacher, R. R., & Wegner, D. M. (1987). What do people think they're doing? Action identification and human behavior. *Psychological Review*, **94**, 3–15.
- Veltkamp, M., Aarts, H., & Custers, H. (forthcoming). *Perception in the Service of Goal Pursuit: Motivation to Attain Goals Enhances the Perceived Size of Goal-Related Objects*. Manuscript under review.
- Veltkamp, M., Custers, R., & Aarts, H. (forthcoming). *On Being Deprived and Positively Minded: The Interplay between Deprivation and Positive Affect in the Implicit Motivation of Goals and Their Pursuit*. Manuscript in preparation.
- Wegner, D. M. (2002). *The Illusion of Conscious Will*. Cambridge, MA: MIT Press.
- Wightman, R. M., & Robinson, D. L. (2002). Transient changes in mesolimbic dopamine and their association with 'reward'. *Journal of Neurochemistry*, **82**, 721–735.
- Wilson, T. D. (2002). *Strangers to Ourselves: Discovering the Adaptive Unconscious*. Cambridge, MA: Belknap Press of Harvard University Press.
- Wood, W., & Neal, D. T. (forthcoming). A new look at habits and the habit-goal interface. *Psychological Review*.
- Wood, W., Quinn, J. M., & Kashy, D. A. (2002). Habits in everyday life: Thought, emotion, and action. *Journal of Personality and Social Psychology*, **83**, 1281–129
- Wyer, R. S., & Strull, T. K. (1986). Human cognition in its social context. *Psychological Review*, **93**, 322–359.
- Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, **35**, 151–175.