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Beyond priming effects: The role of positive affect and discrepancies in implicit processes of motivation and goal pursuit

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Beyond priming effects: The role of positive affect and discrepancies in implicit processes of motivation and goal pursuit

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Recent research demonstrates that goal pursuit can be instigated without conscious interventions when the mental accessibility of goal representations is enhanced by environmental cues. However, the mechanisms producing this non-conscious, motivational, goal-directed activity are not clearly addressed in the literature. In this chapter we present a framework within which the non-conscious activation of goal-directed behaviour can be understood. The framework departs from the idea that a goal is represented as a desired state and identifies three characteristics of this representation that render non-conscious goal pursuit more likely to occur: its mental accessibility, the discrepancy of the represented state with the actual state, and its association with positive affect. We present findings, largely established in our own labs, that demonstrate the crucial role of these three factors. We will close the chapter by showing how the framework can help to address some of the pressing issues in the research on non-conscious goal pursuit.

Modern views on human behaviour assume that people's goal pursuits are governed by consciousness. Surely, we all tend to agree that goal setting is characterised by a conscious reflection process, and that goal adoption and enactment are associated with conscious intent. This unshakeable belief in consciousness as the guiding force behind human behaviour can be seen as a reaction to the traditional views of behaviourism, which dismissed mental processes as mediating causes of behaviour. Consequently, modern research on goal-directed, motivational behaviour focuses on people's explicit experiences and thoughts that accompany their goal pursuits. Perhaps in

an equally rigid way, however, this preoccupation with explicit, conscious goals led modern experimental research on goal pursuit to ignore some of the most intriguing and important questions.

One question that recently attracted a lot of attention is where our goals actually come from (e.g., Wegner, 2002; Wilson, 2002). Although we might be conscious of setting goals, adopting them, or acting on them, it is often unclear what leads us to do so. We are, so to speak, often unconscious of the *sources* of our conscious thoughts and pursuits. To make an even bolder claim: if we reject Descartes' separation of body and mind and accept that our conscious thinking and doing is produced by brain processes that are not open to our introspection, we would have to admit that in essence *all* our conscious thoughts, goals, and intentions start in the unconscious (Blackmore, 2004; Dennett, 2003; Dijksterhuis, Chartrand, & Aarts, in press; Libet, 1985; Nørretranders, 1991). But if this is true, are conscious interventions necessary at all for goal pursuit to occur? Or is it possible that our goal pursuits can be triggered directly by the environment and guided by unconscious processes?

In the last decade or so, researchers have begun to empirically explore this intriguing possibility. Several lines of experimentation have mainly, but effectively, resorted to priming techniques to render mental representations of goals accessible and to test effects of the enhanced accessibility of these goal representations on behavioural measures. The mounting evidence clearly shows that human behaviour is influenced by environmental primes without people being aware of them, or of their effects on their behaviour. That is, people seem to perform goal-directed activities without being aware that these activities are caused by a primed goal. However, the basic mechanisms by which priming directs and motivates our decisions and behaviour automatically are not clearly addressed in the literature, and are perhaps therefore not fully appreciated. As a consequence, research on goal priming runs the risk of becoming a data-driven adventure ("Let's prime people with achievement, cooperation, food, or computers and see what happens") in which principles of conscious motivation and goal pursuit are considered to explore the conditions that render the primed concept more or less likely to act and operate as a goal ("participants should be persistent, enhance their effort, experience interference with other goals ..."). A more detailed understanding of the underlying mechanisms of non-conscious goal pursuit thus may help to better distinguish this proposed process from other recent accounts of automatic behaviour, such as the perception – behaviour link view (Bargh, 1997; Dijksterhuis & Bargh, 2001).

In the present chapter we develop a framework for the comprehension and examination of non-conscious activation of goal-directed behaviour. The framework is based on the idea that direct priming effects on motivation and behaviour do not solely arise from enhanced accessibility of the goal

representation. We suggest that, besides accessibility, two other parameters play a crucial role in triggering the motivation to act on the primed concept. Following the general idea that goal-directed behaviour materialises when there is a discrepancy between the desired goal state and the actual state of the actor, we posit that the perception of discrepancies can directly trigger goal-directed action. Thus, we argue that the process of discrepancy reduction can, in principle, operate automatically. Furthermore, based on recent evidence for the basic role of affect in implicit processes of motivated behaviour, we propose that the assessment of the desirability of a goal state, or its incentive value, is directly based on the association of the state with positive affect. In other words, positive affect linked to a goal representation is capable of directly feeding the motivation system, propelling behaviour aimed at attaining the desired state.

The proposed framework thus considers three basic parameters of the goal state: (a) its mental accessibility, (b) its discrepancy with the actual state, and (c) its association with positive affect. If two of these preconditions are met, introducing the third should trigger non-conscious motivated behaviour directed towards attainment of the goal. According to this framework then, automatic goal pursuit is more likely to ensue when the goal state is more desired or linked to positive affect, and a discrepancy with an accessible desired state is introduced.

Before we present this framework in more detail, we will briefly present classic views on goals and behaviour and their relation to current theory on goal achievement to address the processes involved in goal-directed, motivational behaviour that a framework for non-conscious goal pursuit would have to account for.

GOAL PURSUIT

Today, goal-directed behaviour is, by and large, still regarded as an inherently conscious process (for different views on this issue, see Baumeister & Vohs, 2004; Gollwitzer & Bargh, 1996; Martin & Tesser, 1996; Pervin, 1989; Shah & Gardner, in press). Although most modern theories of goal-directed social behaviour indeed emphasise the pivotal role of conscious intentions in goal pursuit, this has not always been the case. In fact, the early behaviourist theories on motivational behaviour discarded the concept of conscious intentions altogether as an explanatory factor in behaviour (Hull, 1943; Skinner, 1953; Watson, 1925). A goal was considered to be no more than a convenient concept to describe an organism's behaviour observed within the confines of an experimental set-up. The persistent, flexible, searching behaviour of a rat in a maze with food was thought to be most aptly described by stating that it was directed at the goal state of eating food. Hence, early behaviourists studied behaviour by

investigating the impact of environmental stimuli or situations and different reinforcement schedules on the occurrence of different behaviours—which could be described using the goal concept—but without making any assumptions about the mental processes involved. Other theorists, such as Ryle (1949), acknowledged the existence of mental processes, but still posited that goals are merely reflections on behaviour. In this view, behaviours arise from unconscious processes, and goals are functional tools to give meaning to them.

Although behaviourism is now often scorned for this banishing of mental processes to the infamous "black box", it produced perhaps one of the most influential theories of motivation and behaviour. In his expectancy-value theory, Tolman (1932) maintained that the occurrence of motivational behaviour is a function of the *value* or desire of a goal state and the *expectancy* or anticipation of reaching the goal state. Although the term "expectancy" has a conscious or intentional ring to it, it was merely used to refer to the learned rule or knowledge that executing some concrete action (e.g., running through a maze, pressing a lever) leads to a particular desired behavioural outcome or goal state (e.g., eating food when hungry), thereby adding a cognitive element to the learning of behaviour. Thus, the probability of exhibiting goal-directed, motivational behaviour could be predicted from the value of a goal state and previous reinforcement of behaviour leading to the goal state, which was assumed to increase the expectancy that the goal state would be attained by performing the given behaviour. Modern animal-learning theorists who have abandoned strict behaviourism have now embraced this expectancy-value concept in their models (Bolles, 1972; Colwill & Rescorla, 1986; Dickinson & Balleine, 1995).

However, the gap between motivational behaviour and its presumed environmental causes that was created by behaviourism proved to be unsatisfactory for many. Struck by the pervasiveness of intentionality in human behaviour, other researchers (Ach, 1935; Dewey, 1897, Lewin, 1935; McDougal, 1931) insisted that goals or intentions play a crucial role in motivational, goal-directed behaviour and should be conceived of as subjective constructs that exist in the minds of people. Such goals were considered to represent desired behaviours (e.g., consuming fruit, cooperating, socialising) or outcomes (e.g., owning money, being proud; see also the distinction between "do" and "be" goals; Carver & Scheier, 1998; Gollwitzer & Moskowitz, 1996) that people reported when asked for their conscious intentions. With this assumption, two fundamental questions presented themselves and posed a great challenge to the psychological study of human behaviour: How do these goals arise, and how do they subsequently guide behaviour?

The first question was answered by stating that goals arise from people's conscious decisions or self-reflections. People set their own goals, or adopt

goals that are proposed or implied by others to the extent that they are desired (Bandura, 1977; Deci & Ryan, 1985; Fishbein & Ajzen, 1975; Gollwitzer, 1990; Locke & Latham, 2002). The criteria on which these decisions were based were still mainly assumed to follow Tolman's (1932) concept of expectancy-value. However, it was soon realised that people set their goals not based on the objective value or expectancy of producing the goal state (e.g., Savage, 1954; Von Neumann & Morgenstern, 1947), but on their subjective interpretation of those variables (e.g., Edwards, 1954; Kahneman & Tversky, 1979). Thus, expectancy and value were now assumed to be subjective, mentally represented constructs, which influence motivational behaviour through a conscious decision or "fiat" to attain the desired goal state. Accordingly, it was assumed that to understand and predict motivational behaviour one needs to consider the situation as the person perceives it (Lewin, 1935). As a result, investigators were allowed to explicitly elicit and assess goal states in participants and to statistically relate these states to overt behaviour.

Most current theories of motivation and goal-directed behaviour strongly emphasise either expectancy or value as a variable predicting goal striving and pursuit (Atkinson, 1964; Bandura, 1986; Fishbein & Ajzen, 1975; Gollwitzer, 1990; Locke & Latham, 2002; Vroom, 1964; Wright & Brehm, 1989). Bandura (1986), for instance, analysed the role of self-efficacy—and people's past experiences shaping these efficacy beliefs—in showing how their subjective expectancy of reaching the goal state determines motivation. Fishbein and Ajzen (1975), however, mainly focused on attitudes and social norms towards behaviours—which can be thought of as reflecting the subjective motivational value of a particular behavioural activity—to predict goal-directed action. In an extension of this model, Ajzen (1985) later formulated a model of planned behaviour by including perceived behavioural control, which reflects the expectancy of successfully executing the intended activity or behavioural goal. More recently, Gollwitzer, in his phase model of action (1990) portrays the phase of goal setting essentially as a decision-making process in which people have to choose between a multitude of wishes in order to decide, based on expectancy (or feasibility) and value (or desirability), which of these wishes to adopt and strive for as a goal. Thus, expectancy and value are considered to form the input for the conscious process of goal setting or adoption, which produces a conscious intention to attain the desired goal state. Notice, though, that the requirement of conscious involvement to determine whether a goal state is desired and worth pursuing implies that—logically and psychologically— desire is not necessarily a direct property of the goal representation itself.

But when such an intention to pursue a certain goal state is formed, how does it subsequently affect behaviour? How do people bridge the gap between thought and behaviour and translate their goals into real action?

To answer this question properly we need to turn to recent research on action identification, selection, and control. This research suggests that people have the ability to mentally represent their overt actions in terms of possible means for goals, and to store, access, and retrieve these representations from memory (e.g., Elsner & Hommel, 2001; Jeannerod, 1997; Vallacher & Wegner, 1985). Consequently, several actions can become instrumentally linked to a specific goal in memory. Hence, thinking of, or intentionally setting, the goal enhances the mental accessibility of the representations of the instrumentally related actions. In this sense, goal-directed behaviours can be seen as hierarchical mental representations in which activation of a goal leads to activation of a number of associated means lower in the hierarchy (e.g., Aarts, Verplanken, & Van Knippenberg, 1998; Gallister, 1985; Mischel, 1973; Powers, 1973; Schank & Abelson, 1977; Wyer & Srull, 1986). Enactment of a goal, therefore, is commonly argued to require a similar conscious selection process to goal setting (e.g., Gollwitzer & Moskowitz, 1996). That is, people consciously select the means that is most suitable (highest expected value or utility) for producing the goal state and, if needed, plan how, where, and when to act on the goal (for different selection and decision models, see Dawes, 1998; Payne, Bettman, & Johnson, 1993).

However, in an ever-changing world, mere selection and enactment of the proper instrumental action may not be enough. An action may be quite handy in one situation, but faulty in another context to attain one's goals. For example, telling the same jokes that made you popular in the pub, might not produce the same result during lunch at work. Based on cybernetic control theory (Wiener, 1948), various theorists have thus argued that the actions required to produce the same goal state may vary under different conditions (Carver & Scheier, 1998; Hyland, 1988; G. A. Miller, Galanter & Pribram, 1960; Powers, 1973). Therefore, in order to reach a goal state, one has to constantly compare the result of one's instrumental actions, such as telling sexually explicit jokes, to the desired state one has in mind (e.g., I want to be popular). Furthermore, if necessary, one has to modify those actions or act on other opportunities when the dominant means are not directly suitable or available, to reduce the discrepancy between the actual state and the desired goal state (e.g., by telling less sexually explicit jokes or hooking on to gossip about the minister of education) instead of increasing it.

Indeed, several lines of research indicate that humans have a natural tendency to perceive, adjust, and control their actions in terms of expected outcomes (Aarts, Custers, & Wegner, 2005c; Fourneret & Jeannerod, 1998; Franck et al., 2001; Frith, Blakemore, & Wolpert, 2000; Vallacher & Wegner, 1985), which allows them to attain desired results under changing conditions. Accordingly, the representation of the goal, often referred to as a

standard or reference value, is—when activated—the level or focal point at which perception, cognition, and action are usually directed in the situation at hand, and plays a crucial role in selecting and initiating instrumental actions. Furthermore, the accessible goal representation is crucial in determining the discrepancy with the current state, which informs the person of the progress towards or the deviation from the goal. Thus, enactment of goal-directed behaviour not only requires conscious selection of instrumental actions, but also acting on discrepancies between actual and desired states.

In sum, according to modern theories of motivation and goal-directed behaviour, the probability that a given goal state is set, adopted, and enacted depends on people's ability (a) to mentally access the representation of the goal; (b) to subjectively assess the expected (or incentive) value of the goal state; (c) to activate, select, and execute instrumental actions; (d) to detect, assess, and reduce the discrepancy between the actual and desired state.

Thus, a framework describing the mechanisms involved in non-conscious goal pursuit would have to explicate how these four distinctive features can be executed. In other words, it would have to explain how potential goals arise in people, when they are not explicitly given. Moreover, it should spell out how people can assess the incentive value of a goal state without conscious deliberation. Finally, it would have to clarify how means can be selected and their results monitored non-consciously.

A FRAMEWORK FOR NON-CONSCIOUS GOAL PURSUIT

Recent research on goal pursuit has challenged the pivotal role of conscious processes in motivational, goal-directed behaviour, and argues that goal pursuit can be directly triggered and guided by environmental cues. At first glance, the notion that goal pursuit is instigated by the environment seems to bring us back to behaviourism. However, the modern conceptualisation of non-conscious goal pursuit (e.g., Aarts & Dijksterhuis, 2000a; Bargh, 1990) is different in one important way. That is, the notorious black box has been replaced by a tool-box of cognitive constructs, such as mental representations, mental accessibility, and mental associations. Making use of these tools, current research on non-conscious goal pursuit goes beyond behaviourism (Bargh & Ferguson, 2000) by scrutinising the mental processes that underlie it.

Analogous to research on conscious goal pursuit, the idea of automatic goal pursuit begins by assuming that goals are mentally represented as desired states pertaining to behaviours or outcomes. Different from research on conscious goal pursuit, however, is the explicit assumption that goals can

be non-consciously activated because these goals pre-exist in the actor's mind. Furthermore, these pre-existing 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, which evolve by experience (Aarts & Dijksterhuis, 2000a; Aarts, Dijksterhuis, & Dik, in press; Bargh & Gollwitzer, 1994; Kruglanski, Shah, Fishbach, Friedman, Chun, & Sleeth-Keppler, 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 may be connected to interacting with good friends and the desire to socialise and go out. These associative knowledge structures enable people to decide and act on goals without intentional control or forming explicit expectancies. According to the concept of automatic goal pursuit, then, the direction and motivation of people's thinking and doing can start and operate outside of conscious awareness and in an automatic fashion, because one can directly rely on an accessible goal representation that is primed by contextual as well as behavioural information in order to set, adopt, and enact goals.

In the following section, we will present evidence for effects of enhanced accessibility of the goal representation on the process of goal pursuit. Subsequently, we will point out the limitations of using this single parameter of accessibility to unravel the underlying mechanisms of non-conscious goal pursuit. Based on this analysis we will then address two other parameters of the goal state that a model of non-conscious goal pursuit should account for: the discrepancy with the current state and its positive affective valence.

The role of accessibility

Up to now, a number of studies have tested priming effects on goal pursuit by showing how priming affects different stages in the process of goal-directed behaviour. For the sake of organisation, we will discuss three stages in which an accessible goal representation can influence this process: goal setting, goal adoption, and goal enactment, illustrated by studies that largely come from our own labs. *Goal setting* refers to the process by which perceptual and mental processes lead to the formation of goals, i.e., an explicit statement or description of the goals one desires or wants to achieve. *Goal adoption* describes how perception of our social environment leads to the automatic enactment of goals. Goal adoption occurs if a person behaviourally implements and strives for goals assigned or implied by other people. Effects on both goal setting and adoption can be classified as priming effects on goals. Finally, *goal enactment* refers to the activation and selection of mentally represented instrumental actions. We will start with discussing evidence for priming effects in studies in which participants are forced to consciously reflect on their goals and thus are, by definition, aware of them.

Automatic goal setting. Goal setting emerges when a person needs to disambiguate a given goal-situation, or is otherwise triggered to reflect on and describe his or her desires and goals (e.g., when responding to questionnaires or experimental instructions and tasks). Given that conscious awareness usually accompanies goal-setting tasks, the intriguing question is whether and how goal setting may be guided by the mere accessibility of information related to goal states. Are our explicitly stated goals and wants susceptible to influential processes that occur outside of conscious awareness? The answer is "yes, they are".

Priming can affect goal setting when people have to describe the goals they aim to attain in a given situation or at a certain point in time. For instance, Holland, Hendriks, and Aarts (2005) examined whether the mere perception of odour is capable of directly guiding action plans. They exposed participants to the scent of all-purpose cleaner without participants being consciously aware of the presence of the scent. Because the scent of all-purpose cleaner was shown to enhance the accessibility of the concept of cleaning, Holland et al. hypothesised that this behaviour concept would also be more likely to be used in describing one's future home activities. Thus, as a measure of goal setting, participants were asked to list five activities that they wanted to do during the rest of the day. The results showed that in the scent condition 36% of the participants included cleaning in their goals compared to 11% in the control group. These findings suggest that accessible representations of behavioural concepts are readily used when people retrieve attributes and plans to arrive at a goal statement (see also Kay & Ross, 2003).

In another recent study (Custers & Aarts, 2005a), we explored the effects of temporal and chronic accessibility of the goal representation on goal pursuit. In one experiment, participants first engaged in a task in which half of them were parafoveally primed (see Chartrand & Bargh, 1996) by exposure to words describing the goal to look neat or well groomed (which represented a goal that was rather desired in the student population). Next, we asked our participants to list five attributes that would describe how they wanted to look physically. As it turned out, priming affected goal setting: Participants who seldom pursued the goal to look well groomed listed the goal rarely in the control condition, but frequently, and high on their list, when primed. Participants who frequently pursued the goal, however, listed it often and on top of their list regardless of the priming manipulation. For them, the goal-setting index—based the frequency and primacy of the goal—reflected the chronic accessibility of the goal representation (see Figure 1). These studies show that when people are asked to explicate their goals in a specific domain, goal setting is influenced by the chronically or temporally increased accessibility of representations of goal-relevant information in memory.
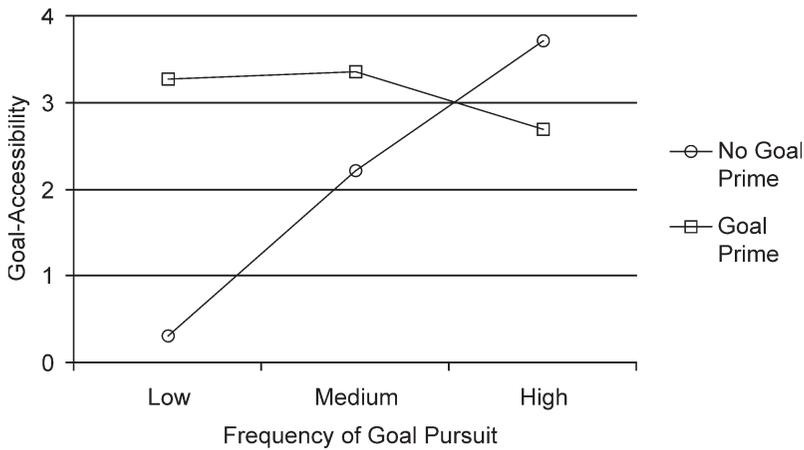
Figure 1. Mean goal-accessibility as a function of frequency of goal activation and priming (adapted from Custers & Aarts, 2005a, Study 2a).

Our research suggests, however, that priming does not always affect measures that ask people explicitly for their goals. For example, in a recent set of studies we assessed goal-priming effects on behaviour as well as explicit measures of goal wanting (Aarts, Custers, & Holland, 2005b; Aarts, Gollwitzer, & Hassin, 2004). In these studies, participants had to indicate how much they wanted to engage in one specific behaviour. The goals we used were all positive and conceived of as personally desirable among our sample of (heterosexual male) students, such as the goal of socialising or seeking casual sex. Although in these studies priming caused participants to perceive and use opportunities, increasing the probability to attain the primed goal, it did not affect the self-reported desire to reach the goal—in other words: *goal-strength*. That is, when primed participants were explicitly asked how much they wanted to attain the primed goal, their answers were not different from those of non-primed participants. Thus, priming of a goal does not seem to influence people's explicit desire for the goal state.

In short, these data suggest that priming of a goal concept *can* influence goal setting. However, it only seems to do so when one needs to find out what one wants to do ("What do you want to do for the rest of the day?"), rather than when one is explicitly asked to indicate how much one wants to attain the primed goal (e.g., "Do you want to socialise, or to earn money?"). To put it more plainly, asking people explicitly how much they want to realise a primed goal state renders the representation of the goal for which they are already motivated themselves accessible (cf. Wegner & Smart, 1997). Thus, no effects of priming are found because one wants to pursue the goal anyway. Priming, and hence accessibility, affects goal setting only when

there is some room to consider the primed goal concept as a potential goal in the situation at hand. In this respect, priming effects on goal setting may not differ fundamentally from other concept priming effects on social perception and cognition (e.g., Higgins, 1996; Stapel & Koomen, 1997; Wyer & Srull, 1986). Priming a goal concept simply increases the chance that the concept is used as a potential goal state in the cognitive processes of forming or setting a goal that eventually lead to goal adoption and enactment.

Automatic goal adoption.   Asking participants to consciously reflect on their goals before they act may increase the correspondence between their conscious goals and behaviour resulting from priming (cf. Kay & Ross, 2003; Wheeler & Petty, 2001). However, not all effects of priming on goal pursuit appear to be mediated by conscious goal setting. Some studies suggest that people can readily adopt a goal without conscious interventions. That is, they exhibit goal-directed activities without being aware that these activities are caused by a primed goal. In what seems to be the first experimental demonstration of this idea, Bargh, Gollwitzer, Lee Chai, Barndollar, and Trötschel (2001), for example, unobtrusively exposed participants to words such as "cooperative" and "share" to prime the goal of cooperation. Next, participants engaged in a resource-dilemma task in which they could keep the profit for their own benefit, or replenish the common source. Results indicated that participants who were primed with the cooperation goal replenished the common source more often than participants in the control group. Of importance, the same effect was found when participants were given the explicit goal (vs no explicit goal) to cooperate. After the game, participants were asked for their conscious intentions to cooperate during the game. Reported intentions significantly correlated with behaviour for participants with a conscious goal, but not for participants with a primed goal. Thus, people who were primed with words related to cooperation appeared to engage in more cooperative behaviour without having formed a conscious intention to do so. In several other studies, Bargh et al. (2001) further demonstrated that behaviour resulting from achievement goal priming has qualities associated with motivation, such as persistence and increased effort.

Although the studies described above clearly demonstrate that exposing people to goal-related words affects their behaviour without them being aware of this, most of these studies can, as Bargh and colleagues (2001) themselves have already noted, be explained as mere behaviour priming. That is, priming words related to cooperation or achievement semantically activates representations of the corresponding motor actions (for details, see Dijksterhuis & Bargh, 2001). These effects are said to result from a common coding system for perception and action, and hence are generally explained in non-goal-directed terms. Thus, when the behavioural measure

(e.g., cooperation) matches the concept that is primed (e.g., cooperation) one can never be sure whether the prime has triggered merely *behaviour* (of cooperating) or a *goal* (to cooperate).

Aarts et al. (2004) tried to rule out such an alternative explanation in one of their experiments on goal contagion. In these studies, participants were not primed with goal-related words, but read a short description of a person engaging in goal-directed behaviour. The goal itself, however, was never mentioned in the scenario. Thus, any effects on subsequent behaviour are more likely to be due to the fact that participants inferred the psychological construct of a goal from the observed behaviour. As Hassin, Aarts, and Ferguson (2005) have demonstrated, such *goal inferences* can occur spontaneously, without conscious intentions or awareness (see also Aarts et al., in press). In effect, this manipulation ensured that the primed concept pertained to a goal, instead of mere behaviour.

In one study (Aarts et al., 2004) students were exposed to a short script that described another person's behaviour implying the goal of making money or not (the goal itself was not mentioned). After reading the goal-implying scenario, participants were told that they could participate in a lottery in which they could win money, but only if there was enough time left. They were then given a mouse-click (filler) task, in which participants had to click on the tiles of various paths that appeared on the screen from the first to the last tile. Thus, the behaviour measure (speed of mouse-clicking) was not similar to the goal concept (making money). The question was whether participants would speed up their performance (as a means to the goal) to make sure that they could participate in the goal-relevant task. Results showed that participants who were exposed to the behaviour implying the goal of making money were indeed faster than those in the control condition. Moreover, these effects were more pronounced for participants who were in greater need of, or had a stronger desire for, money (see Figure 2). However, priming and the desire to earn money did not increase their post-experimental reported intention to work harder on the mouse-click task and this reported intention did not correlate with the actual behaviour.

These findings first of all replicate the effects obtained by Bargh et al. (2001) in that they showed that priming people with a goal directly triggers the corresponding behaviour without mediation by a conscious intention. Moreover, the fact that participants had to infer the goal from a described behaviour increased the likelihood that a *goal* concept was activated. Furthermore, participants' increased effort on the mouse-click task cannot be explained by behaviour priming, as making money is not directly associated with clicking faster along tiles on a computer screen. Increased effort on this task was only perceived as *instrumentally* related to making money when participants were primed with the concept of making money
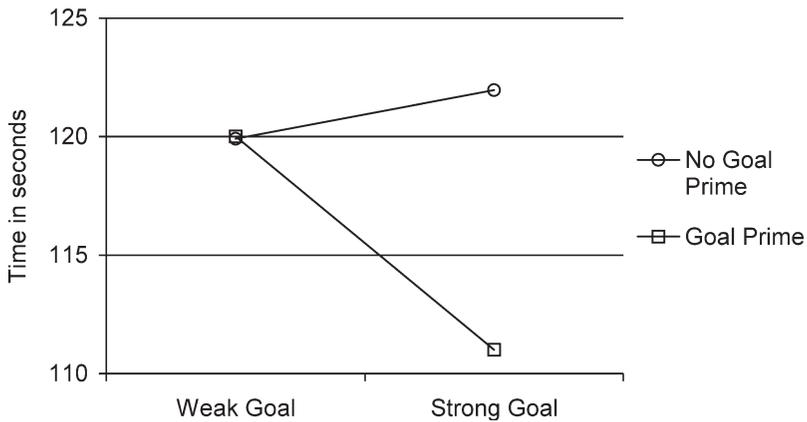
Figure 2. Time spent on the mouse-click task as a function of goal priming and goal strength (adapted from Aarts et al., 2004, Study 1).

and the desire to earn money was relatively strong, which provides compelling evidence for true motivational, goal-directed behaviour.

In another recent line of research, we (Aarts et al., 2005a; Custers, Aarts, Maas, & Wildenbeest, 2005) obtained similar results in a setting in which goals were primed in a way that may often occur in real life. In several experiments, we tested the hypothesis that exposure to social groups causes individuals to pursue the goals that are stereotypical for members of these groups (see also Bargh et al., 2001; who propose a potential goal-priming effect as a result of stereotype activation).

In one study, Aarts et al. (2005a) subliminally primed participants with nurses, a group that is stereotyped in terms of the goal of helping. Upon completion of the experimental session, participants were asked to provide feedback on an earlier performed computer-skill task that was allegedly designed by a student. At this point participants could either decide to leave the lab as quickly as possible (and go on with other things) or to stay a little longer and give feedback to attain the desired state of helping. The question was whether participants primed with the goal of helping took the opportunity to accomplish this goal. As expected, participants who were primed with nurses helped more than those in the no-prime control group. Moreover, in an unrelated survey study, a measure of goal strength was assessed by asking participants to indicate how strongly they wanted to help other people in general. It was found that the priming effect on helping was more pronounced when goal strength was high (see Figure 3). However, the goal strength measure was unrelated to the associative strength between nurses and the helping goal, which rules out the possibility that the goal of
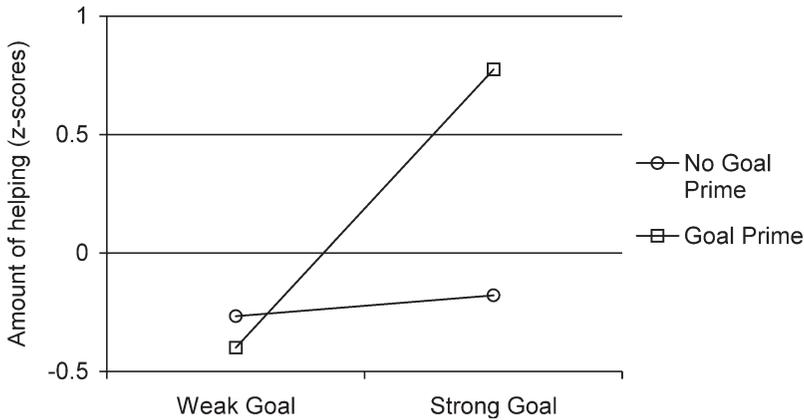
Figure 3. Amount of helping behaviour as a function of goal priming and goal strength (adapted from Aarts et al., 2005a, Study 1).

helping is only included in the representation of nurses for people with strong personal helping goals. These findings, then, suggest that goal-priming effects on motivated behaviour are more likely to occur if the goal pre-exists as a (strong) desired state in the perceiver's mind. Furthermore, we (Custers et al., 2005) demonstrated that these stereotype-goal-priming effects occur despite the fact that the action leading to the goal of helping may have personal negative implications (e.g., picking up dirty, used tissues that were accidentally dropped on the floor by the experimenter).

The studies described above provide evidence for the notion that increasing the accessibility of the goal representation by priming can have a direct effect on goal pursuit without it being accompanied by conscious awareness. Although the findings of some of these studies can be explained by a behaviour-priming account, several findings provide evidence for goal-priming effects. First, the studies of goal contagion made sure that the activated construct was a goal that was inferred from another person's behaviour. Second, effects were found on behaviour that was instrumental in attaining the goal, and could thus not be explained as behaviour priming. Third, in several studies, the effects of priming were found to increase to the extent that the goal pre-existed as a desired state in the person's mind.

Automatic goal enactment.   In order for goal activation to have the desired effects, behaviour representations and resultant actions need to be activated that represent appropriate means to attain the goal. Under some circumstances, this is very straightforward, such as when there is only one

behaviour that can satisfy the goal. Here, a goal also has a unique, one-to-one relation with a behaviour, 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 behaviours. That is, there are often multiple means to attain a goal.

One of the most common perspectives on automatic goal pursuit deals with *habit formation* processes (e.g., Aarts & Dijksterhuis, 2000a, 2000b; Bargh, 1990; Moskowitz, Li, & Kirk, 2004). Specifically, for goal enactment to become automatised one needs to practise the selection and execution of the most proper means in the goal-relevant situation. This way, idiosyncratically learned goal – means links in memory gain strength by extensive direct practice. As a consequence, priming these goals automatically activates behaviour representation and resultant action according to an "if-then" rule, enabling the goal-directed behaviour to occur directly and independent of conscious intentions (e.g., Aarts et al., 1998; Bargh, 1990; Ouellette & Wood, 1998).

Aarts and Dijksterhuis (2000a, 2000b) directly tested the habitual goal – means idea underlying automatic goal pursuit in the realm of travel behaviour. 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 of the goal of travelling 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 travelling to the university for those persons.

Sheeran, Aarts, Custers, Rivis, Webb and Cooke (2005) recently established that this habitual goal – means activation process also pertains to (overt) health behaviour. They showed that, in comparison to non-habitual drinkers, habitual drinkers were more likely to access the mental representation of drinking and were more inclined to actually drink alcohol after priming of the goal of socialising. 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.

But goals cannot always be habitually pursued by automatic selection of the habitual means to reach the same goals in the same situations. Sometimes, the habitual, dominant means are not available or applicable to the situation at hand, and thus one needs to be flexible in the sense of selecting other means to reach the goal. Yet, even in such cases where goals cannot be habitually pursued, people may still be able to automatically

access behaviour representations and execute other actions in a goal-relevant situation, namely when the situation offers opportunities associated with effective goal attainment.

In several experiments we collected evidence for the role of such opportunities in goal priming effects. In one study (Aarts et al., in press), the goal of earning money was primed by having participants unscramble sentences that featured words describing social groups which are associated with the goal to make money (e.g., stockbrokers). Participants were told that they were about to engage in a mouse-click task that would be followed by a lottery task in which they could earn an extra amount of money (see also Aarts et al., 2004). Furthermore, they received the additional information that the lottery task would only be given if there was enough time left. Accordingly, participants for whom the ''money'' goal was primed were expected to spend less time on the mouse-click (filler) task, because that would enable them to get to the goal-relevant task. Whereas the habitual, dominant means to gain money for students may be working in a bar or asking their parents (rather than performance on a mouse-click task), we reasoned that the priming of the goal of earning money would enhance the utilisation of the opportunity to attain the goal by speeding up on the mouse-click task. Results showed that participants who were primed with the goal to make money were indeed faster. That is, they speeded up their performance on the mouse-click task because this task provided an opportunity to engage in the goal-related lottery task. However, no such effects were found on people's reports of how fast they aimed to work on the mouse-click task.

In another line of studies (Aarts et al., 2004), male heterosexual students were primed with the goal to seek casual sex by exposing them to behaviours of a male actor that implied this goal. Subsequently, they participated in a task in which they could provide feedback about a task that they had performed earlier, and that was allegedly designed by an undergraduate student. Aarts et al. reasoned that one strategy to seek casual sex with another person is to help this person, and that the feedback task may provide an opportunity for this. However, heterosexual male persons may not help everybody in this respect; they are only expected to help more if the other person asking for feedback is a female person. Hence, the possibility to provide feedback in this task represented an opportunity to attain their goal, but only when the task was designed by a female, as opposed to a male, student. Indeed, priming increased the number of words participants used, as well as the time they took to provide feedback, but only when the student who designed the task was female (Figure 4). Further experimentation showed that participants' behaviour did not to result from consciously reported intentions, in the sense that they were not aware that the feedback was performed to attain the goal of seeking casual sex. This indicates that
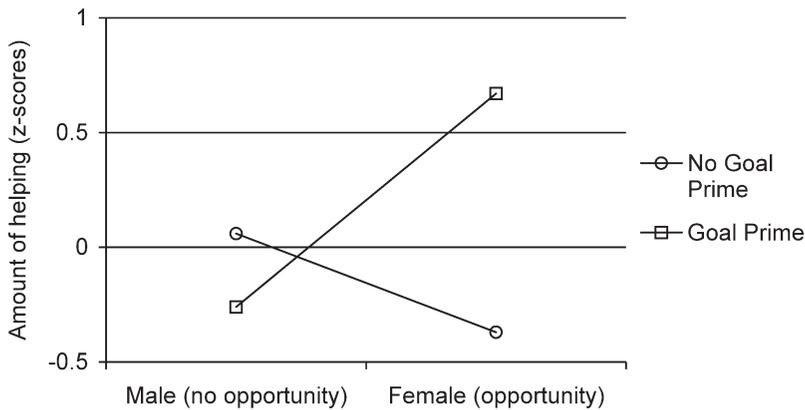
Figure 4. Effort in helping as a function of goal priming and opportunity (adapted from Aarts et al., 2004, Study 2).

switching to, and acting on an opportunity associated with an accessible goal may occur automatically.

Summary.   The work discussed above demonstrates that accessibility of the goal state can affect various stages of the process of goal pursuit. First, it can influence the selection of goals in conscious goal setting, but also determine which goals are non-consciously adopted. Second, priming of a goal state can render associated, habitual means more accessible, which directs the activation, selection, and execution of instrumental actions.

However, the studies also reveal several findings that cannot be explained by accessibility only. For instance, people seem to be rather flexible in their non-conscious goal pursuit, employing novel instrumental actions to reduce the discrepancy with a primed goal state when the habitual means cannot be used in the situation at hand. Are people indeed able to assess and reduce discrepancies with accessible goal states without conscious interventions? Moreover, a number of studies suggest that goal-priming effects on behaviour depend on the (pre-existing) desirability, or incentive value, of the goal state—i.e., goal strength. But if no conscious reflections on the incentive value occur, how then can people non-consciously assess the desirability of a primed potential goal state and determine whether the state is worth working for?

These questions cannot be answered by an approach that only uses accessibility of the goal state as an explanatory factor in non-conscious goal pursuit. A framework for non-conscious goal pursuit should be able to account for these findings. It should incorporate discrepancy reduction and assessment of desirability—*the* characteristic features of goal pursuit in

general—in order to explain the findings reported above. In the next sections we will address these two topics in more detail and provide theoretical support, as well as empirical evidence, for the non-conscious operation of these two processes.

Beyond goal priming: The roles of discrepancy and positive affect

To further explore the underlying mechanisms of non-conscious goal adoption and enactment, we take—in line with previous research on non-conscious goal pursuit—the representation of a goal as a desired state as point of departure. Conceptualising goals as representations of desired states, we argue, suggests the operation of two informational features that are not clearly distinguished in the current literature on non-conscious goal pursuit: a cognitive one and an affective-motivational one. The cognitive feature contains the representation of the state that serves as a standard or reference point which is crucial in discrepancy reduction and gives direction to motivational behaviour. The affective-motivational feature, on the other hand, signals to the individual that the state is desired and worth pursuing, and thus motivates people to attain the state. In other words, we argue that a representation of a goal contains information about the state that is desired, but also the information that this state *is* desired.

The operation of these two features is easily observed in the research on non-conscious goal pursuit. In some studies, effects of goal priming are found on the direction of people's behaviour, whereas in others the motivational property is more prominent. The study of Bargh et al. (2001) on cooperation, for example, clearly demonstrated that the direction of people's behaviour was changed by the non-conscious activation of the cooperation goal: Primed participants engaged in behaviour (i.e., replenishing the common resource pool) that enabled them to reach the activated target or standard of being cooperative. Hence, this experiment is a good example of how priming can determine *what* people strive for.

Effects on motivation are among others apparent in most studies on goal adoption. Aarts et al. (2004) for example, found that compared to a control group, participants activated with the goal of earning money expended more effort on a task that was instrumental in attaining the goal, which indicates that they were more *motivated* to reduce the discrepancy with that state. This motivational property was further supported by the finding that the effects on effort were more pronounced when the goal state was more desired. Hence, these studies reveal that activating a goal representation not only affects *what* people strive for, but also makes it more likely *that* they will strive for it.

Thus, a primed goal state can automatically give direction to people's behaviour, as well as motivate or energise it to the extent that it represents a

desired state. In the following pages we will discuss these two properties of goals in more detail, based on existing theory and evidence, as well as on our own research programme that was guided by the proposed framework. We will start by taking a closer look at how primed goals give direction to behaviour.

Direction in non-conscious goal pursuit: The role of goal discrepancies

Many researchers have argued that setting or adopting a goal creates a discrepancy between the actual state of the world and the desired state, which people are motivated to reduce (Carver & Scheier, 1998; Hyland, 1988; Lewin, 1935; G. A. Miller et al., 1960; Powers, 1973; Wiener, 1948). In order to do so, people have to search for opportunities to attain the goal state and to employ the proper instrumental actions or means to attain it. Successful execution of these instrumental actions, however, requires monitoring of their effects (G. A. Miller et al., 1960; Powers, 1973; Wiener, 1948). That is, people have to compare the actual state to the goal state and change or adjust their actions if required by the situation at hand to attain their goals. Thus, people's minds are said to be tuned to flexibly detecting and acting on situations that are discrepant with their goals.

However, theories of goal pursuit rarely make reference to the question of whether this process of discrepancy detection and reduction requires conscious awareness (Moskowitz et al., 2004). Could this process of discrepancy reduction be instigated by a non-conscious instead of a consciously given goal? If goal priming indeed causes goal-directed behaviour this must be the case, as discrepancy reduction is *one* of the crucial informational features of goal-directed behaviour. There are data pointing in this direction. First of all, the directional effects of goal priming reported in the literature suggest that people can successfully reduce discrepancies between their actual (current) states and primed goal states. Second, there is evidence to suggest that the mental accessibility of primed goal representations does not show the normal decay function that is observed for other mental (semantic) constructs. That is, non-consciously activated goal representations show signs of reverberation as they remain accessible over time (Aarts et al., 2004; Bargh et al., 2001). Such a pattern of sustained activation could indicate the operation of a discrepancy-monitoring process in which the goal representation is repeatedly used or updated, and thus kept accessible in mental operations that assess its relation to the current state. In sum, there is evidence suggesting that the process of monitoring and reduction of goal-discrepancies can operate non-consciously.

However, it is difficult to obtain conclusive evidence for the crucial role of discrepancies in non-conscious goal pursuit from studies that only rely on

priming to trigger goal-directed behaviour. That is, because in these studies goal discrepancies arise from activation of the goal representation, discrepancy and accessibility of the goal state are necessarily confounded. For example, in the study by Aarts and colleagues (2004) in which participants were primed with the goal state of making money, these people were shown to expend additional effort on an instrumental task, thereby reducing the resulting discrepancy with their current state (e.g., having no money or being broke). However, based on this evidence it is impossible to conclude that enhancing the *accessibility* of a goal affects motivational behaviour *because* it creates a discrepancy. In order to effectively study the effects of these two parameters, they have to be manipulated independently.

Apart from activating a goal that is discrepant with the actual state, it has been recognised that an effective way to create a goal discrepancy is to push people's actual states out of a desirable goal state that they aim to maintain (Powers, 1973). In everyday life, people often have to react to arising discrepancies with goal states that they desire to maintain over time (see e.g., Austin & Vancouver, 1996; Boldero & Francis, 2002). For example, when one wants to maintain self-integrity, a discrepancy arises when one's actual state diverges from that goal state, e.g., because one fails in a self-relevant domain (Fein & Spencer, 1997; Koole, Smeets, van Knippenberg, & Dijksterhuis, 1999). These changes in people's actual state can occur independently of the accessibility of the goal state. Thus, an effective way to investigate the role of discrepancies in non-conscious goal pursuit is to manipulate people's perceived actual states, making them discrepant or not with a primed (enhanced accessible) or non-primed (not enhanced accessible) desired state.

Automatic discrepancy processes: Pushing actual states out of desired goal states. In a series of experiments, we employed this strategy to examine whether people automatically—without being instructed or having an intention to do so (see Uleman, 1999)—activate mental representations of instrumental actions upon mere perception of a state that is discrepant with an accessible goal. For this purpose, we again used the goal of looking well groomed, as it typically needs to be maintained over time and was highly desirable for our participants. Furthermore, we designed a set of situations or actual states that are discrepant with this goal (e.g., "The shoes you put on look dirty"), and specific instrumental actions that can reduce the discrepancy (e.g., "polishing").

In a first test of our ideas (Custers & Aarts, 2005c), we adapted the Rapid Serial Visual Presentation paradigm that was designed to measure spontaneous construct activation during text reading (e.g., Long & Golding, 1993). In our paradigm, participants were presented with sentences, the

words of which appeared one after the other at the centre of computer screen for 200 ms. Embedded in filler sentences, the critical sentences were presented which described an actual state that was discrepant with the goal of looking well groomed. At the end of the sentence a word appeared that was surrounded by asterisks (e.g., ***polishing***), and the participants' task was to indicate as quickly as possible whether this word was an existing word or not. Critical sentences were always followed by words that referred to actions that were instrumental in maintaining the goal state for that particular actual state. Thus, for several unique discrepancies (e.g., dirty shoes, wrinkled shirt), the accessibility of the specific applicable means was assessed (polishing and ironing respectively). Importantly, in order to investigate whether the activation of instrumental actions was dependent on an accessible goal representation, before the onset of the critical sentences participants (Dutch undergraduates) were subliminally primed either with the two Dutch synonyms for well groomed or with random letter strings. It was found that participants who were primed with the goal to look well groomed were faster than control participants in indicating that the instrumental actions were words, whereas no such prime effect was found on the filler trials. This suggests that the goal-discrepant actual state spontaneously activated the applicable representations of instrumental actions when the goal to look well groomed was made accessible.

Encouraged by these findings, we conducted a follow-up study in which we compared goal-discrepant versus non-discrepant situations and explored the role of chronic accessibility of the goal state in automatic discrepancy reduction effects (Custers & Aarts, 2005a; Experiment 1). We reasoned that for people who frequently pursued the goal of looking well groomed, this goal would be chronically accessible (see Higgins, 1996), which would enable them to react to goal discrepancies without first having to be primed with the goal. In order to demonstrate this effect in a different paradigm, we employed the probe-recognition task that has been successfully used to assess the automatic emergence of concept-accessibility effects during text comprehension (e.g., Hassin et al., 2005b; McKoon & Ratcliff, 1986; Uleman, Hon, Roman, & Moskowitz, 1996). In this paradigm, participants read sentences that appear on the screen, which are immediately followed by the presentation of a probe word. Their task is to indicate as quickly as possible whether this probe word was part of the preceding sentence or not. For any word that is rendered more accessible during reading of the sentence (but is not part of it), longer reaction times are expected, because the increased accessibility of the concept makes it more difficult to indicate that the word was not part of the sentence. For half of the participants, the critical sentences were goal discrepant (e.g., "The shoes you put on look dirty"), whereas for the other participants the sentences described a similar state that was not discrepant (e.g., "The shoes you put on have laces"). Both

types of sentences were followed by a word that represented an action that was instrumental in reducing the specific discrepancy.

It was established that for people for whom the goal to look well groomed was chronically accessible as a function of frequent pursuit of the goal, reactions to instrumental actions were significantly slower when these were preceded by a goal-discrepant sentence, than when preceded with the similar non-discrepant sentence (see Figure 5). This effect was not present for people who did not frequently pursue the goal. These results demonstrate that perceived actual states that are discrepant with a desired state automatically facilitate access to representations of actions that are instrumental in maintaining or restoring the goal state, but that such automatic discrepancy reduction requires the goal representation to be mentally accessible. These findings were corroborated in a subsequent experiment (Custers & Aarts, 2005a, Experiment 2b), in which we showed that subliminal priming of the goal to look well groomed just before the onset of goal-discrepant sentences also facilitated instrumental actions for participants for which the goal was not chronically accessible (see Figure 6).

To conclude, our findings demonstrate that an accessible goal representation gives direction to people's behaviour by motivating them to reduce the discrepancy between the goal state and the actual state. This crucial role of goal-discrepancies is especially evident when a discrepancy (by actual state manipulations) is introduced with a chronically or temporally accessible goal state that needs to be maintained. In this case, the mere perception of a goal-discrepant situation suffices to trigger goal pursuit: It causes one to
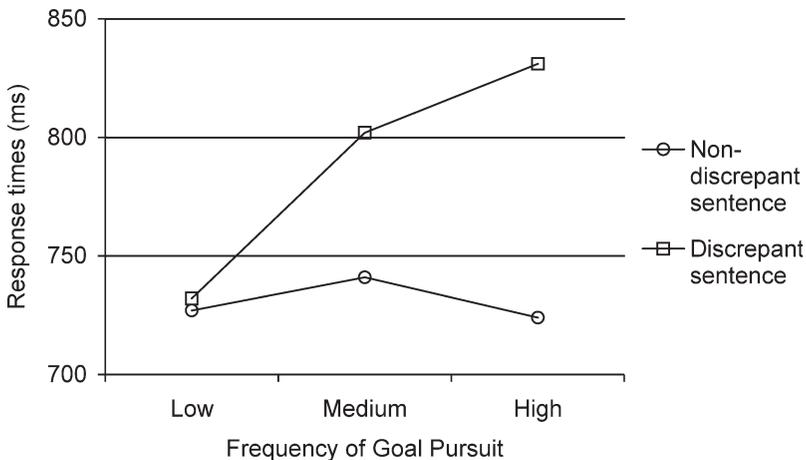

Figure 5. Mean response times as a function of frequency of goal activation and sentence type (adapted from Custers & Aarts, 2005a, Study 1).
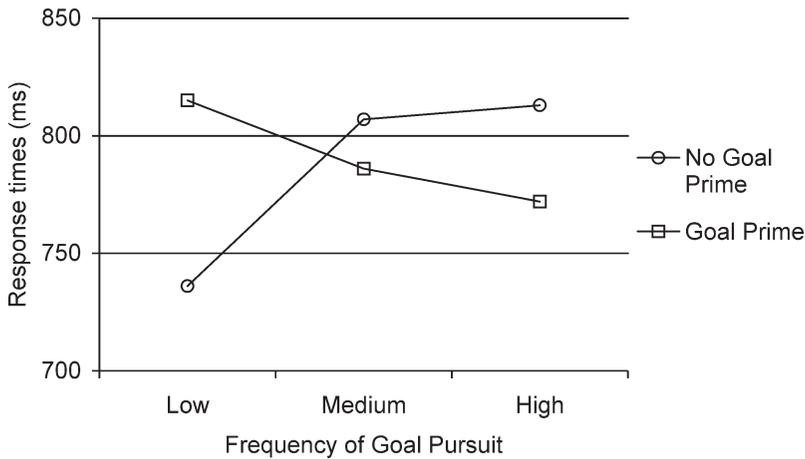
Figure 6. Mean response times as a function of frequency of goal activation and priming (adapted from Custers & Aarts, 2005a, Study 2b).

recruit or adjust actions to reduce the discrepancy and maintain the goal spontaneously, without a conscious intention to do so. It may be noted that the introduction of goal discrepancies triggers non-conscious goal pursuit in a different way from goal-priming manipulations typically used in previous research on non-conscious goal pursuit. However, we would like to argue that the processes that operate are the same. That is, regardless of whether the process is triggered by increasing goal accessibility that causes a discrepancy with the actual state, or by introducing an actual state that is discrepant with an accessible goal state, the process of non-conscious goal pursuit is only instigated if both a discrepancy and an accessible goal are in place. However, the question remains *why* a discrepancy with an activated goal state would *motivate* people to put effort in reaching the goal state. We turn to this issue next.

Motivation in non-conscious goal pursuit: The role of positive affect

Studies from the goal-priming literature clearly show that in addition to direction, priming of goal states also adds motivational properties to the resulting behaviour. For example, people become more persistent, expend more effort, and show flexibility to reduce discrepancies in order to attain a primed goal state, which seemingly shows that they want, and are motivated to attain or engage in the goal (Aarts et al., 2004; Bargh et al., 2001). Indeed, in these and other studies the primed goals that trigger motivational

activity seem to be generally positive and desirable to the research participants (e.g., cooperate, achieve, Bargh et al., 2001; Shah, 2003; making money, having casual sex, Aarts et al., 2004; treating people equally, Moskowitz, Gollwitzer, Wasel, & Schaal, 1999; Moskowitz, Salomon, & Taylor, 2000; helping others, Aarts et al., 2005a; Fitzsimons & Bargh, 2003). Thus, the goals that are primed pre-exist in people's minds as desired states. However, if such goals are activated non-consciously, how do people "recognise" that the activated state is desired? That is, how can people determine the motivational value of the goal state without consciously reflecting on it? Although most researchers in the field of non-conscious goal pursuit just assume that goals are represented as desired states, and priming these representations suffices to produce goal pursuit directly, on a more fundamental level things may be somewhat more delicate.

Along with researchers who argue that the value of a behavioural option is reflected by an "affective tag" (Damasio, 1994; LeDoux, 1996) we propose that the desire or motivational value of a potential goal state is signalled by its association with positive affect (see also Peak, 1955; Pervin, 1989; Young, 1961). Based on the notion that affective processes play a fundamental role in motivating human action, and can run fast without reaching conscious awareness (e.g., Berridge, 2001; Dijksterhuis & Aarts, 2003; LeDoux, 1996; Tesser, Martin, & Cornell, 1996; Zajonc, 1980), we argue that this affective valence can be automatically encoded when a potential goal state is primed, and as a consequence motivate non-conscious pursuit of that state.

Evidence for the idea that positive affect associated with a behavioural state has motivational properties comes from research on incentive theories. Incentive theories (Bindra, 1974; Bolles, 1972; Toates, 1986) propose that stimuli or states associated with positive affect form an incentive for which the organism will work. These theories grew out of several remarkable findings in different animal labs that shed new light on the role of reinforcement in learning processes following the S–R habit paradigm (Skinner, 1953; Watson, 1925). For instance, operant stereotypes or misbehaviours were discovered during operant conditioning experiments (Breland & Breland, 1961). One such behaviour is auto-shaping (Brown & Jenkins, 1968; Williams & Williams, 1969). For example, it has been shown that pigeons, for which free presentation of food is repeatedly paired with a light signal, start to vigorously pick at the lightbulb although this behaviour is not explicitly reinforced. This phenomenon, in which an animal shapes itself, occurs because the positive affect aroused by the food has now become linked to the lightbulb, which therefore serves as an incentive for which the animal is motivated to work.

Other support comes from studies in which animals (mostly rats, but humans have also been recruited for these studies) are given the opportunity to self-stimulate "brain pleasure centres" including, among others, the

nucleus accumbens, by mild electric shocks (Hoebel, 1976; Olds & Milner, 1954, 1956; Sem-Jacobsen, 1976; Shizgal, 1997; Spies, 1965). It is found that animals are highly persistent in attaining the behavioural states that produce this positive affect (e.g., pressing a lever causing the brain stimulation). For example, when in a cage having free access to a lever, rats will cross a shock grid to get to the lever and choose to self-administer electric charges to the brain over food when hungry. Together, these findings show that when a state or event becomes associated with positive affect, it can trigger motivational behaviour upon perception of that state. Thus, the activation of specific pleasure sites in the brain is thought to play a crucial role in the evaluation and selection of goal states.

These findings are backed up by recent data in neuroscience that suggest that the mesolimbic dopamine system, which includes the nucleus accumbens that was targeted in self-stimulation research, is involved in motivational processes (Berridge, 2001; McFarland & Kalivas, 2003; Salamone & Correa, 2002). This system is known to be activated when people engage in behavioural states that evoke positive affect, such as eating food, having sex, and making money. However, the same system is also activated by cues that refer to those states (Schultz, 1998). These findings indicate that mere activation of a mental representation of a goal sets off neurological processes that play a crucial role in motivational behaviour. Thus, there is evidence to suggest that the dopamine system, which is activated when the mental representation of a behavioural state associated with positive affect becomes accessible, is involved in encoding the incentive value of the state, modulating the intensity of mental and behavioural processes in the service of attaining it (Berridge, 2003; Joel, 1999; O'Reilly, Braver, & Cohen, 1999).

Based on this evidence in various fields of research, we propose that the mere attachment of positive affect to a potential goal state will cause a person to pursue this state when it is rendered accessible, as this positive affective valence automatically signals to the person that the state is desired and worth striving for. Such associations between (behavioural) goal states and positive affect may develop as a result of repeated (conscious) positive evaluations of the goal state, positive affect experienced upon attainment of the goal state, or the mere co-activation of the representation of the state and positive affect (for a more detailed account, see Custers & Aarts, 2005d).

Linking neutral goal states to positive affect.   In order to investigate the effect of positive affect attached to the goal representation on motivational activity, we conducted a series of experiments in which we manipulated the affective valence of potential goal states through co-activation with positive affect in an evaluative conditioning paradigm (De Houwer, Thomas, & Baeyens, 2001). Evaluative conditioning refers to the phenomenon whereby

the valence of a stimulus (the conditioned stimulus or CS) changes in the direction of a valenced stimulus (the unconditioned stimulus or US) with which it is paired. Such changes in valence can occur without awareness of the contingency between CS and US, as has been demonstrated by research that presented the CS or US subliminally (Dijksterhuis, Aarts, & Smith, 2005; Krosnick, Betz, Jussim, & Lynn, 1992).

We started out by examining the effects of the affective valence of potential behavioural goals on participants' wanting to engage in those activities (Custers & Aarts, 2005d, Study 1). Participants first completed an alleged dot-detection task, in which we subliminally flashed behavioural states (e.g., doing puzzles; going for a walk—which could all be expressed in one word in Dutch) or non-words on the screen, which were immediately followed by visible positive or neutral words. After this manipulation, participants' motivation to engage in the behavioural states was assessed by having them respond to the potential goal states that appeared on the screen, indicating quickly whether they wanted to engage in those states or not.

Results showed that participants' motivation to attain the states was higher in the condition in which goal states were subliminally flashed together with positive words, than in the conditions in which states were paired with neural words, or only positive words were presented. Results are presented in Figure 7. These findings demonstrate that shaping neutral potential goals more positively increases people's motivation to attain those states.

In order to obtain more conclusive evidence for the primary and unique role of positive affect in motivational processes, in an additional study we
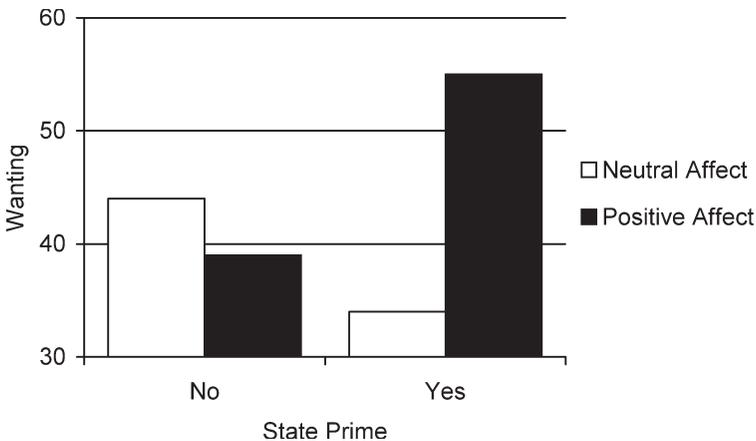

Figure 7. Percentage of states wanted to attain as a function of state prime and affect (adapted from Custers & Aarts, 2005d, Study 1).

compared the effects of shaping neutral behavioural states more positively to the effects of linking them to negative affect (Custers & Aarts, 2005d, Study 2a). Several theorists have argued that affect is not one single dimension that ranges from good to bad, but actually consists of two separate dimensions—a positive and a negative one—that independently contribute to motivation and behaviour in opposite directions (e.g., Cacioppo & Berntson 1999; Gray, 1987; Lang, Bradley, & Cuthbert, 1990; Watson & Clark, 1992). Whereas positive affect is commonly associated with the preparation and instigation of motivated action, it has been proposed that negative affect attached to goal pursuits reduces the motivation and operation of the given pursuits. Hence, negative affect may cease people's pursuit of desired states (see Aarts et al., 2005b). However, when states are neutral, and do not represent an incentive, linking these states to negative affect would not, according to this reasoning, decrease people's motivation to attain those states, as they would not be motivated to pursue them to begin with. Hence, we predicted that negative shaping of neutral states would not decrease participants' motivation to attain them. This is exactly what we observed: Compared to a neutral control condition, participants' reported motivation to attain the originally neutral states increased when these states were linked to positive affect, but did not decrease when linked to negative affect.

In a related study, Veltkamp, Aarts, and Custers (2005) measured the incentive value of positively and negatively shaped behavioural states in a more implicit way. Their implicit measurement was based on the phenomenon reported in studies on functional perception, that objects with a high incentive value are perceived as higher or bigger in size (e.g., Ashley, Harper, & Runyon, 1951; Bruner & Goodman, 1947; Lambert, Solomon, & Watson, 1949). For example, in their seminal work on this idea, Bruner and Goodman (1947) established that children overestimated the size of coins as a positive function of their monetary value and that this effect was more pronounced for poor than rich children. Following this rationale, Veltkamp et al. asked participants to estimate the height of stimuli (e.g., a piece of a puzzle) that represented objects appropriate to attain (neutral) behavioural goal states (e.g., doing puzzles). These behavioural states were linked to either negative, neutral, or positive affective words in a within-participants design similar to the affective shaping procedure discussed above. It was found that compared to objects related to the neutral behavioural states, objects related to positively shaped states were estimated to be higher in size, whereas no effect was found for objects related to negatively shaped behavioural states (see Figure 8). Together, these results demonstrate that the motivational value of goal representations is determined by their association to positive affect.
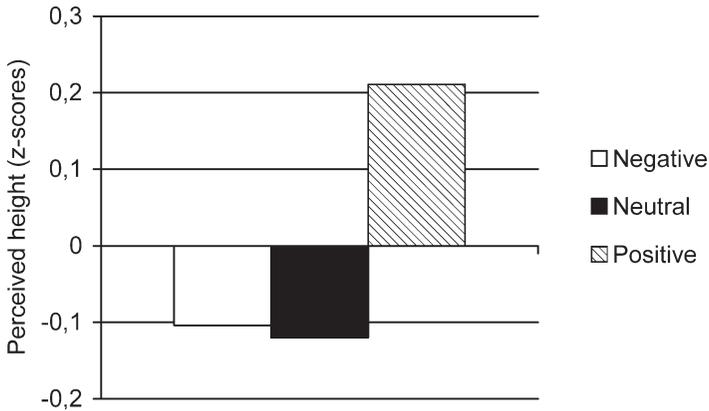
Figure 8. Mean perceived height as a function of goal valence (adapted from Veltkamp et al., 2005).

The studies reported above show that the motivational value of neutral behavioural goal states, as measured explicitly or implicitly (e.g., through height perceptions), increases when the states are shaped more positively outside of the person's conscious awareness. In further studies we investigated whether this unobtrusive shaping treatment of desired goal states causes actual motivated behaviour. That is, we tested effects of affective valence of accessible goal representations on performance of actions instrumental in attaining the goal without the person's awareness of the source causing their goal-directed behaviour. When presented with an opportunity to realise a goal state, participants should exhibit more motivational behaviour (e.g., increased effort to attain the state) when that state is shaped more positively. In other words, people for whom a goal state is non-consciously shaped more positively should behave similarly to people who have a conscious goal to attain the state (cf. Bargh, 1990; Bargh et al., 2001). Accordingly, we expected a positively shaped behavioural state to direct and motivate behaviour in the same way that conscious instructions motivate people to attain a specific goal state. To test these ideas we compared the effects of positive shaping with those of explicit instructions to attain the state (cf. Bargh et al., 2001).

Participants were assigned to one of three conditions: a conscious goal condition, a non-conscious goal condition, or a control condition. First, participants completed the shaping manipulation in which words related to the neutral state of doing "number sequence puzzles" were linked to positive affect for people in the non-conscious goal condition. For people in the other two conditions the goal was left neutral. Subsequently, participants were informed that they would engage in a mouse-click task and

number-sequence-puzzle task, but that the latter task would only be given if there was sufficient time left (Aarts et al., 2005a). Additionally, participants in the conscious goal condition were told that it would be desirable to do the number-sequence puzzles (which explicitly attached desire to the goal state). We expected participants in both (conscious and non-conscious) goal conditions to work harder (i.e., be faster) on the mouse-click task—which in this setting was a means to get to the puzzle task—because in both conditions the goals were rendered more accessible and desirable by the explicit instructions or the shaping procedure respectively. It turned out that this was the case: participants were faster on the mouse-click task in both goal conditions compared to the control condition (see Figure 9).

Goal priming and goal striving: When pre-existing goals are associated with positive affect.   The findings described above suggest that the motivational strength of a primed goal depends on the goal's positive affective valence. However, because the manipulation in these experiments always involved co-activation of the neutral potential goal state and positive affect, this paradigm did not allow us to pit the effects of accessibility against those of affective valence. In order to be able to manipulate the accessibility of the goal state independently of its association with positive affect, we took on the challenge to measure the affective valence of existing goal states (Custers & Aarts, 2005b).

In a first study, we investigated whether the measured affective valence of an accessible goal state predicted motivational behaviour. To this end, we employed an adapted affective priming task (Fazio, Sanbonmatsu, Powell, & Kardes, 1986) that allowed us to prime a goal state and measure
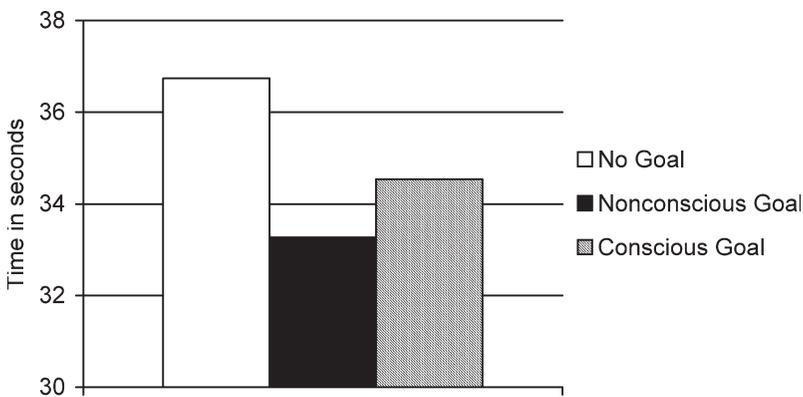

Figure 9. Time spent on the mouse-click task as a function of goal condition (adapted from Custers & Aarts, 2005d, Study 4).

the positive affective valence of this state at the same time. In this task the goal state was presented subliminally, followed by positive or negative target words that participants had to categorise in affective terms within a response window, which forced them to respond very rapidly, thereby increasing the chance of errors (see Draine & Greenwald, 1998; Frings & Wentura, 2003). A positive affective valence of the primes would, within this paradigm, be indicated by more errors in responses to negative targets and fewer errors in responses to positive targets, compared to the responses on control trials. As the goal under investigation we selected an activity that, in general, was assumed to be associated with positive affect for our student population: socialising and going out.

Participants first engaged in the affective priming task, and were subsequently presented with the mouse-click task that, if there was enough time left, would be followed by a goal-related lottery in which they could win tickets to a student dance party in the city centre. For each individual participant, a goal-positivity index was calculated based on their error rates on prime and control trials. The results showed that the implicitly measured affective valence of the goal state was positive overall. More importantly, the goal-positivity index correlated significantly with participants' effort to work on the mouse-click task: Participants for whom the goal of socialising and going out was positive were faster on the instrumental goal task compared to those for whom the goal state was relatively neutral. Awareness checks of behaviour revealed that participants' self-reported speed of performance to ensure participation in the goal-relevant lottery task did not correlate with actual expended effort or the implicit measure of goal valence. When controlling for these self-reports of behaviour, the correlation between effort and goal valence remained significant, which suggests that the effects of goal valence on motivational behaviour are not mediated by participants' conscious reflections on their behaviour. These findings show that people are able to assess the valence of a goal state upon being subliminally primed with this state, and moreover that they are motivated to pursue an accessible goal state to the extent that the state is attached to positive affect and thus represents a desired state, although they have no conscious access to the motivational processes guiding their behaviour.

These findings conceptually replicate and extend our earlier findings on creating goals (Custers & Aarts, 2005d) by showing that goals that pre-exist in people's minds become manifest automatically when the goal state is associated with positive affect. However, in the study presented above we were not able to manipulate accessibility independently of affective valence. For this reason, we conducted a second experiment, in which we also meant to replicate the effects of the first study with a different implicit measure of affective valence. In this study, participants first engaged in an alleged letter-detection task, in which the goal of socialising and going out was

subliminally primed. Next, they engaged in the (by now familiar) mouse-click task that was instrumental in attaining the goal-related lottery-task. Finally, after an extensive filler task, participants engaged in the Extrinsic Affective Simon Task (EAST; De Houwer, 2003), in which the affective valence of the potential goal was assessed.

In the EAST, which is conceptually similar to the Implicit Association Task (IAT; Greenwald, McGhee, & Schwartz, 1998), participants have to respond to white and coloured words that appear on a computer screen with a left or right key-press. Specifically, they are instructed to respond to white words based on their affective valence (e.g., press left for negative and right for positive words), but to base their responses to the other words on their colour (e.g., press left for blue and right for green words). Hence, depending on the colour of these words, people have to respond with a key that is also used for positive or negative responses to the white words. The idea behind the task is that responses to coloured words should be faster if their valence is congruent, compared to incongruent with the response that is required based on colour.

In our study, words related to the goal of socialising and going out were presented as coloured words. For each participant, an EAST score was computed by subtracting the log-transformed reaction times on the trials that required a positive response from those that required a negative response. Hence, a higher score reflects a more positive valence of the goal. Results showed that participants expended more effort to attain the goal state when it was more positive, but only when the goal was primed (see Figure 10). Thus, these results replicate the main finding in research on non-conscious goal pursuit that enhancing the accessibility of a goal
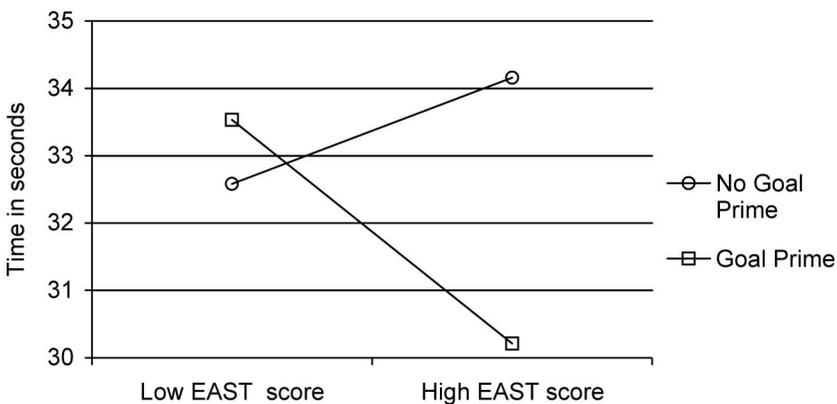

Figure 10. Time spent on the mouse-click task as a function of goal valence (EAST score) and priming (Adapted from Custers & Aarts, 2005b, Study 2).

representation motivates behaviour aimed at realising a desired state. Importantly, our findings demonstrate that this effect is moderated by the positive affective valence of the goal state. Only when a primed state pre-exists as a desired state associated with positive affect does goal priming induce motivational behaviour.

THE MERITS OF THE FRAMEWORK FOR RESEARCH ON NON-CONSCIOUS GOAL PURSUIT

The aim of the present chapter was to develop a framework for the comprehension and examination of the non-conscious activation of goal-directed behaviour. We presented empirical work of a research programme guided by this framework, and showed how the enhanced accessibility of a goal state automatically provides behaviour with direction and motivation. First, the enhanced accessibility of the goal representation is required for the goal to function as a standard or reference point for goal-directed behaviour through the detection and reduction of goal discrepancies. Second, if a goal representation is rendered accessible, the positive affective valence attached to the goal is automatically encoded and feeds the motivational system, signalling the presence of an incentive and modulating effort to reach the goal state. These two features of non-conscious goal pursuit were demonstrated in two lines of research. First, the directional property of non-conscious goal pursuit was demonstrated by showing that the instigation of goal-directed activity depends on both accessibility of the goal and its discrepancy with the current state. Second, it was shown that positive affect attached to the goal is an important prerequisite for non-conscious goal pursuit.

Based on these findings we conclude that non-conscious goal pursuit depends on three features of the goal state: (a) its mental accessibility, (b) its discrepancy with the actual state, and (c) its association with positive affect. Together, these features provide non-conscious goal pursuit with direction and motivation. Thus, the current framework can aid in making a priori predictions about priming effects on motivational, goal-directed behaviour and in designing measures that will capture the relevant property of the predicted behaviour (i.e., motivation or direction).

Future directions in research on non-conscious goal pursuit

Below, we address a few suggestions based on the framework that could help to resolve some pressing questions in the field of non-conscious goal pursuit. First, we will focus on how the present framework can help to distinguish between different accounts of priming effects on behaviour. Second, we discuss the possible similarities and differences between approach and

avoidance goals. Last, we will explore the relation between non-conscious goal pursuits and working memory processes and the possibility of measuring discrepancy reduction processes using working memory models.

Distinguishing between two ways by which priming can affect behaviour. As noted earlier, the literature on behaviour priming offers two accounts by which behaviour can arise from non-conscious activation of a mental representation of the behaviour. First, activation of a representation could directly trigger the corresponding behaviour through a direct perception – action link (Dijksterhuis & Bargh, 2001), resulting from an overlap between mental representations used in perception and action (e.g., Prinz, 1997, see also Greenwald, 1970). Second, priming of the behaviour representation could produce goal pursuit if the representation refers to a behavioural goal (Bargh, 1990). These two mechanisms appear to be used almost interchangeably in the literature. Macrae and Johnston (1998), for example, explained their finding that participants who were primed with helping, more often helped the experimenter in picking up dropped pens in terms of the perception – action link. However, Fitzsimons and Bargh (2003) interpreted similar effects on helping behaviour as resulting from goal priming (see also Custers et al., 2005). We believe that the current framework can help to distinguish between these two theoretical accounts for priming effects on behaviour.

The usual approach to finding out which of the two mechanisms is operating is to consider the properties of the observed behavioural effects. Indicators for effects resulting from goal priming are, for instance, persistence (e.g., Aarts et al., 2004), resumption after interruption (e.g., Bargh et al., 2001), and resistance to other interfering goals (e.g., Macrae & Johnston, 1998). Macrae and Johnston, for example, concluded that their priming effects on helping behaviour were produced by the perception – action link, because the effect disappeared when the pens that participants could pick up to help were leaking. Although we believe that measuring such indicators is important to examine the potential outcomes of priming, knowing the actual cause of these priming effects is more helpful in predicting the outcomes.

Our framework makes it possible to make such a priori predictions about the nature of the behaviour priming effects. When a primed behavioural state is not or is only weakly associated with positive affect (e.g., being rude, Bargh, Chen, & Burrows, 1996; helping others for those who do not care, Aarts et al., 2005a), any priming effects that occur would have to be produced by the direct perception – action link. The behaviour resulting from this priming would therefore not be very persistent, and easily overruled by other processes (Dijksterhuis & Van Knippenberg, 2000; Macrae & Johnston, 1998). When the primed state is

associated with positive affect, however, subsequent behaviour is more likely to be produced by goal priming, and thus propelled by the motivation to attain the behavioural goal state, which becomes apparent in studies that find that goal-priming effects are moderated by goal strength (e.g., Aarts et al., 2004; Aarts et al., 2005a). Thus, conceptualising behavioural goals as mental representations of behavioural states associated with positive affect allows one to make predictions about the nature of priming effects, based on the affective valence of the primed behavioural state, instead of having to rely on post hoc assessments of the qualities of the behaviour.

Approach versus avoidance goals.   Our research, as well as most of the literature on non-conscious goal pursuit, focuses on desired states that one wants to attain or maintain. Several theorists, however, have argued that in addition to motivational behaviour directed towards desired states, people can also be motivated to avoid undesired states (Carver & Scheier, 1998; Elliot & Covington, 2001; Higgins, 1997). This process is often seen as the exact mirror-image of approaching desired states. That is, it is assumed that people are motivated to establish or maintain a discrepancy between their actual state and an undesired state. How can the pursuit of these avoidance goals be understood within the current framework?

One way to look at avoidance goals is to maintain that they are—in line with the general conceptualisation of goals—mentally represented as desired states. Trying to avoid an undesired state can just as easily be regarded as trying to attain a desired state of non-punishment (e.g., not being disapproved of by one's parents). Although this may sound like a conceptual sleight of hand, there is research to suggest that states of non-punishment motivate behaviour in the same way that positive states do. Gray (1987), for example, has argued that signals of non-punishment and reward both activate the Behavioural Activation System (BAS), which propels appetitive, motivational behaviour as opposed to reflex-like avoidance reactions, which are initiated by the Behavioural Inhibition System (BIS) in reaction to non-punishment and non-reward. Moreover, Higgins (1998) has argued that realising an avoidance goal is accompanied with positive feelings (relief) just as the attainment of an approach goal (joy), which suggests that both are associated with positive affect. Thus, avoidance goals can often be treated as a special case of approach motivation, aimed at the desired state of non-punishment that has a positive incentive value (Wicker, Wiehe, Hagen, & Brown, 1994).

In a related, but somewhat different way, it could be argued that avoiding undesired states can be part of the process of maintaining a desired state. As we have seen, people can automatically react to goal discrepancies (e.g., dirty boots) with the proper instrumental actions (e.g., polishing) to

maintain a desired state (e.g., looking well groomed). However, those reactions to goal-discrepant states could be interpreted by researchers as motivational behaviour aimed at avoiding those states (e.g., getting dirty shoes) if the goal people aim to maintain—that is, the desired standard or focal point at which perception and cognition is directed in the situation at hand—is left outside of consideration.

It is important to realise, however, that many avoidance behaviours may not qualify as motivational, goal-directed (or avoiding) behaviour because of a fundamental asymmetry between realising desired (positive) states and avoiding undesired (negative) states. In order to realise a desired state, people often have to rely on their mental representation of that state and their knowledge about the means that will produce it, as the state can most of the time not be directly perceived in the environment. For example, if one wants to go out and socialise, one will need a representation of where to go and knowledge about how to get there, and to tune one's actions so that the discrepancy with the goal state is reduced. However, in order to avoid an undesired state it is often enough to react to it when it occurs in the environment (e.g., when your friends have dragged you to a sleazy-looking bar). Thus, whereas successfully attaining a desired state almost always requires enactment and maintenance of motivational, goal-directed behaviour, avoidance of a state can often materialise as a simple avoidance or withdrawal reaction (propelled by the BIS) upon perceiving that state in the environment (see e.g., Gray, 1987; Strack & Deutsch, 2004). This notion concurs with the literature on the approach/ avoidance gradient (Cacioppo & Berntson, 1994; N. E. Miller, 1951), which shows that the motivational strength of avoidance goals rapidly decreases with the distance from the goal, whereas that of approach goals seems to be less affected by this variable. Although the ability to distinguish between goal-directed (avoiding) actions and approach/ avoidance reactions depends on how one defines them and on the level at which one analyses behaviour, we argue that—in the light our current conceptualisation of goal pursuit—many instances of avoidance behaviour may not qualify as goal-directed (avoiding) behaviour, but rather as reflex-like avoidance reactions towards negative states, situations, or stimuli.

In sum, avoidance goals may be either be conceptualised as goals aimed at attaining a state of non-punishment or as states that are discrepant with a state that one aims to maintain. In both cases, the goals guiding behaviour are positive, and enacting them leads to desired outcomes (cf. Higgins, 1997). However, because of fundamental differences in the processes that are needed to realise desired states and avoid undesired states, avoidance behaviour may often be explained as a mere avoidance reaction to a perceived state or stimulus.

Non-conscious goal pursuit and working memory.   A final issue that requires further examination is the question of whether non-conscious goal pursuit requires mental resources. Although it is assumed that automatic processes are extremely efficient (e.g., Bargh, 1994) and thus do not claim any mental resources, it has recently been argued that those non-conscious processes do not come without any cost, but use up working memory capacity to some extent (Hassin, 2005; Kintsch, Healy, Hegarety, Pennington, & Salthouse, 1999). Specifically, because non-consciously activated goals trigger mental processes in the service of goal attainment, they must almost inevitably consume some sort of mental resources—unless one assumes that some mental processes do not require resources at all.

An important function for which goal pursuit is generally thought to require working memory is the monitoring of goal discrepancies and goal attainment (Baddeley, 1999; Curtis & D'Esposito, 2003; Shah & Miyake, 1999). Such working memory activity would explain why goals remain accessible or even increase in accessibility over time, when the rate or degree of goal checking increases (see e.g., Aarts et al., 2004; Bargh et al., 2001). Thus, working memory activity may very well be used by the discrepancy-monitoring process that is automatically instigated upon activation of the goal. According to our present framework, this working memory activity may increase when the accessible goal state is desired or associated with positive affect (O'Reilly et al., 1999). That is, if the recruitment of working memory resources is indeed a motivational process, it could be dependent on the motivational value of the goal state. Recent research in our own lab points to this suggestion: Subliminal priming of desired states (e.g., socialising goals or self-described goals) was found to impair performance on working memory tasks (Hassin, Aarts, Eitam, & Custers, 2005a). Note that these findings suggest that working memory is not only dedicated to the control of conscious intentions. Non-consciously activated goals recruit resources from the same pool as well.

In short, because discrepancy reduction is a crucial feature of motivated goal pursuit, working memory models may prove very useful tools to detect non-conscious motivational processes and help to distinguish between processes that do and do not rely on discrepancy reduction (e.g., goal priming vs perception-action priming or avoidance goals vs avoidance reactions).

CONCLUDING REMARKS

The present chapter aimed to explore and delineate the processes involved in goal pursuit. Specifically, we presented a framework to account for the emergence of non-conscious goal pursuit—i.e., goals that are set in the unconscious and are adopted and enacted in an automatic fashion—and

demonstrated that non-conscious goal pursuit is more likely to occur if the representation of the goal state is accessible, discrepant with the actual state, and linked to positive affect. Although the quest to unravel the mechanisms underlying non-conscious goal pursuit has just begun, we feel that the current framework can provide guidance in this endeavour. It is time to move beyond priming effects and adopt a theory-driven approach that deepens our insight into the mechanisms that make non-conscious goal pursuit possible.

Based on theory and empirical evidence we have added two determinants—discrepancies and positive affective valence of the goal state—to accessibility as a determinant of non-conscious goal pursuit. This conceptual extension and precision may aid us in tackling some of the most pressing issues in the field, which involve the distinction between motivational and non-motivational priming effects, the nature and operation of (non-conscious) goals, and the role of working memory in non-conscious motivational behaviour. We hope that this approach allows us to further open the black box and see what is really producing these intriguing goal-priming effects.

REFERENCES

Aarts, H., Chartrand, T. L., Custers, R., Danner, U., Dik, G., Jefferis, V. E. et al. (2005a). Social stereotypes and automatic goal pursuit. *Social Cognition*, *23*, 464–489.

Aarts, H., Custers, R., & Holland, R. W. (2005b). *The non-conscious cessation of goal pursuit: When goals and negative affect are co-activated*. Manuscript submitted for publication.

Aarts, H., Custers, R., & Wegner, D. M. (2005c). On the inference of personal authorship: Enhancing experienced agency by priming effect information. *Consciousness and Cognition*, *14*, 439–458.

Aarts, H., & Dijksterhuis, A. (2000a). Habits as knowledge structures: Automaticity in goal-directed behaviour. *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., & Dik, G. (in press). 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 behaviour from actions in the past: Repeated decision making or a matter of habit? *Journal of Applied Social Psychology*, *28*, 1355–1374.

Ach, N. (1935). *Analyse des Willens*. Berlin, Germany: Urban & Schwarzenberg.

Ajzen, I. (1985). From intentions to actions: A theory of planned behaviour. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behaviour* (pp. 11–37). Berlin, Germany: Springer-Verlag.

Ashley, W. R., Harper, R. S., & Runyon, D. L. (1951). The perceived size of coins in normal and hypnotically induced economic states. *American Journal of Psychology*, *64*, 564–572.

Atkinson, J. W. (1964). *An introduction to motivation* Oxford, UK: Van Nostrand.

Austin, J. T., & Vancouver, J. B. (1996). Goal constructs in psychology: Structure, process, and content. *Psychological Bulletin*, *120*, 338–375.

Baddeley, A. D. (1999). *Essentials of human memory*. Hove, UK: Psychology Press.

Bandura, A. (1977). *Social learning theory*: Oxford, UK: Prentice-Hall.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bargh, J. A. (1990). 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. (1994). The four horsemen of automaticity: Awareness, intention, efficiency, and control in social cognition. In R. S. Wyer Jr. & T. K. Srull (Eds.), *Handbook of social cognition* (2nd ed. pp. 1–40). Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Bargh, J. A. (1997). The automaticity of everyday life. In R. S. Wyer Jr. (Ed.), *Advances in social cognition* (Vol. 10, pp. 1–61). Mahwah, NJ: Erlbaum.

Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behaviour: Direct effects of trait construct and stereotype activation on action. *Journal of Personality and Social Psychology*, *71*, 230–244.

Bargh, J. A., & Ferguson, M. J. (2000). Beyond behaviourism: On the automaticity of higher mental processes. *Psychological Bulletin*, *126*, 925–945.

Bargh, J. A., & Gollwitzer, P. M. (1994). Environmental control of goal-directed action: Automatic and strategic contingencies between situations and behaviour. 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., Gollwitzer, P. M., Lee Chai, A., Barndollar, K., & Trötschel, R. (2001). The automated will: Non-conscious activation and pursuit of behavioural goals. *Journal of Personality and Social Psychology*, *81*, 1014–1027.

Baumeister, R. F., & Vohs, K. D. (Eds). (2004). *Handbook of self-regulation: Research, theory, and applications*. New York: Guilford Press.

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. (2003). Pleasures of the brain. *Brain and Cognition*, *52*, 106–128.

Bindra, D. (1974). A motivational view of learning, performance, and behaviour modification. *Psychological Review*, *81*, 199–213.

Blackmore, S. (2004). *Consciousness: An introduction*. New York: Oxford University Press.

Boldero, J., & Francis, J. (2002). Goals, standards, and the self: Reference values serving different functions. *Personality and Social Psychology Review*, *6*, 232–241.

Bolles, R. C. (1972). Reinforcement, expectancy, and learning. *Psychological Review*, *79*, 394–409.

Breland, K., & Breland, M. (1961). The misbehaviour of organisms. *American Psychologist*, *16*, 681–684.

Brown, P. L., & Jenkins, H. M. (1968). Auto-shaping of the pigeon's key-peck. *Journal of the Experimental Analysis of Behaviour*, *11*, 1–8.

Bruner, J. S., & Goodman, C. C. (1947). Value and need as organizing factors in perception. *Journal of Abnormal Social Psychology*, *42*, 33–44.

Cacioppo, J. T., & Berntson, G. G. (1994). Relationship between attitudes and evaluative space: A critical review, with emphasis on the separability of positive and negative substrates. *Psychological Bulletin*, *115*, 401–423.

Cacioppo, J. T., & Berntson, G. G. (1999). The affect system: Architecture and operating characteristics. *Current Directions in Psychological Science*, *8*, 133–137.

Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behaviour*. New York: Cambridge University Press.

Chartrand, T. L., & Bargh, J. A. (1996). Automatic activation of impression formation and memorization goals: Non-conscious goal priming reproduces effects of explicit task instructions. *Journal of Personality and Social Psychology*, *71*, 464–478.

Colwill, R. M., & Rescorla, R. A. (1986). Associative structures in instrumental learning. In G. H. Bower (Ed.), *The psychology of learning and motivation* (Vol. 20, pp. 55–104). New York: Academic Press.

Curtis, C. E., & D'Esposito, M. (2003). Persistent activity in the prefrontal cortex during working memory. *Trends in Cognitive Sciences*, *7*, 415–423.

Custers, R., & Aarts, H. (2005a). *Goal-discrepant situations prime goal-directed actions if goals are temporarily or chronically accessible*. Manuscript submitted for publication.

Custers, R., & Aarts, H. (2005b). *In search of the non-conscious sources of goal pursuit: Accessibility and positive affective valence of the goal state*. Manuscript submitted for publication.

Custers, R., & Aarts, H. (2005c). *Effects of goal priming on discrepancy detection*. Manuscript in preparation.

Custers, R., & Aarts, H. (2005d). Positive affect as implicit motivator: On the non-conscious operation of behavioural goals. *Journal of Personality and Social Psychology*, *89*, 129–142.

Custers, R., Aarts, H., Maas, M., & Wildenbeest, M. (2005). *Goals and dirty hankies: The influence of environmental obstacles on non-conscious motivational behaviour*. Manuscript in preparation.

Damasio, A. R. (1994). *Descartes' error: Emotion, reason, and the human brain*. New York: Putnam.

Dawes, R. M. (1998). Behavioural decision making and judgment. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (4th ed., Vol. 1, pp. 497–548). New York: McGraw-Hill.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behaviour*. New York: Plenum Press.

De Houwer, J. (2003). The extrinsic affective Simon task. *Experimental Psychology*, *50*, 77–85.

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: Penguin.

Dewey, J. (1897). The psychology of effort. *Psychological Review*, *6*, 43–56.

Dickinson, A., & Balleine, B. (1995). Motivational control of instrumental action. *Current Directions in Psychological Science*, *4*, 162–167.

Dijksterhuis, A., & Aarts, H. (2003). On wildebeests and humans: The preferential detection of negative stimuli. *Psychological Science*, *14*, 14–18.

Dijksterhuis, A., Aarts, H., & Smith, P. K. (2005). The power of the subliminal: On subliminal persuasion and other potential applications. In R. R. Hassin, J. S. Uleman, & J. A. Bargh (Eds.), *The new unconscious* (pp. 77–106). New York: Oxford University Press.

Dijksterhuis, A., & Bargh, J. A. (2001). The perception–behaviour expressway: Automatic effects of social perception on social behaviour. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 33, pp. 1–40). New York: Academic Press.

Dijksterhuis, A., Chartrand, T. L., & Aarts, H. (in press). The relation between perception, motivation, and behaviour. In J. A. Bargh (Ed.), *Handbook of automaticity*. Philadelphia: Psychology Press.

Dijksterhuis, A., & van Knippenberg, A. (2000). Behavioural indecision: Effects of self-focus on automatic behaviour. *Social Cognition*, *18*, 55–74.

Draine, S. C., & Greenwald, A. G. (1998). Replicable unconscious semantic priming. *Journal of Experimental Psychology: General, 127*, 286–303.

Edwards, W. (1954). The theory of decision making. *Psychological Bulletin, 51*, 380–417.

Elliot, A. J., & Covington, M. V. (2001). Approach and avoidance motivation. *Educational Psychology Review, 13*, 73–92.

Elsner, B., & Hommel, B. (2001). Effect anticipation and action control. *Journal of Experimental Psychology: Human Perception and Performance, 27*, 229–240.

Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C., & Kardes, F. R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology, 50*, 229–238.

Fein, S., & Spencer, S. J. (1997). Prejudice as self-image maintenance: Affirming the self through derogating others. *Journal of Personality and Social Psychology, 73*, 31–44.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behaviour: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Fitzsimons, G. M., & Bargh, J. A. (2003). Thinking of you: Non-conscious pursuit of interpersonal goals associated with relationship partners. *Journal of Personality and Social Psychology, 84*, 148–163.

Fourneret, P., & Jeannerod, M. (1998). Limited conscious monitoring of motor performance in normal subjects. *Neuropsychologia, 36*, 1133–1140.

Franck, N., Farrer, C., Georgieff, N., Marie Cardine, M., Dalery, J., d'Amato, T. et al. (2001). Defective recognition of one's own actions in patients with schizophrenia. *American Journal of Psychiatry, 158*, 454–459.

Frings, C., & Wentura, D. (2003). Who is watching Big Brother? – TV consumption predicted by masked affective priming. *European Journal of Social Psychology, 33*, 779–791.

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 Series B, 355*, 1771–1788.

Gallister, C. R. (1985). Motivation, intention, and emotion: Goal-directed behaviour from a cognitive-neuroethological point of view. In M. Frese & M. Sabini (Eds.), *Goal-directed behaviour: The concept of action in psychology* (pp. 48–66). Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Gollwitzer, P. M. (1990). Action phases and mind-sets. In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook of motivation and cognition* (Vol. 2, pp. 53–92). New York: Guilford Press.

Gollwitzer, P. M., & Bargh, J. A. (Eds.). (1996). *The psychology of action: Linking cognition and motivation to behaviour*. New York: Guilford Press.

Gollwitzer, P. M., & Moskowitz, G. B. (1996). Goal effects on action and cognition. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 361–399). New York: Guilford Press.

Gray, J. A. (1987). *The psychology of fear and stress* (2nd ed.). New York: Cambridge University Press.

Greenwald, A. G. (1970). Sensory feedback mechanisms in performance control: With special reference to the ideo-motor mechanism. *Psychological Review, 77*, 73–99.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology, 74*, 1464–1480.

Hassin, R. R. (2005). Non-conscious control and implicit working memory. In R. R. Hassin, J. S. Uleman, & J. A. Bargh (Eds.), *The new unconscious* (pp. 196–224). New York: Oxford University Press.

Hassin, R. R., Aarts, H., Eitam, B., & Custers, R. (2005a). *On the mechanics of automatic goal pursuit: The ACROBAT model*. Manuscript submitted for publication.

Hassin, R. R., Aarts, H., & Ferguson, M. J. (2005b). Automatic goal inferences. *Journal of Experimental Social Psychology*, *41*, 129–140.

Higgins, E. T. (1996). Knowledge activation: Accessibility, applicability, and salience. In E. T. Higgins & A. W.Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 133–168). New York: Guilford Press.

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, *52*, 1280–1300.

Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. *Advances in Experimental Social Psychology*, *30*, 1–46.

Hoebel, B. G. (1976). Brain-stimulation reward in relation to behaviour. In A. Wauquier & E. T. Rolls (Eds.), *Brain-stimulation reward* (pp. 335–372). New York: Elsevier.

Holland, R. W., Hendriks, M., & Aarts, H. (2005). Smells like clean spirit: Non-conscious effects of scent on cognition and behaviour. *Psychological Science*, *16*, 689–693.

Hull, C. L. (1943). *Principles of behaviour: An introduction to behaviour theory*: Oxford, UK: Appleton-Century.

Hyland, M. E. (1988). Motivational control theory: An integrative framework. *Journal of Personality and Social Psychology*, *55*, 642–651.

Jeannerod, M. (1997). *The cognitive neuroscience of action*. Oxford, UK: Blackwell Publishers.

Joel, D. (1999). The limbic basal-ganglia-thalamocortical circuit and goal-directed behaviour. *Behavioural and Brain Sciences*, *22*, 525–526.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, *47*, 263–291.

Kay, A. C., & Ross, L. (2003). The perceptual push: The interplay of implicit cues and explicit situational construals on behavioural intentions in the Prisoner's Dilemma. *Journal of Experimental Social Psychology*, *39*, 634–643.

Kintsch, W., Healy, A., Hegarety, M., Pennington, B., & Salthouse, T. (1999). Eight questions and some general issues. In A. Miyake & P. Shah (Eds.), *Models of working memory: Mechanisms of active maintenance and executive control* (pp. 412–441). New York: Cambridge University Press.

Koole, S. L., Smeets, K., van Knippenberg, A., & Dijksterhuis, A. (1999). The cessation of rumination through self-affirmation. *Journal of Personality and Social Psychology*, *77*, 111–125.

Krosnick, J. A., Betz, A. L., Jussim, L. J., & Lynn, A. R. (1992). Subliminal conditioning of attitudes. *Personality and Social Psychology Bulletin*, *18*, 152–162.

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). New York: Academic Press.

Lambert, W. W., Solomon, R. L., & Watson, P. D. (1949). Reinforcement and extinction as factors in size estimation. *Journal of Experimental Psychology*, *39*, 637–641.

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1990). Emotion, attention, and the startle reflex. *Psychological Review*, *97*, 377–395.

LeDoux, J. (1996). *The emotional brain*. New York: Simon & Schuster.

Lewin, K. (1935). *A dynamic theory of personality*. New York: McGraw-Hill.

Libet, B. (1985). Unconscious cerebral initiative and the role of conscious will in voluntary action. *Behavioural and Brain Sciences*, *8*, 529–566.

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist*, *57*, 705–717.

Long, D. L., & Golding, J. M. (1993). Superordinate goal inferences: Are they automatically generated during comprehension? *Discourse Processes*, *16*, 55–73.

Macrae, C. N., & Johnston, L. (1998). Help, I need somebody: Automatic action and inaction. *Social Cognition*, *16*, 400–417.

Martin, L. L., & Tesser, A. (Eds.). (1996). *Striving and feeling: Interactions among goals, affect, and self-regulation*: Mahwah, NJ: Lawrence Erlbaum Associates Inc.

McDaniel, M. A., Robinson-Riegler, B., & Einstein, G. O. (1998). Prospective remembering: Perceptually driven or conceptually driven processes? *Memory & Cognition*, *26*, 121–134.

McDougall, W. (1931). *An introduction to social psychology*. New York: Methuen.

McFarland, K., & Kalivas, P. W. (2003). Motivational systems. In M. Gallagher & R. J. Nelson (Eds.), *Handbook of psychology: Biological psychology* (Vol. 3, pp. 379–403). New York: John Wiley & Sons.

McKoon, G., & Ratcliff, R. (1986). Inferences about predictable events. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *12*, 82–91.

Miller, G. A., Galanter, E., & Pribram, K. H. (1960). *Plans and the structure of behaviour*. London: Holt, Rinehart & Winston.

Miller, N. E. (1951). Comments on theoretical models illustrated by the development of a theory of conflict behaviour. *Journal of Personality*, *20*, 82–100.

Mischel, W. (1973). Toward a cognitive social learning reconceptualization of personality. *Psychological Review*, *80*, 252–283.

Moskowitz, G. B., Gollwitzer, P. M., Wasel, W., & Schaal, B. (1999). Preconscious control of stereotype activation through chronic egalitarian goals. *Journal of Personality and Social Psychology*, *77*, 167–184.

Moskowitz, G. B., Saloman, A. R., & Taylor, C. M. (1999). Preconsciously controlling stereotyping: Implicitly activated egalitarian goals prevent the activation of stereotypes. *Social Cognition*, *18*, 151–177.

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.

Nørretranders, T. (1991). *The user illusion: Cutting consciousness down to size*. New York: Penguin.

Olds, J., & Milner, P. (1954). Positive reinforcement produced by electrical stimulation of septal area and other regions of rat brain. *Journal of Comparative and Physiological Psychology*, *47*, 419–427.

Olds, J., & Milner, P. (1956). Pleasure centers in the brain. *Scientific American*, *195*, 105–116.

O'Reilly, R. C., Braver, T. S., & Cohen, J. D. (1999). A biologically-based computational model of working memory. In A. Miyake & P. Shah (Eds.), *Models of working memory: Mechanisms of active maintenance and executive control*. New York: Cambridge University Press.

Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behaviour predicts future behaviour. *Psychological Bulletin*, *124*, 54–74.

Payne, J. W., Bettman, J. R., & Johnson, E. J. (1993). *The adaptive decision maker*. New York: Cambridge University Press.

Peak, H. (1955). Attitude and motivation. In M. R. Jones (Ed.), *Nebraska symposium on motivation: 1955* (pp. 149–189). Lincoln, NE: University of Nebraska Press.

Pervin, L. A. (Ed.). (1989). *Goal concepts in personality and social psychology*. Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Powers, W. T. (1973). *Behaviour: The control of perception*. New York: Aldine de Gruyter.

Prinz, W. (1997). Perception and action planning. *European Journal of Cognitive Psychology*, *9*, 129–154.

Ryle, G. (1949). *The concept of mind*. Oxford, UK: Barnes & Noble.

Salamone, J. D., & Correa, M. (2002). Motivational views of reinforcement: Implications for understanding the behavioural functions of nucleus accumbens dopamine. *Behavioural Brain Research*, *137*, 3–25.

Savage, L. J. (1954). *The foundations of statistics*. Oxford, UK: John Wiley & Sons.

Schank, R. C., & Abelson, R. P. (1977). *Scripts, plans, goals and understanding: An inquiry into human knowledge structures*. Hove, UK: Lawrence Erlbaum Associates Ltd.

Schultz, W. (1998). Predictive reward signal of dopamine neurons. *Journal of Neurophysiology*, *80*, 1–27.

Sem-Jacobsen, C. W. (1976). Electrical stimulation and self-stimulation with chronic implanted electrodes: Interpretation and pitfalls of results. In A. Wauquier & E. T. Rolls (Eds.), *Brain-stimulation reward* (pp. 505–520). New York: Elsevier.

Shah, J., & Gardner, W. L. (Eds.). (in press). *Handbook of motivation science*. New York: Guilford Press.

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, P., & Miyake, A. (1999). Models of working memory: An introduction. In A. Miyake & P. Shah (Eds.), *Models of working memory: Mechanisms of active maintenance and executive control* (pp. 1–27). New York: Cambridge University Press.

Sheeran, P., Aarts, H., Custers, R., Rivis, A., Webb, T. L., & Cooke, R. (2005). The goal-dependent automaticity of drinking habits. *British Journal of Social Psychology*, *44*, 47–63.

Shizgal, P. (1997). Neural basis of utility estimation. *Current Opinion in Neurobiology*, *7*, 198–208.

Skinner, B. F. (1953). *Science and human behaviour*. Oxford, UK: Macmillan.

Spies, G. (1965). Food versus intracranial self-stimulation reinforcement in food-deprived rats. *Journal of Comparative and Physiological Psychology*, *60*, 153–157.

Stapel, D. A., & Koomen, W. (1997). Using primed exemplars during impression formation: Interpretation or comparison? *European Journal of Social Psychology*, *27*, 357–367.

Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behaviour. *Personality and Social Psychology Review*, *8*, 220–247.

Tesser, A., Martin, L. L., & Cornell, D. P. (1996). On the substitutability of self-protective mechanisms. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behaviour* (pp. 48–68). New York: Guilford Press.

Toates, F. (1986). *Motivational systems*. Cambridge, UK: Cambridge University Press.

Tolman, E. C. (1932). *Purposive behaviour in animals and man*. New York: Appleton.

Uleman, J. S. (1999). Spontaneous versus intentional inferences in impression formation. In Y. Trope & S. Chaiken (Eds.), *Dual process theories in social psychology* (pp. 141–160). New York: Guilford Press.

Uleman, J. S., Hon, A., Roman, R. J., & Moskowitz, G. B. (1996). On-line evidence for spontaneous trait inferences at encoding. *Personality and Social Psychology Bulletin*, *22*, 377–394.

Vallacher, R. R., & Wegner, D. M. (1985). *A theory of action identification*. Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Veltkamp, M., Aarts, H., & Custers, R. (2005). *Perception of height as a measure of incentive value*. Manuscript in preparation.

Von Neumann, J., & Morgenstern, O. (1947). *Theory of games and economic behaviour*. Princeton, NJ: Princeton University Press.

Vroom, V. H. (1964) *Work and motivation*. Oxford, UK: Wiley.

Watson, D., & Clark, L. A. (1992). Affects separable and inseparable: On the hierarchical arrangement of the negative affects. *Journal of Personality and Social Psychology*, *62*, 489–505.

Watson, J. B. (1925). *Behaviourism*. New York: Norton & Company.

Wegner, D. M. (2002). *The Illustration of conscious will*. Cambridge, MA: MIT Press.

Wegner, D. M., & Bargh, J. A. (1998). Control and automaticity in social life. In D. T. Gilbert & S. T. Fiske (Eds.), *The handbook of social psychology* (4th ed., Vol. 2, pp. 446–496). Boston, MA: McGraw-Hill.

Wegner, D. M., & Smart, L. (1997). Deep cognitive activation: A new approach to the unconscious. *Journal of Consulting and Clinical Psychology*, *65*, 984–995.

Wheeler, S. C., & Petty, R. E. (2001). The effects of stereotype activation on behaviour: A review of possible mechanisms. *Psychological Bulletin*, *127*, 797–826.

Wicker, F. W., Wiehe, J. A., Hagen, A. S., & Brown, G. (1994). From wishing to intending: Differences in salience of positive versus negative consequences. *Journal of Personality*, *62*, 347–368.

Wiener, N. (1948). *Cybernetics: Or control and communication in the animal and the machine*. Cambridge, MA: MIT Press.

Williams, D. R., & Williams, H. (1969). Auto-maintenance in the pigeon: Sustained pecking despite contingent non-reinforcement. *Journal of the Experimental Analysis of Behaviour*, *12*, 511–520.

Wilson, T. D. (2002). *Strangers to ourselves: Discovering the adaptive unconscious*. Cambridge, MA: Belknap Press of Harvard University Press.

Wright, P. M., & Brehm, J. W. (1989). Energization and goal attractiveness. In L. A. Pervin (Ed.), *Goal concepts in personality and social psychology*. Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Wyer, R. S., & Srull, T. K. (1986). Human cognition in its social context. *Psychological Review*, *93*, 322–359.

Young, P. T. (1961). *Motivation and emotion*. New York: John Wiley & Sons.

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, *35*, 151–175.