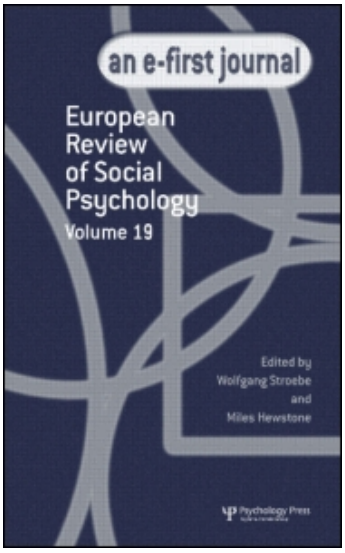


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# Unravelling the motivational yarn: A framework for understanding the instigation of implicitly motivated behaviour resulting from deprivation and positive affect

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# Unravelling the motivational yarn: A framework for understanding the instigation of implicitly motivated behaviour resulting from deprivation and positive affect

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Research suggests that the motivation to perform specific behaviours can originate in the unconscious. This implicit motivation can generally be traced to two basic sources: Deprivation of essential resources and positive affect attached to the specific behaviour. Yet, whereas previous research has increased our understanding of the emergence of implicit motivation, there is little theoretical analysis and empirical research that addresses how these sources interact in producing motivation. This chapter presents a framework for the comprehension of implicitly motivated behaviour resulting from deprivation and positive affect. The framework consists of two essential components. First, it proposes that mental representations of behaviour direct and prepare individuals to engage in behaviour. Second, it suggests that a reward signal either emanating from deprivation or positive affect acts upon behaviour representations to produce motivated behaviour. We present several findings supporting the framework and discuss these findings in the context of non-conscious goal pursuit and needs.

***Keywords:*** Deprivation; Motivation; Non-conscious goal pursuit; Needs; Positive affect.

Human beings often perform concrete actions in the pursuit of a specific goal. The most defining feature of such goal pursuit is that it not only requires the initiation of the proper actions, but also the motivation to see it

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through. In order to get a cup of coffee, one has to mentally select and prepare the necessary behaviour (walking to the machine), but the successful performance of that behaviour also requires that the effort it takes (walking the distance to the machine, taking a detour because of construction, finding another machine that *does* work) is matched by a motivation for the behaviour. In theories and models of goal-directed behaviour it is often assumed that whether one becomes motivated to perform a behaviour depends on conscious reflections and formed intentions (e.g., self-efficacy theory, Bandura, 1986; self-determination theory, Deci & Ryan, 1985; theory of reasoned action, Fishbein & Ajzen, 1975; goal-setting theory, Locke & Latham, 1990). However, recent research has revealed that motivated behaviour can also arise outside conscious awareness. Specifically, work on non-conscious goal pursuit (for overviews, see e.g., Custers & Aarts, 2005a; Dijksterhuis, Chartrand, & Aarts, 2007) shows that when a particular behaviour is desired (i.e., a behavioural goal; Fishbach & Ferguson, 2007; Gollwitzer & Moskowitz, 1996), merely rendering the mental representation of that behaviour accessible produces motivated behaviour without people necessarily being aware of this motivation and without them consciously forming an intention.

The observation that many motivated behaviours may develop non-consciously rather than originate from conscious intentions, raises the question of what motivates people to execute these behaviours. Theories that regard the motivation to attain a specific behaviour as originating from conscious reflection especially emphasise the role of expectancy and value (e.g., Ajzen, 1985; Atkinson, 1964; Bandura, 1986; Gollwitzer, 1990; Locke & Latham, 1990). For example, people's motivation for a behaviour increases with the expectancy of being able to successfully perform it (Ajzen, 1985; Bandura, 1986). Also, value-related factors such as attitudes (how would you feel about performing a behaviour) and social norms (how would others feel about you performing a behaviour) are thought to be taken into account when people form intentions that are assumed to subsequently motivate behaviour (Fishbein & Ajzen, 1975). However, because in these theories the factors that influence people's motivation to engage in a particular behaviour have to be combined into an intention by conscious deliberation, they do not explain how behaviour is motivated in the absence of such conscious processes. In the present chapter we will therefore focus on the sources of motivation that are able to instigate motivation for a specific behaviour outside conscious awareness.

Research addressing the issue of which sources may implicitly motivate behaviour suggests that positive affect is such a motivational source. Positive value or affect was already considered to be a vital input in the process of forming intentions (e.g., Fishbein & Ajzen, 1975; Locke & Latham, 1990), but there is no compelling reason to assume that positive affect can only

motivate behaviour through such a conscious route. Indeed, recent work suggests that implicit affective processes are essential in decision making and goal pursuit (Bechara, Damasio, & Damasio, 2000; Ferguson & Bargh, 2004; Phelps, 2005; Winkielman & Berridge, 2004). Building on these insights, it has been proposed that priming can non-consciously motivate behaviour due to the positive affect that is mentally associated with behaviour representations (Aarts, Custers, & Veltkamp, 2008b; Custers & Aarts, 2005a), with affect being conceptualised as the valence assigned to an entity (Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Zajonc, 1980) and not a feeling state or emotion that people experience (Isen & Diamond, 1989; Russell, 2003). For example, various positive experiences with partying may create an association between partying and positive affect. Consequently, rendering the behaviour representation of partying accessible could result in a motivation to party outside conscious awareness, because the positive affect associated with the behaviour (partying) signals that it is something that is desired.

Another source that has been shown to be a strong motivator, and that may be able to motivate behaviour without the need for conscious interventions, is deprivation of resources that are needed by people. Deprivation of crucial resources (e.g., fluid, food, or social contact) has long been considered an important motivator (e.g., Maslow, 1943; McDougall, 1908; Murray, 1938) and explains why the motivation for many behaviours fluctuates over time (e.g., one may be motivated to sleep when tired, but not after waking up), which is something that would not be expected from rather stable associations of behaviour representations with positive affect. Supporting the proposition that deprivation can motivate behaviour non-consciously, recent studies have shown that the effects of subliminal priming on motivation are conditional on the level of deprivation (e.g., Bermeitinger et al., 2009; Karremans, Stroebe, & Claus, 2006; Strahan, Spencer, & Zanna, 2002; Veltkamp, Aarts, & Custers, 2008a).

Although the observation that positive affect and deprivation can motivate behaviour may sound obvious, little work has systematically analysed how these sources can exactly result in implicit motivation. Also, it seems to be a complicated enterprise to grasp how the two sources of motivation are related and how they interact in motivating behaviour. Previous work on this matter mainly has examined both sources separately. Accordingly, the question of how these two sources interact in motivating concrete behaviour has hitherto received only little theoretical analysis and empirical attention.

The present chapter aims to fill this gap by presenting a framework that helps to comprehend and examine non-conscious motivation of human behaviour (see Figure 1). This framework consists of two essential components. First, it proposes that mental representations of behaviour

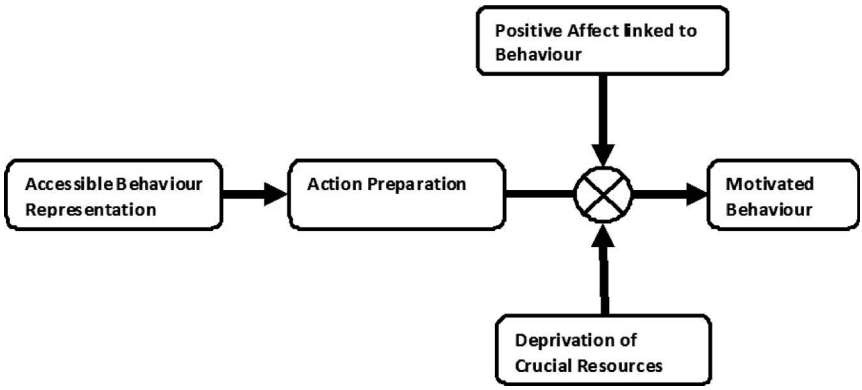


**Figure 1**. A framework of implicitly motivated behaviour. An accessible behaviour representation prepares action and results in overt motivated behaviour depending on deprivation or positive affect attached to the behaviour representation.



direct and prepare behaviour. However, whether the mental preparation of the behaviour results in overt motivational behaviour (i.e., results in allocating resources and spending effort to perform the behaviour) is thought to depend on motivational factors. That is, the framework suggests that deprivation of crucial resources and positive affect interact with the accessibility of these representations to bring about the actual motivation to engage in the behaviour. In particular, the framework puts forward that motivated behaviour requires the mental representation of that behaviour to be accessible, and that the rewarding value of the behaviour is modulated by either positive affect attached to the behaviour representation or deprivation. This way, people may become motivated to engage in a specific behaviour without being aware of the actual motivational sources behind that behaviour.

To present and substantiate this framework in more detail we will discuss various findings—mainly presenting work from our own lab. We will elaborate on the role of mental representations in motivated behaviour and then turn to the role of deprivation to find out how deprivation may affect the motivational properties of these representations. Furthermore, whereas the role of positive affect as an implicit motivator of behaviour has been discussed in an earlier review (Custers & Aarts, 2005a), we will also provide an update of the research that has been conducted in the last 5 years on this issue for the sake of completeness and understanding. Finally, we will examine how deprivation and positive affect associated with a behaviour representation may work together to motivate behaviour, and discuss implications of this framework for the literature on motivation.

Before we move on, however, we want to be clear about how we conceptualise motivation. In line with other research that uses a process approach to study the intensity and persistence of behaviour (cf. Brehm & Self, 1989; Geen, 1995; Young, 1961), we consider motivation as the amount of energy a person mobilises to invest effort in the pursuit of a behaviour. Motivated behaviour can be discerned from non-motivated behaviour in a number of ways. For instance: it is more persistent over time, the pursuit of the behaviour continues in the face of obstacles, and the behaviour is preferred over attractive alternatives (Bargh, Gollwitzer, Lee Chai, Barndollar, & Trotschel, 2001). Motivation can be absent or range from low to high (i.e., the *motivational strength* can differ). It is important to note that for the present purposes we are mainly interested in sources that non-consciously *create* motivation (i.e., from absence to presence) and will therefore not discuss factors that may increase or decrease the motivational strength for behaviour that is already motivated (e.g., expectancies, regulatory fit; Higgins, 2000; Oettingen, 2000) or that may increase the likelihood that the motivated behaviour will actually be performed (e.g., implementation intentions; Gollwitzer, 1993).



## THE ROLE OF BEHAVIOUR REPRESENTATIONS IN MOTIVATED BEHAVIOUR

To understand how people become motivated to perform specific behaviours without awareness of the origin of this motivation, it is important to first discuss how people can perform behaviours without conscious intent at all. Answers to this question date back to the nineteenth century, when the principle of ideomotor action was proposed. This principle holds that behaviours are mentally represented and that activating a "... [mental] representation of a movement awakens in some degree the actual movement which is its object" (James, 1890, p. 526; cf. Carpenter, 1874). Supporting this view, modern scientific accounts regard behaviour representations that are available in our repertoire as embedded in a connective network that encompasses perception, cognition, but also action (Prinz & Barsalou, 2000). Thus, perceiving words referring to a behaviour (such as painting) are expected to activate the semantic knowledge about that action, but also representations of objects or tools associated with the behaviour (e.g., Marsh, Hicks, & Bink, 1998; Tucker & Ellis, 1998), and of the movements required to perform the behaviour. Because activating behaviour representations also activates the corresponding motor programs in the pre-motor cortex (Glenberg & Kaschak, 2002; Pulvermüller, 2005; Zwaan & Taylor, 2006), subliminally priming a behaviour representation will automatically prepare this behaviour and increase the likelihood of its execution (e.g., Chartrand & Bargh, 1999; Greenwald, 1970; Prinz, 1997).

Although activating behaviour representations prepares the execution of those behaviours outside conscious awareness, an additional signal may be necessary to instigate actual motivation to perform the behaviour. That is, previous work on non-conscious goal pursuit suggests that for an activated behaviour representation to result in motivated behaviour, the behaviour has to be mentally represented as a desirable state (i.e., a goal; Fishbach & Ferguson, 2007; Gollwitzer & Moskowitz, 1996). Thus, activating a behaviour representation is thought to prepare the execution of the behaviour, but to only motivate behaviour if the behaviour is desirable (i.e., has motivational value to the organism, cf. Higgins, 2006).

In a recent attempt to experimentally differentiate between action preparation and motivation, Aarts, Custers, and Marien (2008a) compared the effects of priming the behaviour representation of exertion with those of attaching this representation subliminally to positively valenced stimuli. Specifically, the representation of exertion was primed by subliminally presented words such as *exert* or *vigorous*. Shortly (100 ms) after this prime either neutral (priming condition) or positive information (words such as *pleasant*; positive affect condition) appeared, consciously visible to participants. If positive affective information directly follows the primes that activate the behaviour representation, it is thought to be linked to this representation and to act as a reward signal indicating that performing the behaviour is desirable. In a control condition, the representation of exertion was not primed. Participants then allegedly had to test a new research instrument. They squeezed a handgrip after the word *squeeze* appeared on the computer screen and the force with which they squeezed was measured. In line with expectations, results showed that mere priming causes participants to (covertly) prepare the execution of the behaviour. That is, there was a faster development of force compared to the control condition. However, this force rapidly decreased again over time, indicating that the behaviour was not motivated (see Figure 2). Attaching positive affect to the representation of exertion, however, not only led to preparation, but also to motivation of the behaviour. This was demonstrated by an increased physical *persistence* in executing the behaviour (see Figure 2). Together, these results demonstrated that a behaviour representation has to be represented as rewarding to cause motivated behaviour.

By now, research has revealed several ways in which representations of behaviours that are already represented as desired can become activated and induce motivation without conscious intervention. The first and most commonly used way is through exposure to words that are semantically related to the representation itself (e.g., words such as ''win'', ''strive'', and ''achieve'' prime the representation of ''achievement'', see Bargh et al.,

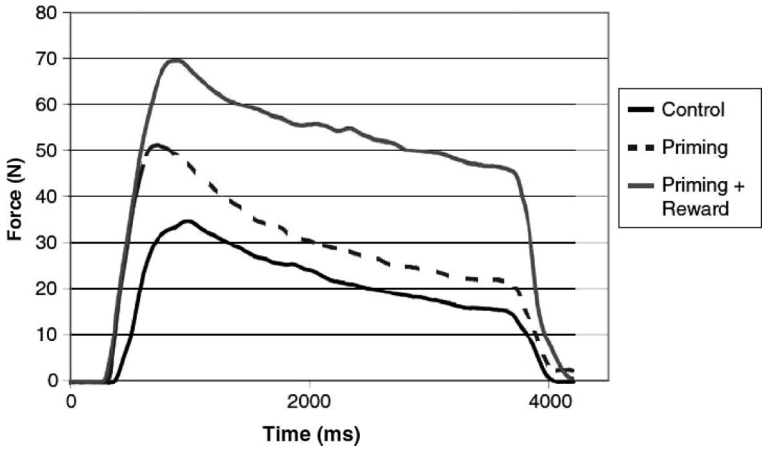


**Figure 2**. Development of force on the handgrip as a function of the experimental manipulations (adapted from Aarts et al., 2008b).



2001). However, recently it has been shown that goal representations can also be primed if one observes another person perform a specific behaviour that implies a given goal (e.g., Aarts, Gollwitzer, & Hassin, 2004; Dik & Aarts, 2007; Hassin, Aarts, & Ferguson, 2005; Loersch, Aarts, Payne, & Jefferis, 2008). Furthermore, thinking about a significant other (e.g., Fitzsimons & Bargh, 2003; Shah, 2003), smelling a particular scent (e.g., scent of cleaning fluid; Holland, Hendriks, & Aarts, 2005; Holland, Veling, & Aarts, 2008), and perceiving a member of a stereotyped group (e.g., nurses; see Aarts et al., 2005) that is associated with a specific goal (e.g., helping) are capable of priming a goal in the person's mind. Thus, in daily life there are many internal and external triggers (such as one's thoughts, or a movie on television) that can activate mental representations of behavioural goals and hence increase the motivation for that behaviour without conscious intervention.

Apart from examining the environmental cues that prime desirable behaviour representations and potentially induce non-conscious motivated behaviour, it is also important to understand how the enhanced accessibility of these representations acts on our mental and behavioural system in the absence of conscious awareness. The answer may already have been indicated by Kurt Lewin about 70 years ago: he stated that "a strongly accented goal so transforms the situation that practically all objects acquire a reference to this goal" (Lewin, 1935, p. 102). Indeed, the motivation to perform a behaviour seems to tune the mental system towards engaging in that behaviour. Research showed that (subliminal) priming of desirable

behaviour representations (e.g., earning money) biases attention to objects (e.g., a wallet or coin) associated with the behaviour (e.g., Aarts, Dijksterhuis, & de Vries, 2001; Ferguson & Bargh, 2004), increases the likelihood that objects and tasks are seen as instrumental in attaining the opportunity to engage the behaviour (e.g., Balcetis & Dunning, 2006; Kay & Ross, 2003), and modulates conscious experiences of being motivated to perform it (e.g., Custers & Aarts, 2005b; Fitzsimons & Bargh, 2003; Veltkamp et al., 2008a). Thus, the motivation to perform a specific behaviour seems to bring the mental system in a state of readiness for goal pursuit, which facilitates goal attainment.

Whereas priming the representation of a behavioural goal has been shown to tune higher cognitive processes in the service of performing goal-directed behaviour, such priming effects may even occur on a more fundamental level. Specifically, a person's motivation to engage in a behaviour or to attain a goal has been proposed to affect basic perceptual processes. Perception has been conceptualised as a tool in the service of action. Therefore objects instrumental in performing an action are expected to be spontaneously perceived as being bigger (Bruner, 1957). Accordingly, several studies have provided evidence for this functional size perception account by showing that the perceived size of objects (e.g., coins) is positively related to their value (for an overview, see e.g., Bruner & Postman, 1949). Although intriguing and groundbreaking, the early studies reporting these findings were heavily criticised because of poor methodology and potential confounds between objective value and size (Eiser & Stroebe, 1972; Tajfel, 1957, 1959). However, recent neuroscientific findings do suggest that top-down processes that operate in the service of motivation affect perception in early visual processing areas (e.g., Bundesen, Habekost, & Kyllingsbaek, 2005; Desimone & Duncan, 1995; Serences & Yantis, 2006). This indicates that motivational states can modulate basic perceptual processes that are assumed to be outside the reach of conscious control.

In sum, representations of behaviour are crucial in preparing and motivating behaviour. Such representations can be triggered by a variety of cues. Once activated, these representations are capable of modulating low-level perception processes as well as higher cognitive processes that facilitate the performance of the behaviour and the attainment of goals. An important question emanating from this line of thought is how the human mental system is able to determine when a behaviour is desirable to attain and when not, in the absence of conscious awareness (see e.g., Aarts et al., 2008b; Bargh, 2006; Custers & Aarts, 2005a). It is proposed here that when a mental representation of a behaviour is activated, deprivation and positive affect motivate the execution of the respective behaviour by providing a reward signal that indicates that engaging in the behaviour is desirable.

## FROM DEPRIVATION OF CRUCIAL RESOURCES TO MOTIVATED BEHAVIOUR

Deprivation of crucial resources is often considered an important motivational source for behaviour (e.g., Fiske, 2004; Mook, 1996; Murray, 1938; Pittman & Zeigler, 2007). Deprivation is an especially powerful motivator because some resources are essential to the well-being and optimal functioning of the organism. Failure to replenish deprived resources like fluid or food may eventually result in illness or even death. Indeed, conditions of extreme deprivation have been found to result in obsessive thoughts and fantasising about the lacking resources (e.g., Read, 1996; Wolf, 1958). Furthermore, deprivation may be a good candidate to motivate behaviour outside awareness, as it is a biologically based source of motivation, present in both humans and other animals. An important question, however, is how deprivation increases the motivation for behaviours that reduce deprivation.

By far the most influential theory that explains how deprivation results in motivated behaviour is that of homeostasis. Homeostasis refers to the process by which organisms keep the amount of essential resources at a fixed level under changing conditions (Cannon, 1932; see also Cooper, 2008). In order to maintain a fixed amount of resources, deprivation produces a compensatory increase in motivation for behaviours functional in replenishing the resources in question, which eventually restores the balance. Although the concept of homeostasis was originally used to explain how bodily states of deprivation (food, fluid, oxygen) affect behaviour, it was adopted in theorising on psychological needs (Murray, 1938). In recent definitions of needs, the idea that motivated behaviour is caused by a state of deprivation is still a central assumption (e.g., Baumeister & Leary, 1995; Deci & Ryan, 2000; Fiske, 2004), but especially in psychology needs have also been defined and operationalised differently. For example, the concepts of goals (Grouzet et al., 2005; Maslow, 1970), wants (Pittman & Zeigler, 2007), and desires (Maslow, 1970; Murray, 1938; Reiss, 2004) have all been used as synonyms for needs, although none of those concepts is directly related to deprivation. Furthermore, to test whether people have certain needs, researchers do not often measure the state of deprivation but instead ask individuals how much they need a resource (e.g., Aarts et al., 2004), how important certain events are for them (e.g., Reiss & Havercamp, 1998) or how satisfying it is to perform certain actions (e.g., Sheldon, Elliot, Kim, & Kasser, 2001). These inconsistencies make it rather unclear whether the concept of needs refers to resources regulated through homeostasis or something else altogether.

There seems to be consensus that the need to belong, referring to people's need for non-aversive interactions within already existing interpersonal

relations, motivates behaviour according to the homeostatic principle (see e.g., Baumeister & Leary, 1995; Fiske, 2004; cf. the work on social contact and deprivation in the context of attachment, Bowlby, 1980; Harlow, 1958). That is, a deprivation of such interactions will increase people's motivation for such interactions. However, there is disagreement about other social needs. For many social needs (e.g., need for achievement, autonomy, closure, cognition, competence, control, and self-enhancement) it is unclear whether they motivate behaviour through deprivation or not. Such needs are supposed to differ in strength between individuals, in that some people do and others do not have a specific need (or have it to a lesser degree; see e.g., Pittman & Zeigler, 2007; Sheldon et al., 2001). For such needs, then, it is both tenable to propose that they depend on deprivation as well as that they depend on positive affect: deprivation may motivate behaviour for such needs depending on how important or desirable a resource is to an individual (McClelland, 1951; Reiss, 2004), or individual differences in needs such as a need for achievement may reflect differences in how desirable or positive the act of achieving is for an individual (see e.g., Senko, Durik, & Harackiewicz, 2008; Thompson & Schlehofer, 2008). However, as our present purpose is to understand how deprivation results in motivation, especially in a non-conscious fashion, we will confine our analysis to resources for which it is clear that they are crucial for one's well-being (such as fluid, food, or social contact).

Whereas the concept of needs is rather unclear and ambiguous in a host of research programmes, studies that conceptualised needs as deprivation of crucial resources (in line with the homeostatic principle) have been quite informative about the effects of deprivation on motivation. Specifically, by now, several studies have shown that increases in, for example, fluid or food deprivation result in increased attention for objects that are instrumental in reducing deprivation (e.g., Jones, Bruce, Livingstone, & Reed, 2006; Mogg, Bradley, Hyare, & Lee, 1998), approach reactions towards instrumental objects (e.g., Raynor & Epstein, 2003; Seibt, Häfner, & Deutsch, 2007), and increased consumption of resources such as food or fluid (see e.g., Fitzsimons, 1972; Le Magnen, 1985).

The research on homeostatic behaviour regulation referred to above suggests that deprivation directly leads to motivated behaviour. However, although a direct link between deprivation and behaviour may fit well with the behaviourists' approach towards stimulus–response habits (e.g., Watson, 1925), such a homeostatic model may be too rigid and simplistic to explain all circumstances that can induce deprivation-motivated behaviours in both animals and humans (e.g., Berridge, 2004; Pinel, Assanand, & Lehman, 2000). Rather, motivated behaviour seems to be based on the acquisition of knowledge about a link between a deprivation-reducing behaviour (e.g., drinking) and deprivation (e.g., of fluid).

Importantly, assuming that such knowledge usually derives from learning processes under conditions of deprivation, this suggests that deprivation motivates behaviour via the mental representations of that behaviour.

The central role of learning processes in the link between deprivation and motivated behaviour has a well-established theoretical and empirical tradition in psychological science. Early psychological theories suggested that an organism has to learn through reinforcement that certain responses are functional in reducing deprivation while other responses are not (e.g., Hull, 1931). For instance, animal research showed that when infant rats are only allowed to reduce fluid deprivation by means of eating lettuce (and hence never *drink* to reduce deprivation) this results in distorted drinking behaviour when given access to water later in life (Milgram, 1979; Milgram, Krames, & Thompson, 1974). Such findings support the idea that the link between fluid deprivation and the basic act of drinking as a deprivation-reducing behaviour has to be learnt.

According to incentive theory (Bindra, 1974; Bolles, 1972; Toates, 1986), animals as well as humans do not merely learn to associate deprivation (e.g., of fluid) with a particular behaviour (e.g., drinking), but rather that performing a specific behaviour is rewarding given that there is a state of deprivation. Thus, one may originally learn through trial-and-error that drinking water, for example, is only rewarding when one is deprived of fluids. Through reinforcement, then, the link between the rewarding properties of the specific behaviour under conditions of deprivation will eventually be stored in memory. In other words, what incentive theory suggests is that deprivation increases the motivation for deprivation-reducing behaviours by modulating the rewarding properties of the mental representations of these behaviours, which signal that the behaviour is worth pursuing. Supporting this idea, research has shown that the reward value of objects instrumental in reducing deprivation increases with increasing deprivation (e.g., Cabanac, 1979; Ferguson & Bargh, 2004; Seibt et al., 2007) and diminishes again when deprivation decreases (Berridge, 2004; Cabanac, 1979; Gottfried, O'Doherty, & Dolan, 2003).

The notion that deprivation acts on, and modulates, the rewarding value of the representation of a deprivation-reducing behaviour suggests that this representation has to be mentally accessible to influence overt motivated behaviour. However, there is actually little empirical work testing this idea. In fact, most studies on deprivation seem to support a direct link between deprivation and motivated behaviour (e.g., Drobes et al., 2001; McClelland & Atkinson, 1948; Mogg et al., 1998; Raynor & Epstein, 2003). It is important to note, however, that in studies suggesting a direct link participants are consciously aware of their state of deprivation, either because they are instructed to abstain from for example eating or drinking (e.g., Drobes et al., 2001; McClelland & Atkinson, 1948), or because they are

asked questions about deprivation (e.g., Drobes & Tiffany, 1997; Raynor & Epstein, 2003). Thus, the behaviour of interest is rendered accessible to all participants, which confounds deprivation with accessibility of the representation of related deprivation-reducing behaviours.

In one of the few studies in which deprivation and accessibility were manipulated orthogonally, Strahan and colleagues (2002) obtained an interaction effect between subliminal priming of the representation of drinking and fluid deprivation on the amount of drinking: Deprived participants drank more during a taste test when primed with the concept of drinking, whereas non-deprived participants were not influenced by the primes. These priming effects emerged even though the representation of the behaviour was already rendered accessible by explicitly asking participants several times about their state of deprivation before the dependent variable was assessed. Whereas conscious and non-conscious priming effects in motivated behaviour have been demonstrated to occur independently (e.g., Bargh et al., 2001), participants' opportunity to explicitly reflect on their state of fluid deprivation before assessing drinking behaviour provides a challenge as to the meaning of the subliminal priming effects. In another recent study (Aarts et al., 2004), the interaction between deprivation (of income) and accessibility of a behaviour representation (earning money) was investigated without making any reference to the behaviour or the state of deprivation before the assessment of the dependent variable. Although the results of this study showed a similar interaction between deprivation and priming to the Strahan et al. (2002) study, deprivation was operationalised as the extent to which participants felt that they needed money, which could also be tapping into how positive they perceived the act of gaining money to be. Therefore, the findings may either represent an instance of deprivation-motivated behaviour or of positive affect-motivated behaviour.

To test the effects of accessibility of behaviour representations on the relation between deprivation and motivation, we (Veltkamp, Aarts, & Custers; 2008a, 2008b) therefore focused on a resource that is obviously regulated through deprivation: fluid. Furthermore, we made sure that the mental representation of drinking was not activated by anything other than a priming procedure in which the level of accessibility was unobtrusively manipulated. In one study (Veltkamp et al., 2008a, Study 2), students participated either before or after lunchtime. Pilot work had shown that people usually drink during lunch and are almost twice as deprived of fluids before than after their lunch (cf. Hulshof et al., 2004). Thus, by testing only before or after lunch we were able to test participants under different levels of fluid deprivation, without participants being aware of this. In the first stage of the experiment participants engaged in a priming task where the concept of drinking was rendered accessible for half of the participants by subliminally priming the words *thirst* and *drinking* (each word 20 times).

Finally, participants engaged in a taste test where they had to taste and evaluate soda, and their consumption (in grams) was measured as a dependent variable. It was found that relatively highly deprived individuals (participation before lunch) consumed more soda, but only if the mental representation of drinking had been primed before (see Figure 3).

We also examined the interplay of deprivation and accessibility on basic perception (Veltkamp et al., 2008b, Study 1). As mentioned earlier, there is suggestive, but not conclusive evidence that the motivation for a specific behaviour can spontaneously increase the perceived size of objects that are instrumental in performing the behaviour (e.g., Bruner & Goodman, 1947; Bundesen et al., 2005). Thus, by taking the functional size perception idea into the lab, we tested whether fluid deprivation and behaviour accessibility affected the perceived size of a glass of water. In this experiment participants first engaged in a task where the representation of drinking was subliminally primed. Subsequently they performed a size estimation task, where they had to estimate the size of a glass of water as it was presented on the computer screen. Finally, participants indicated their level of deprivation by indicating how long ago they last consumed fluids ($M = 2.1$ hours). To prevent the representation of drinking from becoming accessible by anything other than the priming procedure, participants indicated their deprivation level at the end of the experiment and no reference to the objects was made until they appeared on the screen and their size had to be estimated. Results showed that the glass was only perceived to be bigger for participants who were relatively deprived and for whom the representation of drinking was mentally accessible (see Figure 4), indicating that those participants were



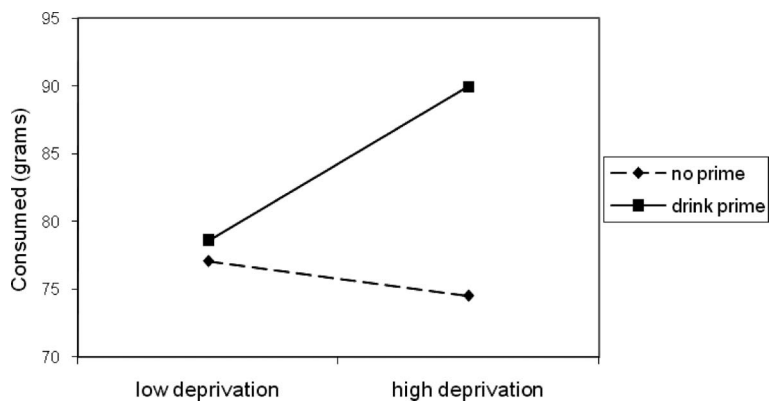


**Figure 3**. Quantity of drinking (in grams) as a function of deprivation and accessibility (adapted from Veltkamp et al., 2008a, Study 2).

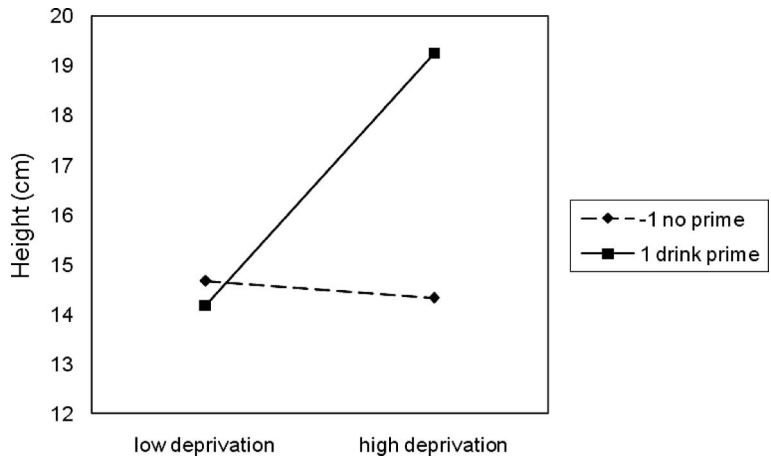


**Figure 4**. Perceived size of glass as a function of deprivation and accessibility (adapted from Veltkamp et al., 2008b, Study 1).

motivated to reduce their deprivation and ready to do so on a basic perceptual level.

Together these studies show that, when deprived (of, e.g., fluid or food), one will not become motivated to drink or eat until the representation of the drinking or eating behaviour itself has been primed by cues that have become associated with those behaviours (e.g., perceiving a McDonalds sign, a clock indicating lunchtime, or thinking about that plate you broke could all activate the mental representation of eating). Note, however, that the studies discussed above mainly focus on mild rather than severe deprivation. Under conditions of severe deprivation, bodily sensations themselves may activate the corresponding behaviour representation. Specifically, one may start to consciously experience a dry mouth when fluid-deprived and an empty stomach when food-deprived (Mook, 1996; Rolls et al., 1980), which renders the relevant behaviour representations accessible and thus motivates behaviour in the absence of further primes.

To recapitulate, deprivation motivates deprivation-reducing behaviour by modulating the rewarding properties of the mental representation of that behaviour. Specifically, people learn throughout life that specific behaviours are rewarding to perform given a state of deprivation. As a result, being in a deprived state will eventually automatically alter the rewarding properties of behaviours and objects that are instrumental in reducing the deprivation (e.g., Berridge, 2001; Cabanac, 1979; Ferguson & Bargh, 2004; Seibt et al., 2007). However, the actual emergence of deprivation-motivated behaviour requires the mental representation of the behaviour to be mentally accessible, whether we are aware of it or not (Veltkamp et al., 2008a, 2008b).

## MOTIVATED BEHAVIOUR IN THE ABSENCE OF DEPRIVATION: THE CASE OF POSITIVE AFFECT

So far, we have examined the role of deprivation in motivating people to engage in behaviours to reduce the deprivation. However, there are also behaviours in an individual's repertoire that are perceived to be positive and, as such, can motivate the person to engage in them. For example, one may go for a stroll for no other reason than for the joy of it, or one may want to drink a soda because one simply likes it. In such cases the motivation to engage in a specific behaviour does not seem to be contingent on a state of deprivation, but instead is driven by the fact that the behaviour is positive in itself. Thus, apart from deprivation, positive affect can be considered another source of motivation. This affective-motivational signal can take different forms and arise from many events. For example, one may anticipate the enjoyment of going out with friends; develop a rapid appetite for a Sushi-King meal when one learns that this meal is ordered by a good friend; or become more eager to earn some additional cash when one observes someone else smiling upon making money by operating a slot machine. More generally, the motivation to engage in specific behaviours (e.g., socialising, eating sushi, earning money) can increase as a result of a link between the representation of the behaviour and positive affect.

The idea that positive affect is another important source of motivation to engage in behaviour is supported by an abundance of research in several areas. For example, in the literature on persuasion (for overviews, see e.g., Chen & Chaiken, 1999; Petty, Wegener, & Fabrigar, 1997) it has been shown that creating more positive attitudes towards specific behaviours can increase the motivation (or intention) for these behaviours (e.g., showing celebrities driving environmentally friendly cars may increase the willingness to buy such cars). The operation of such an attitude–behaviour link can occur quite spontaneously (e.g., Wilson, Lindsay, & Schooler, 2000), and can take place even in the absence of deprivation (e.g., Shimp, Stuart, & Engle, 1991). In a related vein, research on operant conditioning showed that the motivation to engage in behaviour can increase if that behaviour has been followed by positive feedback in the past (e.g., a child consistently praised when riding a bike may become more motivated to go cycling; see e.g., Krosnick, Betz, Jussim, Lynn, & Stephens, 1992; Kuykendall & Keating, 1990). Furthermore, in the literature on self-determination it is explicitly stated that when all human needs are met, people will still be motivated to perform certain behaviours because they derive intrinsic motivation from performing these actions (Deci & Ryan, 1985, 2000; cf. Berlyne, 1960). Although this intrinsic motivation may be expressed in different ways (in terms of e.g., pleasure, joy, interest, curiosity, or challenge), the common theme is that the behaviour is associated with

positive affect. Findings from different research areas, then, provide strong support for the idea that the positivity of a behaviour can result in motivated behaviour that is not contingent on deprivation states.

Taking into account that people are motivated to perform a given behaviour non-consciously when they represent that behaviour in terms of a desired state or goal (e.g., Custers & Aarts, 2005a; Dijksterhuis et al., 2007), it seems that the mental system can process information about the positivity of a behaviour on an implicit level. Such implicit processing of affective information is indeed consistent with research showing that affective processes can moderate decision making and behaviour very quickly and without reaching conscious awareness (e.g., Damasio, 1994; Dijksterhuis & Aarts, 2003; LeDoux, 1996).



Building on these findings, it has recently been proposed that motivated behaviour results from associations between behaviour representations and positive affect (Aarts et al., 2008a; Custers & Aarts, 2005b). Such associations are thought to act as a reward signal that can indicate—without conscious awareness—whether a behaviour is worth engaging in and pursuing or not. An association between a behaviour representation and positive affect can arise when a person performs the behaviour in close temporal proximity to the activation of positive affective information. Furthermore, apart from directly performing the behaviour, the representation of behaviour may also be linked to positive affect by mere co-activation (e.g., when the perception of others performing the behaviour is followed by a smile). In essence, any event that activates the representation of a specific behaviour and positive affect at (nearly) the same time should lead to the development of an association between the two (e.g., Aarts et al., 2008a; Custers & Aarts, 2005b) and act as a reward signal that is not conditional on a state of deprivation.

Preliminary evidence for this ''positive affect as implicit motivator'' perspective comes from research suggesting that so-called ''pleasure-centres'' in the brain (mainly targeting the nucleus accumbens) are involved in the mechanism that turns positive affect into a motivator (see e.g., Shizgal, 1999). For example, rats performing an arbitrary behaviour such as pressing a lever that is followed by positive affect become highly motivated to perform that behaviour (as the behaviour activates the pleasure-centre; Olds & Milner, 1954). The motivational strength of a behaviour under such positive affective circumstances is demonstrated by research showing that animals run uphill and leap over hurdles (Edmonds & Gallistel, 1974) and cross electrified grids (Olds, 1958) in order to engage in the behaviour associated with positive affect. Importantly, such effects occur even in the absence of physiological deprivation states such as thirst or hunger (Shizgal, 1997). This research demonstrates that positive affect can work as a reward signal that motivates behaviour.

Recent research suggests that such reward signals can also motivate behaviour outside awareness. In a study by Pessiglione and colleagues (2007) participants engaged in a task in which they could win money on successive trials by squeezing a handgrip. The amount of money at stake (a pound versus a penny) was subliminally primed during each trial. This prime affected the force of handgrip, along with skin conductance and activation in the ventral palladium, an area known to be devoted to emotional and motivational output of the limbic system. Building on these findings, Bijleveld, Custers, and Aarts (in press) recently tested the effects of subliminal reward cues on pupil dilation, which has been shown to be an accurate measure of resource investment and effort mobilisation (Ahern & Beatty, 1979; Kahneman, 1973). The authors argued that a high reward should result in more motivation and hence in more resource recruitment to obtain a reward, thereby increasing the pupil size. However, this enhanced pupil dilation effect as a result of recruiting more mental resources would show up only if obtaining the reward required considerable mental effort. To test this idea, during several trials participants could earn money (low vs high reward; 1 or 50 eurocents) by recalling random digits (easy vs difficult; three or five digits). Rewards were presented subliminally (17 ms) in half of the trials, and supraliminally (300 ms) in the remaining trials. As expected, regardless of whether the reward was presented subliminally or supraliminally, people recruited more resources (larger pupil size) in response to high reward cues, but only when the reward required considerable mental effort to obtain it (see Figure 5). This research suggests that people use reward

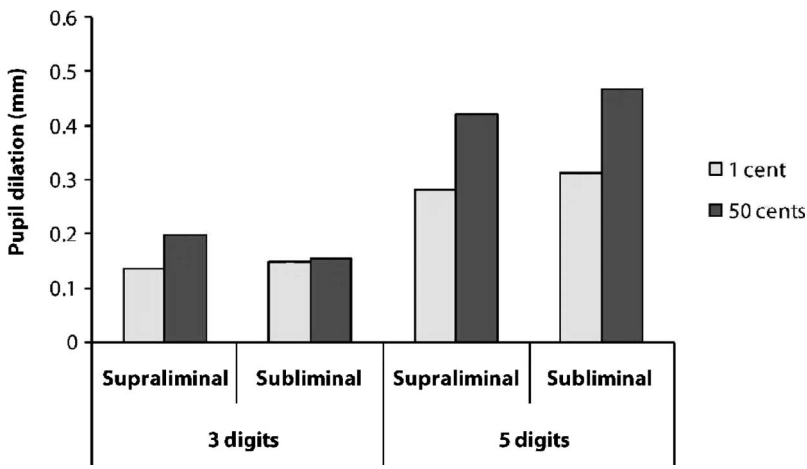


**Figure 5**. Maximum increase in pupil diameter as a function of reward, number of digits, and supraliminal versus subliminal coin presentation (adapted from Bijleveld et al., in press).

information in a strategic manner to recruit resources, without this information ever reaching conscious awareness.

Recently researchers have started to investigate how reward information attached to behaviour representations may motivate people to specifically engage in that behaviour. For example, in one study (Custers & Aarts, 2007) participants were either subliminally primed or not with words representing the behaviour of socialising. Next they performed a mouse-click task that, if sufficient time was left, was followed by a lottery in which they could win tickets for a popular student party. Thus working quickly on the task was instrumental in attaining the goal of socialising. Participants also took an implicit measure (EAST; De Houwer, 2003) that tapped their associative strength between socialising and positive affect. It was established that participants put more effort (were faster) into the instrumental (mouse-click) task when the behaviour representation of "socialising" was primed, and this effect was more pronounced for participants who more strongly associated the act of socialising with positive affect (see Figure 6). In a similar vein, Ferguson (2007) showed that priming the behaviour representation of "treating people equally" caused participants to vote against cutting Medicare (a federal programme that offers aid to specific minority groups) when they associated the concept of egalitarianism with positive affect. Obviously these studies adopted an individual difference approach towards the associative strength between behaviour and positive affect, and hence the findings are correlational in nature. However, they do show that priming effects on motivated behaviour are conditional on the positive valence of the behaviour.

If motivated behaviour can originate from positive affect associated with behaviour representations, then creating such links in a lab environment should also result in affect-motivated behaviour. This idea has recently been put to the test (Aarts et al., 2008a, 2008b; Custers & Aarts, 2005b; Holland, Wennekers, Bijlstra, Jongenelen, & van Knippenberg, 2009; Veltkamp et al.,

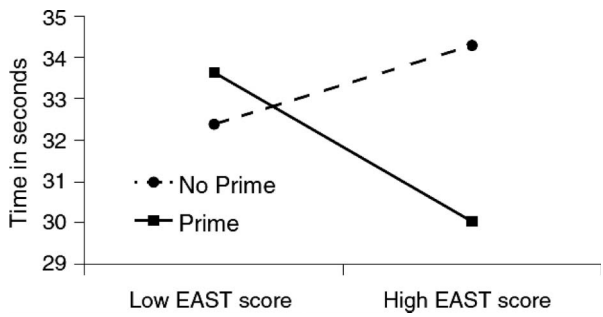


**Figure 6**. Time spent on mouse-click task as a function of valence (adapted from Custers & Aarts, 2007, Study 2).

2008b). These studies used an adaptation of an evaluative conditioning paradigm (De Houwer, Thomas, & Baeyens, 2001), enabling the researchers to co-activate behaviour representations with positive affective information.

For example, Aarts and colleagues (2008b) tested whether creating a link between a behaviour representation and positive affect outside awareness would motivate participants to engage in the behaviour, and hence perceive objects instrumental in performing the behaviour bigger in size (as would be predicted by the functional perception hypothesis; Bruner, 1957; see also Veltkamp et al., 2008b). In one study (Study 1) participants engaged in the conditioning task where the (for the research participants) originally neutral behaviour representation of doing puzzles was subliminally presented and immediately followed by consciously visible positively or neutrally valenced words. As an indication of motivation, participants then engaged in a size estimation task where they estimated the size of objects instrumental in performing the behaviour (e.g., a puzzle booklet). For half of the participants, a 3-minute delay was introduced prior to the size estimation task. The delay allowed the researchers to test whether the effects on size perception were motivational in nature, as motivational effects should remain constant or get stronger after delay, whereas memory or accessibility effects should weaken (e.g., Bargh et al., 2001; Chartrand, Huber, Shiv, & Tanner, 2008). Results showed that creating a link between the behaviour representation and positive affect increased the perceived size of puzzle objects, both immediately following the conditioning procedure and after a delay (see Figure 7). Thus these findings show that creating a link between behaviour representations and positive affect motivates people to engage in the behaviour.

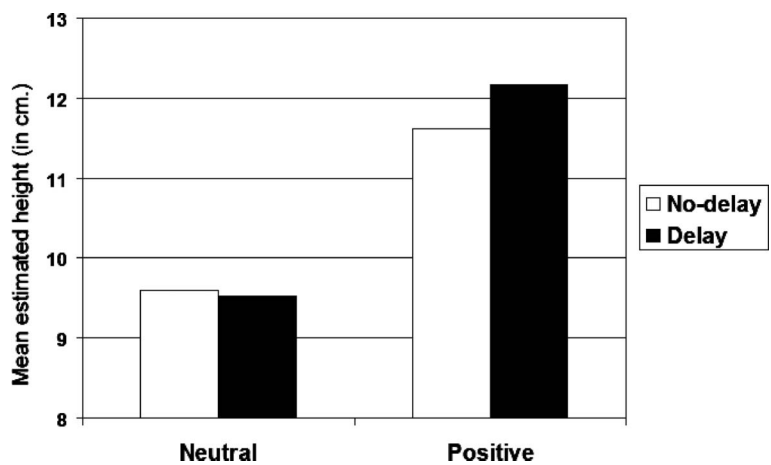


**Figure 7**. Perceived object size as a function of the experimental treatment (adapted from Aarts et al., 2008a, Study 1).

Whereas the findings discussed above support the positive affect as implicit motivator account, one may argue that linking positive affect to a behaviour representation renders the *evaluation* of that behaviour as more positive, thus reflecting an *evaluative* rather than a *motivational* process. If this line of reasoning is true, then linking negative affect to a behaviour representation should reduce the motivation to perform an originally neutral behaviour as a result of more negative evaluations. To address this issue, Custers and colleagues linked a neutral behaviour representation to positive, neutral, or negative affect. Participants were then asked to evaluate the behaviour. It was shown that conditioning rendered the positively conditioned behaviours more positive and the negatively conditioned behaviours more negative compared to neutrally conditioned behaviours (Custers & Aarts, 2005b, Study 2b). However, motivational measures such as the perceived size of objects instrumental in attaining a behaviour (Veltkamp et al., 2008b, Study 2) or self-reported motivation to perform a behaviour (Custers & Aarts, 2005b, Study 2c) showed an increased motivation for positive conditioning, but no difference between negative conditioning and neutral conditioning.

The observation that positive affect impinged on motivation while negative did not is in line with several models proposing that affect 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, 1995; Schneirla, 1959; Watson & Clark, 1992; Watt, 1998). Positive affect is associated with the preparation and motivation of action, whereas negative affect reduces the motivation and puts behaviour on hold. Consistent with this view, follow-up research showed that pairing negative affect to behavioural states dampens the motivation for pre-existing desirable behavioural states but not for behavioural states in which there is no motivation to engage to begin with (Aarts, Custers, & Holland, 2007; Veling & Aarts, 2009). Together, then, these findings suggest that positive affect, but not necessarily negative affect, creates the motivation to engage in behaviour outside conscious awareness.

It is important to note that behaviours capable of reducing deprivation (such as drinking) do not necessarily have rewarding value in the absence of deprivation (cf. Seibt et al., 2007). Hence, priming such behaviour representations does not increase the motivation to engage in the behaviour in the absence of deprivation (see Veltkamp et al., 2008a). However, based on the ''positive affect as implicit motivator'' research discussed above, this does not mean that creating a link between a deprivation-reducing behaviour and positive affect cannot motivate behaviour. That is, unobtrusively pairing the representation of drinking water with positive affect may increase the motivation to drink a glass of water in the absence of fluid deprivation. Whereas this idea can easily be tested (Veltkamp,

Custers, & Aarts, 2009), establishing such an effect raises the question of how deprivation and positive affect work together in motivating people to engage in a specific behaviour, such as drinking a glass of water. This is the issue that we will turn to now.

## THE INTERPLAY BETWEEN DEPRIVATION AND POSITIVE AFFECT

Our framework and the studies reported so far suggest that the preparation and motivation of behaviour requires the mental representation of the behaviour to be active. Whether a behaviour representation that is rendered accessible results in actual motivation depends on deprivation or its association with positive affect. Thus, when deprivation is absent, people can still be motivated to engage in deprivation-reducing behaviour when the representation is attached to positive affect. An important issue that has been left untouched up to this point, however, is how the two sources of motivated behaviour work together. Do they have additive effects on motivation, in that the presence of both deprivation and positive affect results in stronger motivation than if only one of these sources is present? Or do they interact, such that the effects of one source of motivation depend on the absence or presence of the second one?

Recent research testing the effects of two different non-conscious inputs on motivation suggests that they may interact. Specifically, Aarts and van Honk (2009) compared the effects of a cognitive manipulation of motivation (linking behaviour representations with positive affect) with those of a hormonal manipulation: intake of testosterone. The hormone testosterone is thought to generate unconscious broad-spectrum motivations to act. That is, low levels of testosterone have been shown to result in apathy and lack of motivation in general (e.g., Tostain & Blanc, 2008), and increasing testosterone levels modulates the working of subcortical brain structures involved in unconscious aspects of motivated behaviour (e.g., Packard, Cornell, & Alexander, 1997). However, attaching positive affect to a behaviour representation differs, as it targets cortical and subcortical areas relevant for the non-conscious preparation and motivation for that *specific* behaviour.

To test the combined effects of testosterone and positive affect, healthy young female participants received testosterone or placebo treatment (Aarts & van Honk, 2009). Next, neutral behaviours were subliminally paired with positive or neutral affect in a conditioning paradigm and participants indicated how much they wanted to perform the primed activity (Custers & Aarts, 2005b). Results showed that attaching the behaviours to positive affect increased the motivation to perform them, but only in the placebo condition. In the testosterone condition the motivation was high for all

behaviours, irrespective of the conditioning procedure (see Figure 8). The finding that testosterone and positive affect can, in the absence of a joint contribution, lead to similar motivational effects indicates that behaviour can be motivated by different sources that rely on the same motivation and reward processing system.

The idea of one underlying mechanism that turns behaviour representations into motivated behaviour suggests that if one source (e.g., deprivation) motivates behaviour, the second source (e.g., positive affect) may not add much to the motivational equation, as the presence of a single source already gives input or a signal that a behaviour is rewarding to perform and thus instigates motivated behaviour. In a sense, then, the organism might adaptively set a limit on its capacities when motivation is sufficient for an action to be performed, in order not to needlessly spoil its processing resources (Bishop, 2009). Thus, whereas deprivation may typically motivate behaviour by providing a rewarding signal to engage in the behaviour, positive affect will offer such a rewarding signal and motivate behaviour in the absence of deprivation.

Circumstantial evidence for this idea comes from animal research. For example, the amount of consumed fluid in non-deprived rats has been shown to be positively related to the strength of the rewarding property of the fluid (operationalised as the percentage of sucrose added to it), while overall fluid consumption is high when animals are deprived (Mook & Cseh, 1981; see Mook, 1996). In addition, research on preferential behaviour suggests that as food deprivation decreases and a state of satiation kicks in,

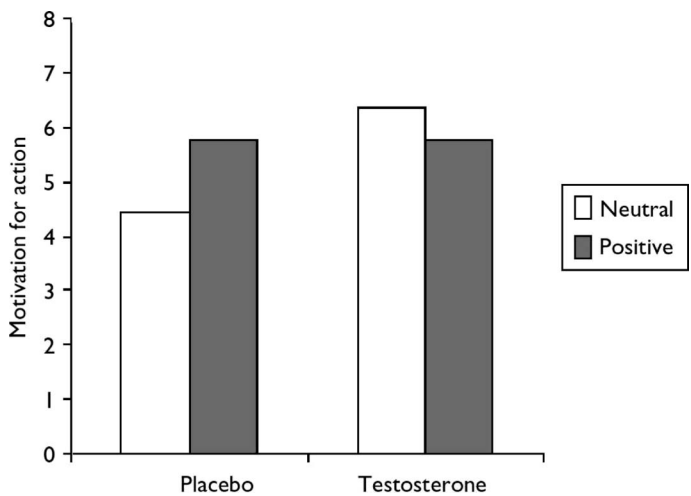


**Figure 8**. Motivation as a function of conditioning and the testosterone manipulation (adapted from Aarts & van Honk, 2009).

animals become more selective in the food they consume (Barbano & Cador, 2006; Rudski, Billington, & Levine, 1994). Assuming that preferences are based on affective processes, these studies suggest that deprivation and positive affect associated with behaviour can interact in their effects on the motivation to engage in behaviour.

In a recent set of studies we empirically examined the effects of deprivation and positive affect attached to behaviour representations more directly in a single research design (Veltkamp et al., 2009). Specifically, we tested how fluid deprivation and positive affect influenced the motivation to drink to reduce the deprivation. In a first study, fluid deprivation was manipulated by allowing half of the participants to drink water at the start of the experiment after they had consumed a set of dry biscuits in an alleged product-comparison task. Subsequently, the mental representation of drinking water was unobtrusively paired with either positive or neutral affective information in a computer task, using the same co-activation procedure as in earlier research (Aarts et al., 2008a, 2008b; Custers & Aarts, 2005b). Finally, participants engaged in another product-comparison test where they had to compare and drink from three differently shaped glasses filled with water. In actuality this test allowed us to unobtrusively measure the amount of consumed water as an indication of the motivation to drink. The results showed that deprivation and positive affect interacted, in that fluid deprivation increased the motivation to drink, but that pairing with positive affect motivated behaviour merely when deprivation was low or absent (see Figure 9).

This finding shows that the motivation to perform a behaviour can be caused by a state of deprivation but if such a deprivation is absent, motivated behaviour can result from an association between a behaviour and positive affect. These findings are consistent with earlier work proposing that the association between behaviour and positive affect creates a desired goal to engage in the behaviour (Aarts et al., 2008b; Custers & Aarts, 2005a). In other words, the association between drinking water and positive affect results in the specific goal of drinking water. As previous research suggests, however, the effects of fluid deprivation on the motivation to drink may be reduced by actions not typically associated with reducing fluid deprivation, yet capable of reducing the current state of deprivation (Milgram, 1979; Milgram et al., 1974). Accordingly, eating food with high fluid content may reduce the deprivation of fluid and the motivation to drink water as well. This very same act of eating should not reduce the motivation to drink arising from the established link between drinking and positive affect, as this positive affect-motivated source can encourage people to drink in the absence of deprivation. Indeed, it is known that people have a tendency to consume more than they need (Pinel et al., 2000; Rolls, Rolls, Rowe, & Sweeney, 1981), suggesting that, at least in the domain of drinking

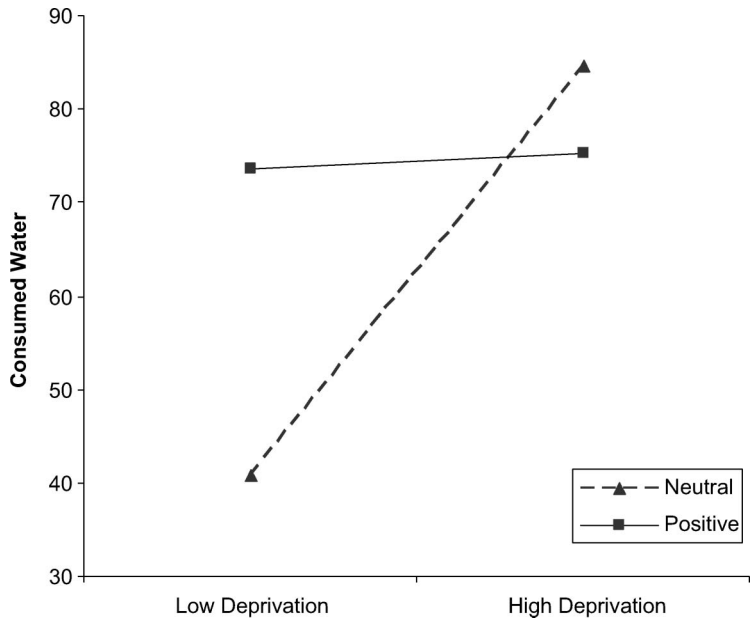


**Figure 9**. Quantity of drinking (in grams) as a function of deprivation and conditioning (adapted from Veltkamp et al., 2009, Study 1).

and eating, positive affect attached to behaviour can act as a motivator even when basic needs are satisfied and deprivation is absent.

To test this idea, we (Veltkamp et al., 2009, Study 2) asked participants to abstain from drinking fluid for 3 hours before participating in our experiment, thereby creating a relatively high level of fluid deprivation (for a similar procedure, see Ferguson & Bargh, 2004; Strahan et al., 2002). Next, drinking water was paired with positive or neutral affect. Accordingly, at this point participants may be motivated to drink because of either fluid deprivation or the non-conscious goal to drink water (due to its association with positive affect). The experiment then took a twist. Half of the participants were allowed to eat a certain amount of a food with a high fluid content—i.e., cucumber, which contains 96% water (Davidson, 1999)—whereas the other half were not. In the eating condition, then, participants were able to reduce their fluid deprivation through performing an action that is usually not considered to be instrumental in quenching thirst. Finally, participants were allowed to drink water ad libitum. It was found that eating cucumber reduced water intake when drinking was motivated only by deprivation, but cucumber consumption did not diminish water intake when drinking had been paired with positive affect (see Figure 10). Thus, the motivation to drink water ceases to exist without executing that specific

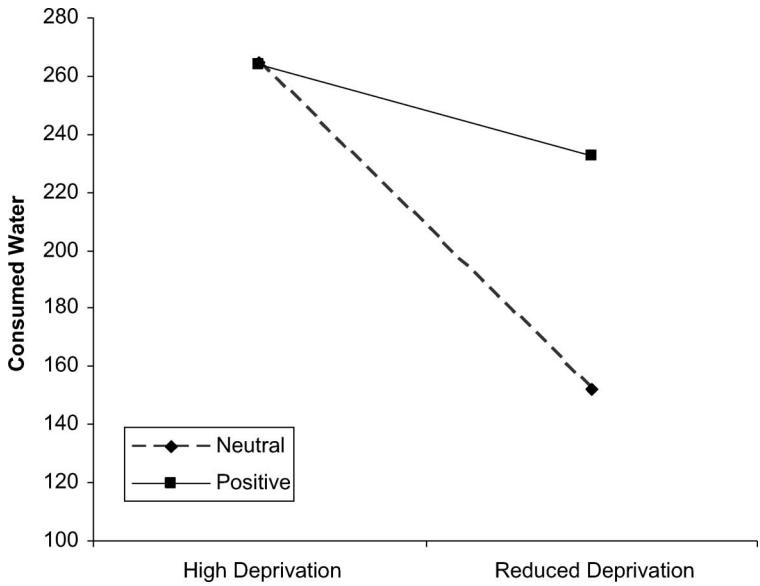


**Figure 10**. Quantity of drinking (in grams) as a function of deprivation-reduction and conditioning (adapted from Veltkamp et al., 2009, Study 2).

behaviour after fluid deprivation has been reduced by eating, but remains if there is link between drinking water and positive affect.

Taken together, then, these findings support the idea that the motivation to engage in a specific behaviour can emerge from two different sources (deprivation and positive affect), which modulate the reward value assigned to a behaviour. However, both motivational sources react differently to deprivation-reducing methods that do not refer to the behaviour at issue. That is, the motivation to drink may be reduced if fluid deprivation is resolved by eating. However, if the representation of drinking water is associated with positive affect, the representation may start to operate as a desired goal in itself, motivating us to engage in that specific behaviour even when deprivation is reduced by other means. Therefore deprivation and positive affect can lead to similar, but also to different, effects on motivated behaviour.

## GENERAL DISCUSSION

In this chapter we have presented a framework for the comprehension and examination of non-consciously motivated human behaviour that arises from two basic sources: deprivation of crucial resources, and an association between behaviour representations and positive affect. Specifically, the framework holds that the accessibility of mental representations of

behaviour is crucial in preparing the execution of behaviour. Importantly, the framework suggests that deprivation of crucial resources as part of a homeostatic principle modulates the reward value of the behaviour representation, and accordingly turns the preparation into actual motivation to engage in the behaviour. When deprivation is absent, however, an association of a behaviour representation with positive affect can act as a reward signal and thus motivate behaviour as well. We presented several findings that provided support for this framework of motivated behaviour. The present analysis thus clarifies the distinction between different sources of non-conscious motivation, by showing how deprivation and positive affect separately result in motivation for behaviour and how these two sources may interact in their effects on motivation.

In our framework a crucial role is allocated to the mental representations of behaviour. Activating behaviour representations prepares people to initiate the corresponding overt behaviour, even though these representations are activated outside awareness; i.e., through subliminal priming (e.g., Aarts et al., 2008a; Pulvermüller, 2005). In doing so, our framework takes into account the most proximal determinant of behaviour (e.g., Bargh, 1990), explaining non-conscious influences on behaviour such as the habitual activation of a behaviour in a familiar environment (Aarts & Dijksterhuis, 2000) or activation of normative behaviour in a particular social setting (Aarts & Dijksterhuis, 2003). Although a certain degree of motivation for the behaviour must exist to turn preparation into overt behaviour, the initial occurrence of those behaviours is thought to be driven by changes in accessibility, rather than desirability.

However, most contemporary models of motivated goal-directed behaviour do not explicitly explain the role of behaviour representations in determining people's motivation to engage in behaviour (e.g., Bandura, 1986; Deci & Ryan, 1985; Fishbein & Ajzen, 1975; Locke & Latham, 1990). Rather, these models mainly aim to specify the conditions that cause people to consciously assess the desirability of behaviours or to consciously set and adopt goals to engage in the behaviours. Focusing instead on mental representations of behaviour as the proximal determinant of motivated behaviour fits with recent developments in research on non-conscious processes in motivated behaviour, and as such may open new ways to understand and examine how deprivation and positive affect alter people's motivation to engage in behaviour. We will now briefly discuss how the framework may contribute to current research that examines the sources and processes of human motivated behaviour.

## Sources of motivation in non-conscious goal pursuit

The idea that mere priming of behaviour representations influences motivated behaviour in the absence of awareness of the source of this

influence is consistent with recent developments in research on non-conscious goal pursuit (for overviews, see Custers & Aarts, 2005a; Moskowitz, Li, & Kirk, 2004). Research in this area shows that (subliminally) priming a behaviour representation (e.g., of helping) can induce motivation for that behaviour outside conscious awareness, depending on whether that behaviour is represented as a desired state or not. The question of how people non-consciously "know" whether the behaviour is represented as a desired state, and hence worth engaging in, has led to intriguing speculation about the workings of the mind by introducing concepts such as automated will (Bargh et al., 2001), implicit volition (Moskowitz et al., 2004), or implicit intention (Wood, Quinn, & Kashy, 2002). However, such terms merely stretch the applicability of inherently conscious concepts to the unconscious level and do not explain how the unconscious can perform operations that until recently were assumed to require consciousness. The present framework takes a somewhat different stance on the matter. That is, the framework specifies two potential sources (deprivation and positive affect) that turn accessible representations of behaviour into a state of readiness for goal pursuit, and thus motivate people to engage in the behaviour in the absence of awareness of the sources of their motivation. As such, our framework offers insight into the boundary conditions of priming effects on motivated behaviour.

Furthermore, it is important to note that previous research on non-conscious goal pursuit suggests that priming a behaviour representation associated with positive affect may cause that representation to operate as a goal that people want to attain (Bargh & Huang, 2009; Custers & Aarts, 2005b; Fishbach & Ferguson, 2007). Conceptualising non-conscious goals in terms of an association between a behaviour representation and positive affect may have implications for the way people's motivation to engage in a behaviour ceases after they have been able to perform the behaviour. Specifically, one of the important characteristics of motivated goal-directed behaviour is that the cognitive processes supporting the goal remain active until that goal is attained (Aarts, 2007; Förster, Liberman, & Friedman, 2007; Goschke & Kuhl, 1993; Marsh et al., 1998). This suggests that the operation of deprivation-reducing behaviours (e.g., drinking water) associated with positive affect does not depend on deprivation under these circumstances, but rather should stop after that behaviour has been performed (e.g., Förster et al., 2007).

Deprivation and an association of behaviour representations with positive affect are important sources of non-conscious goal pursuit, but many behaviours that people perform are preceded by conscious reflection, so what is the role of the motivational sources in such situations? In fact, dual-process models in psychology (see Chaiken & Trope, 1999) focus exactly on how non-conscious processes versus conscious processes act on attitudes and motivation. Non-conscious and conscious processes in such

models are expected to be able to operate at the same time, where non-conscious processes are often regarded to result in impulses (to perform the most desirable action), and where conscious processes allow other factors to be taken into account (e.g., social desirability of performing a behaviour, long-term goals) that may require a different path of action. However, several dual-process theories argue that implicit processes not only predict non-consciously motivated behaviour, but can also serve as input for conscious deliberation (e.g., Strack & Deutsch, 2004). Thus deprivation and positive affect may not only motivate behaviour non-consciously, but they may also indirectly motivate conscious goal pursuit, such as implied by recent models proposing a mediating role of construal (Kay & Ross, 2003) or an active self-concept (Wheeler, DeMarree, & Petty, 2007) in priming effects on motivated behaviour. The present framework may provide a valuable contribution to dual-process theories, then, in that it explains how on an implicit level two sources of motivation operate and work together to motivate behaviour outside conscious awareness.



## The relation between deprivation, positive affect, and needs

The present chapter not only examined the crucial role of the accessibility of behaviour representations in preparing overt behaviour and the effects of deprivation and positive affect in motivating behaviour. It also sheds new light on how these two sources of motivation may interact in producing people's motivation to engage in a specific behaviour.

It is important to emphasise that most research on motivated behaviour tends to conceptualise the sources of motivated behaviour in terms of needs (e.g., Baumeister & Leary, 1995; Fiske, 2004; Maslow, 1943; McClelland, 1951; Murray, 1938; Sheldon et al., 2001). Although it is certainly a parsimonious strategy to use one concept for similar sources, the current framework suggests that it may be important to differentiate between deprivation and positive affect in understanding and examining the occurrence of motivated behaviour. Thus the motivation to engage in a specific behaviour that is thought to result from social needs (such as a need for achievement, affiliation, power, closure, cognition, or safety) can be explained in terms of being deprivation motivated (in which case motivation should depend on underlying states of deprivation; Deci & Ryan, 2000; McClelland, 1951) or positive affect motivated (in which case behaviours such as performing well on an anagram task or seeking power in a social situation are positive in itself; Kruglanski & Chun, 2008; Senko et al., 2008). Which of these two sources actually accounts for motivated behaviour may have important implications, as the effect of positive affect attached to behaviour representations on motivated behaviour seems to be

dependent on the absence or presence of a state of deprivation (Veltkamp et al., 2009).

To further illustrate the importance of differentiating between deprivation and positive affect as non-conscious sources of motivation, consider for example a teenager who spends a fortune on visiting online chat-rooms. She may be motivated to do so either because she is deprived of social contact and has a need to belong (Baumeister & Leary, 1995), or because she enjoys visiting chat-rooms. In the first case, stimulating social contact (e.g., signing her up for soccer to interact with her peers) may reduce chat-room visits. However, this may not be true in the latter case. That is, our framework suggests that when a person is motivated to visit chat-rooms because that behaviour is associated with positive affect, offering the opportunity to engage in another deprivation(need to belong)-reducing behaviour (e.g., soccer) does not necessarily decrease the motivation to engage in visiting chat-rooms. However, the reverse may be true as well. Making chat-rooms less attractive may reduce chat-room visits but not the need for social contact, which may cause other detrimental behaviours to arise. In short, failing to correctly distinguish between deprivation and positive affect as sources of motivated behaviour may not only hamper theoretical research on motivation but may lead to bad parental decisions in daily life as well.

It should be noted that, although the present chapter examines the effects of deprivation and positive affect as motivational sources in general, the studies that directly tested the role of deprivation in our framework were limited to behaviours for which it was clear they could be motivated both by positive affect and deprivation; namely drinking behaviour. However, based on the assumption that the occurrence of many social behaviours relies on the activation of the representation of those behaviours, it seems likely that the proposed contribution of deprivation and positive affect also applies to a broader area of our behavioural repertoire. For example, if socially excluding members of a minority group as an act of discrimination can be motivated by deprivation of a positive self-image (Fein & Spencer, 1997), then the mental representation of that behaviour may be rewarding conditional on the state of deprivation. In theory, attaching this representation to positive affect would also motivate the behaviour in the absence of deprivation, which thus may explain people's motivation to discriminate minorities in terms of an interplay between positive affect associated with the behaviour and deprivation (Kunda & Spencer, 2003). In sum, we believe that the way deprivation motivates behaviour and interacts with positive affect depends on a general mechanism that should govern biological as well as social needs. However, testing these predictions of our framework in social settings would prove an interesting avenue for further research.

## CONCLUDING REMARK

Kant once stated that "... we can never, even by the strictest examination, get completely behind the secret springs of action" (1785/2004, p. 17). Indeed, psychological research shows that people have troubles in determining the true causes of their behaviour (e.g., Nisbett & Wilson, 1977; Wegner, 2002). However, rendering it especially hard to assess the secret sources of action is the recent observation that the motivation for behaviour can develop outside people's conscious awareness (e.g., Dijksterhuis et al., 2007). In the present chapter we presented a framework that aimed to unravel the apparent motivational yarn that underlies such non-consciously motivated behaviour. Our approach allows us to differentiate between two basic sources of human motivation: deprivation of crucial resources and an association between behaviour representations and positive affect. We presented findings of several studies that provided support for the proposed role of deprivation and positive affect in motivating behaviour. By focusing on the operation of these two motivational sources and the way they interact in their effects on the motivation to perform behaviour, we hope the current framework may further our understanding of human motivation and will provide a good starting point for future research on this matter.



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