



## The nonconscious road to perceptions of performance: Achievement priming augments outcome expectancies and experienced self-agency

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### ABSTRACT

Three experiments explored the effects of priming the achievement concept on the expectation of performance outcomes and experiences of self-agency over outcomes in a task in which performance outcomes were dependent on chance. Experiment 1 and 2 showed that achievement priming produced expectations of higher (more successful) outcomes prior to working on the task, regardless of whether priming was subliminal (nonconscious) or supraliminal (conscious) and that this effect could not be attributed to subjective motivation to perform well. Experiment 3 revealed that subliminal achievement priming decreased participants' experienced self-agency when outcome feedback was low, but increased self-agency when it was high. Together, these results suggest that activating achievement concepts outside of awareness spontaneously triggers expectations of higher task outcomes, which increases or decreases self-agency depending on whether there is a match or mismatch with observed outcomes. Implications for the literature on achievement-priming effects on behavior are discussed.

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### Introduction

A theme that dominates research in personality and social psychology concerns the way in which the concept of achievement directs people's thoughts, behaviors, and outcomes (Elliot, 2005). One of the first research programs on this matter proposed that achievement represents an implicit or unconscious need, and utilized the Thematic Apperception Test (Murray, 1938) to show that individual differences in achievement motivation directly predict achievement-relevant outcomes (McClelland, 1987; McClelland, Atkinson, Clark, & Lowell, 1953). Following the cognitive revolution in psychology, others have argued that human achievement is governed by an intentional process in which the agent consciously and reflectively guides action-performance. The emphasis on conscious intent as the immediate psychological cause of achievement has produced a variety of models that identify and predict the person's expected values of achieving outcomes, and responses to success and failure feedback (Bandura, 1977; Locke & Latham, 1990; Ryan, 1970; Weiner, 1985). Recent research, however, has reopened the possibility that mental processes involved in achievement may originate in the unconscious (Bargh & Gollwitzer, 1994). This line

of research appreciates the pervasive role of the social environment (e.g., classroom, workplace) in triggering cognitive representations of achievement that affect performance outside people's awareness.

The present research focuses not on performance itself, but on how people's perceptions of their performance are influenced by cognitively activating the achievement concept. Specifically, we aim to demonstrate that achievement priming can lead to augmented expectancies about successful outcomes when working on a task. Although such changes in expectancies could potentially influence motivation and performance on a task, they may also independently alter the way in which people perceive their task outcomes once they are established. That is, we argue that outcome expectancies directly affect people's experiences of self-agency when their causal role in producing the outcome is unclear. Under such circumstances, augmented expectancies of success should increase experienced self-agency for relatively high outcomes, but decrease it for relatively low outcomes. Crucially, we aim to show that such achievement-priming effects can even ensue from subliminal sources, as conscious expectations and experiences can be readily produced by unconscious primes (e.g., Aarts, 2007; Aarts, Custers, & Wegner, 2005; Custers & Aarts, 2005). This paper reports three experiments designed to demonstrate such effects of achievement priming on outcome expectancies and experiences of self-agency.

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### *Outcome expectancies, motivation and performance*

As outcomes expectancies are intimately related to motivation and performance, it is important to consider this relation in more detail in order to be able to distinguish between achievement-priming effects on perceptions of performance and effects on motivation and performance itself. Outcome expectancies are related to motivation and performance in several ways. On the one hand, outcome expectancies are seen as causes of motivation and performance. In Expectancy  $\times$  Value models of human decision-making and behavior, for instance, the expected outcome of the task and its value are proposed to be the main antecedents of motivation (Bandura, 1977; Deci & Ryan, 1985; Fishbein & Ajzen, 1975; Gollwitzer, 1990; Locke & Latham, 1990; Tolman, 1932). According to these models, if the expectancy of successful performance on a task increases while its value remains constant, task motivation goes up, usually resulting in higher (i.e., more successful) outcomes. For example, one may be more motivated to work on a revision of a paper and produce a better manuscript if the perceived expectancy of getting the paper published is higher. It is important to note, however, that in these models expectancy and value are regarded as (subjective perceptions of) properties of the task. Outcome expectancies, then, are regarded as cognitive representations produced by the characteristics of the task at hand that determine how strongly people are motivated to produce the outcomes in question.

On the other hand, expectancies of successful outcomes can also be the result, rather than the cause of motivation. That is, if people reflect on their motivation for a task, or on the perceived effort they invest in it, they may expect to produce better task outcomes on the same task when they are motivated, compared to not motivated. When, for example, one writes a letter for an important job application, one may expect to write a better letter than for a less important application, not because the task is easier, but because one takes into account one's increased motivation for that task in one's expectancies of the outcome. Indeed, if one believes that one's additional effort as a consequence of an increased motivation will affect the task outcome for the better (see Bandura, 1977), one should expect more successful task outcomes. In this case, the change in expectancies is unrelated to changes in the expectancy property of the task, but is entirely based on beliefs about the relation between one's own motivation and task outcomes. Hence, outcome expectancies are closely intertwined with motivation and cannot only be seen as the antecedent of motivation, but also as its consequence.

### *Achievement priming and outcome expectancies*

Research on achievement suggests that apart from objective characteristics of the task itself, people's performance is also affected by the setting in which a task takes place. When a given task is executed in a setting where people have achievement on their mind, such as a classroom or a sport venue, people try harder and usually do better than in settings where achievement is less salient (Elliot & McGregor, 2001). In this case, thoughts about achievement that are triggered by features of the environment increase task performance and produce more successful outcomes independently of task characteristics.

This suggests that mere activation of the achievement concept is enough to motivate behavior. Bargh and colleagues (Bargh, Gollwitzer, Lee Chai, Barndollar, & Trötschel, 2001) presented evidence in line with this notion. In their research, they activated the construct of achievement in participants by having them work on a word search puzzle in which words related to achievement were hidden, or not. Subsequently, achievement was tested in a second puzzle task. It was found that participants for whom the achievement con-

struct was unobtrusively activated performed better – obtaining higher task outcomes (see also Oikawa, 2004). Although these findings could be explained by assuming that achievement priming directly motivates behavior, it could also be the case that achievement priming induces expectancies of successful outcomes, which may – together with task value – affect performance.

Such expectations of successful outcomes may have become associated with the concept of achievement through repeated simultaneous activation of the cognitive representations of achievement and successful outcomes. It has been suggested that thoughts, or the cognitive activation of mental representations, can be linked to other mental representations (Meyer & Schvaneveldt, 1971) if they are often co-activated (Hebb, 1949). In the same way that pepper is associated with salt because these mental constructs are often activated together, the construct of achievement and expectancies of successful task outcomes may become linked together if they are often activated at the same time. If people often expect and observe successful outcomes (e.g., as a result of previous performance of skilled actions that have led to the successful outcomes; Aarts & Dijksterhuis, 2000) when they have the concept of achievement on their mind, expectancies of successful outcomes may directly come to mind if the concept of achievement is triggered by a cue in the environment.

The main purpose of the first two experiments is to demonstrate – using explicit measures of outcome expectancies – that these increases in outcome expectancies as a result of nonconscious achievement primes do occur. Moreover, they aim to demonstrate that these increased outcomes expectations are triggered directly by the achievement primes and are not the result of people's reflections on their motivation to perform well. However, in order to demonstrate that such expectancies are also formed spontaneously – in the absence of explicit instructions to reflect on them – one would have to measure these expectancies in a more indirect way. One way to do this is to look at experiences of self-agency that arise when people are confronted with task outcomes, as these experiences are known to be based on previously formed outcome expectancies.

### *Outcome expectancies and experienced self-agency*

Expectations about successful outcomes are not only important because they may potentially affect performance. They are also important because they help us to establish the cause of effects that occur in the world. For many outcomes in the real world (e.g., acceptance of a co-authored paper; a successful party), it is unclear whether they are the result of our own doing, or whether they are caused by someone or something else. Indeed, Hume (1888) already argued that causality can never be readily perceived, but always has to be inferred. It has been proposed that experiences of self-agency arise from a match between the outcome of an action and knowledge about the outcome that is active prior to its occurrence (Wegner & Wheatley, 1999).

Indeed, recent research suggests that the establishment of self-agency operates through an authorship ascription process that is tuned to offering a current agent information about outcomes fluently and perfunctorily (Aarts, Custers, & Marien, 2009; Aarts et al., 2005; Wegner & Sparrow, 2004). Building on this work, we here propose that experiences of self-agency can be altered by the subliminal priming of achievement. Specifically, priming the concept of achievement before one performs a task (e.g., searching for words) and observes the actual outcomes (e.g., accurate detection of words) moderates the experience of self-agency by the spontaneous activation of expectancies about the attainment of higher outcomes. A match between the two is expected to increase experienced self-agency, while a mismatch is thought to not affect or even decrease experienced agency. Importantly, because expecta-

tions of success can result from nonconscious activation of the concept of achievement, people's experiences of self-agency can be modulated without awareness of the cause of this influence. Whereas the mechanism proposed here offers a key to understanding how nonconscious activation of the concept of achievement produces a conscious sense of agency over action performance, it also suggests that these experiences can arise independently of actual causation, resulting in illusory experiences of self-agency (Aarts et al., 2005; Wegner & Wheatley, 1999).

Although the influence of achievement priming on experiences of self-agency may be interesting in its own right, increases in those experiences would also provide more direct evidence for the *spontaneous* generation of higher outcome expectancies. Asking people to report their expectancies about performance for an upcoming task just after achievement priming may provide first evidence for augmented expectations about success. However, in that instance it remains ambiguous as to whether those expectations arise spontaneously or whether people only generate expectancies based on the activated achievement construct because they are asked to reflect on them. According to the literature on experiences of agency, outcome information would only affect experiences of agency if it is activated *before* people engage in action and produce the outcome (Wegner & Wheatley, 1999). Hence, if achievement priming would affect the experiences of self-agency of people after they have performed a task and perceived the outcome, this would demonstrate that expectations were already formed spontaneously before they engaged in the task. In Experiment 3 we therefore assessed people's experiences of self-agency to obtain converging evidence for the idea that outcome expectancies were formed spontaneously upon achievement priming.

In line with the above reasoning, in the present paper we report three experiments that provide evidence for the idea that achievement priming leads to expectations of more successful outcomes. In Experiment 1, the basic idea that achievement priming increases outcome expectancies was tested, by explicitly asking people to report those expectancies. In order to further disentangle perceptions of performance from motivation and actual performance, motivation to perform well was measured. Experiment 2 compared the effect of unconscious achievement priming on outcome expectancies with that of a conscious goal to achieve and probed for relations between expectancies on the one hand and perceived effort and task value on the other hand. In Experiment 3, participants engaged in a performance task after nonconscious achievement priming and were confronted with outcomes that could either be their own or those of a fellow participant. We anticipated that participants who were nonconsciously primed with achievement would report higher expected outcomes (Experiments 1 and 2) and claim more authorship over relatively high outcomes and less authorship over relatively low outcomes (Experiment 3), compared to control participants.

## Experiment 1

In this first experiment, we aimed to gather initial evidence for the hypothesis that expectations of success can be increased as a result of nonconscious activation of the achievement concept. To test this, participants were subliminally primed with words related to the concept of achievement, and were then asked to perform a subliminal lexical decision task in which they had to indicate whether a briefly flashed string of letters was an existing word or not. The task was designed in such a way that random responses would produce a 50% chance of successful detection (the default performance rate), but allegedly allowed participants to exceed the level of chance. Pilot testing showed that participants did not consider this task as important, or diagnostic for achievement, rul-

ing out the possibility that achievement was primed by the task itself (cf. Bargh et al., 2001). Before actually working on the task, the subjective expectation of successful performance was measured by asking participants to indicate (in percentage form) how many of the trials they expected to answer correctly. It was predicted that achievement primed participants would expect a higher rate of success than nonprimed participants. Moreover, in order to investigate whether changes in expectancies could be the result of changes in participants' motivation to perform well, two additional questions were included that tapped into this subjective motivation.

## Method

### Participants and design

Fifty undergraduates participated in the experiment in exchange for € 3 or extra course credit. They were randomly assigned to one of the following two conditions: the nonconscious achievement prime, or no achievement prime-control condition.

### Procedure

Upon arrival at the laboratory, participants were told that they would take part in research conducted by different investigators that involved performing several tasks on a computer. The computer program provided the instructions, and participants worked in separate cubicles. After some general instructions and practice with the computer program, participants started with the first task of the session.

The first task was a letter-detection task in which participants had to press a key to indicate, as quickly as possible, whether a string of similar letters contained a capital or not. Half of the letter strings contained a capital. Before each letter string, a prime word was presented. In the *nonconscious achievement prime* condition, the prime was one of four different achievement-related words (achieve, strive, accomplish, win; see Bargh et al. (2001) for a similar approach to achievement priming). In the *no achievement prime-control* condition, these four words were replaced by four positive words unrelated to the concept of achievement (beach, home, summer and smile). These positive words were chosen to control for possible affective valence effects. Furthermore, previous work showed that these words do not modulate thoughts about performance (Aarts, Custers, & Marien, 2008; Custers & Aarts, 2005). Each trial began with a random letter string as a fixation-point presented on the screen (100 Hz) for 500 ms. The prime was then presented for 30 ms, followed by a mask of random letters for 200 ms (see Aarts et al., 2008 for a subliminality check of this procedure). Finally, a string of similar letters was presented and remained on the screen until a response was made regarding capitalization. Each prime word was presented 10 times, and the inter-trial interval was 1.5 s.

Next, participants were given a second task that ostensibly involved determining whether letter strings represented existing words or not. They were told that a number of letter strings would be briefly presented on the screen, and that in half of the trials the letter strings would be an existing word, and in the other half they would simply be random strings of letters. Furthermore, it was stressed that previous research had indicated that the task is experienced as quite difficult, but that it should be possible to get more than 50% of the trials correct (i.e., have a higher success rate than would be expected based on chance).

Before participants started to work on the task, they were asked to indicate (in percentage form) how many trials they expected to respond to correctly. This measure represents their *outcome expectations* for task performance. Moreover, participants were asked to report their motivation to perform well on the upcoming task (*low* [1] to *high* [9]), as well as the perceived importance of performing

well on the upcoming task (*not important* [1] to *very important* [9]). The responses on the two questions proved to be highly correlated ( $r = .67$ ,  $p < .01$ ), and were therefore averaged into one index of motivation. After completing these ratings, participants commenced the task, which consisted of 60 trials. In half of the trials, existing words (e.g., key, machine) were presented; none of these words were achievement-relevant. Each trial began with a random letter string as a fixation-point presented on the screen for 500 ms. The target letter string was then presented for 30 ms, followed by a mask of random letters for 200 ms. Next, participants were asked to indicate whether or not an existing word had been presented on the screen. The question remained on the screen until a response was made. The trials were randomly presented, and the inter-trial interval was 1.5 s.

At the end of the session, participants were debriefed using a funnel debriefing procedure based on that recommended by Bargh and Chartrand (2000). This debriefing indicated that participants did not realize the true nature of the experiment, and had not consciously processed the primes during the initial priming task.

## Results and discussion

### Effects on outcome expectations

Participants' expected percentage of correct responses on the second task was subjected to a single factorial design (no achievement prime-control vs. nonconscious achievement prime) between-participants ANOVA. Participants' outcome expectations proved to be higher in the nonconscious achievement prime condition,  $M = 60.20$ ,  $SD = 10.56$ , than in the no achievement prime-control condition,  $M = 52.60$ ,  $SD = 10.42$ ,  $F(1, 48) = 6.56$ ,  $p = .01$ ,  $\eta^2 = .12$ .

### Effects of self-reported motivation to perform

The index of motivation to perform well did not differ between conditions,  $M = 4.89$ ,  $SD = 2.12$ ,  $F < 1$ . Moreover, the motivation index did not correlate with the outcome expectancies ( $r = -.09$ , ns).

### Effects on task performance

To examine whether there was a difference between conditions in the success of detecting the subliminally presented words in the second task, the proportions of correct responses were subjected to an ANOVA. Given that the target letter strings were presented below the threshold of conscious perception, null results were anticipated. As expected, this analysis showed that there was no difference between conditions on this task performance measure,  $F < 1$ . Furthermore, the average proportion of correctly categorized letter strings across conditions was .50 ( $SD = 0.06$ ), and this proportion did not differ from chance,  $t(49) = 0.18$ .

The current findings demonstrate that achievement priming activates expectations of higher task outcomes. This effect, however, does not seem to be accompanied by, and can hence not be attributed to, changes in task motivation.

## Experiment 2

Experiment 2 served three purposes. First, we aimed to replicate the findings of Experiment 1 to examine the robustness of the achievement priming effect on outcome expectations. Second, this experiment was designed to more thoroughly investigate the relation between expectations of successful outcomes and motivation to perform well. Although it is known that motivation resulting from nonconscious priming of goals can affect explicit reports of motivation (e.g., Custers & Aarts, 2005), it could be the case that certain motivational processes were triggered in Experiment 1, but did not lead to a conscious experience of motivation (see e.g., Aarts,

Gollwitzer, & Hassin, 2004; Fitzsimons & Bargh, 2003). Whereas Experiment 1 demonstrated that people's outcome expectancies could not be based on such a conscious experience of motivation to perform well, it could be that people based these expectancies on reflections on other motivation-related internal states. One important correlate of motivation to perform well is the experience of effort (Geen, 1995; Preston & Wegner, 2009; Wright & Brehm, 1989). If achievement priming motivates people outside their awareness, it could be that they feel they have more effort to spend on their behavior. Thus, achievement priming may have caused participants to anticipate spending more effort on the task, which would yield more successful outcomes. Accordingly, the achievement-priming effects on outcome expectancies established in Experiment 1 may be associated with changes in such subjective assessments of effort.

Finally, in order to investigate the relation between motivation and outcome expectancies more closely, in this experiment we also included a conscious achievement prime condition, in which participants were explicitly encouraged to try to achieve as many correct responses as they could. Such explicit achievement instructions should motivate people to do well and also activate the achievement construct. If people would base their outcome expectancies on the effort they anticipate to spend on the task, assessments of effort should be correlated with outcome expectancies. This would not necessarily be the case if outcome expectancies are directly activated by priming of the achievement construct.

Although Experiment 1 demonstrated that nonconscious achievement priming did not cause people to consider performing well on the task as more important, it could be the case that achievement priming changes the subjective perceptions of the properties of the task itself. That is, participants who are primed with achievement may perceive the task as more valuable or important, which could motivate them to spend more effort on the task. Accordingly, subjective task value was assessed as well.

## Method

### Participants and design

Seventy-four undergraduates participated in the experiment in exchange for € 3 or extra course credit. They were randomly assigned to one of the following three conditions: nonconscious achievement prime, no achievement prime-control, or conscious achievement prime.

### Procedure

Upon arrival at the laboratory, participants were told that they would take part in research conducted by different investigators that involved performing several tasks on a computer. The computer program provided the instructions, and participants worked in separate cubicles. After some general instructions, participants started with the first task of the session.

The procedure of the task was the same as that of Experiment 1, except for three changes. First, after the assessment of participants' outcome expectancies, the questions that probed for motivation to perform well were removed. Second, the additional conscious achievement prime condition unfolded in the same manner as the no achievement prime-control condition, until the lexical decision task was reached. Then, before starting on this task, participants in this condition were encouraged to try to achieve as many correct responses as they could. Third, after the lexical decision task, perceived effort and perceived task value were assessed. Participants were asked to report the effort they had exerted on the task (*none at all* [1] to *very much* [9]). This measure represents their *reported effort* for the task. Furthermore, two questions were posed that focused on how *valuable* and *important* the task was to participants (*not at all* [1] to *very much* [9]). The two ratings were averaged

( $r = .48, p < .01$ ) to form an index of *perceived task value*. Apart from these changes, the procedure was the same as in Experiment 1.

At the end of the session, participants were debriefed in the same manner as in Experiment 1. This debriefing indicated that participants did not realize the true nature of the experiment, and had not consciously processed the primes during the initial priming task. One participant reported not having understood the idea of 50% as a chance level of performance (this person reported a success expectation of 0%; all other participants reported a success expectation of 50% or above). This participant was omitted from the analyses.

## Results and discussion

### Effects on outcome expectations

The main dependent variable was participants' expected percentage of correct responses on the second task. This variable was subjected to a single factor (nonconscious achievement prime, no achievement prime-control, conscious achievement prime) between-participants ANOVA. The analysis yielded a significant main effect,  $F(2, 70) = 4.81, p = .01, \eta^2 = .12$ . To test our specific hypothesis, several contrast analyses were conducted. These analyses revealed that participants' outcome expectations were higher in the nonconscious achievement prime ( $M = 69.60, SD = 15.47$ ) and conscious achievement prime ( $M = 67.92, SD = 9.20$ ) conditions than they were in the no achievement prime-control condition ( $M = 59.38, SD = 11.26$ ),  $F(1, 71) = 8.34, p = .01$ , and,  $F(1, 71) = 5.56, p = .02$ , respectively. Outcome expectations in the nonconscious achievement prime and conscious achievement prime conditions did not differ from each other,  $F < 1$ . Fig. 1 displays the success expectation ratings for each experimental condition.

### Effects on task performance

To examine whether the three conditions produced differences in the success of detecting the subliminally presented words in the second task, the proportions of correct responses were subjected to the same ANOVA. As expected, this analysis showed that the three conditions did not differ from each other on this task performance measure,  $F < 1$ . Furthermore, the average proportion of correctly categorized letter strings across conditions was 0.51 ( $SD = 0.04$ ), and this proportion did not differ from chance,  $t(72) = 1.63$ .

### Effects on reported effort

To test whether the experimental conditions influenced participants' reported effort, this measure was subjected to the same AN-

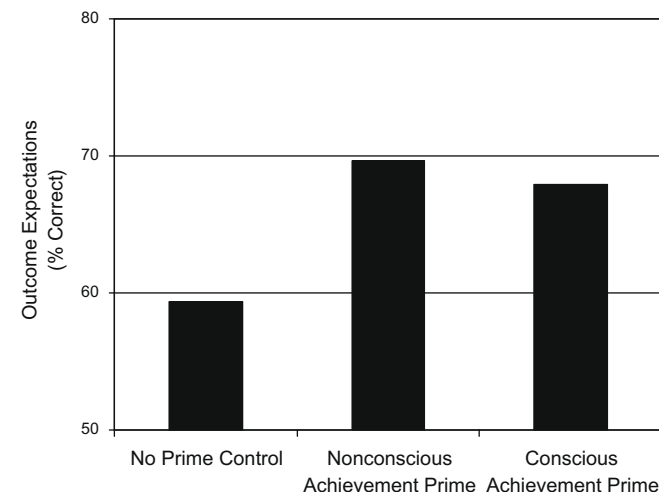


Fig. 1. Outcome expectations as a function of achievement prime condition (Experiment 2).

OVA. A significant main effect was found,  $F(2, 70) = 5.28, p = .01, \eta^2 = .13$ . Further analyses revealed that reported effort was higher in the conscious achievement prime condition ( $M = 8.29, SD = 0.69$ ) than in the nonconscious achievement prime ( $M = 7.76, SD = 0.78$ ) and the no achievement prime-control ( $M = 7.58, SD = 0.88$ ) conditions,  $F(1, 71) = 5.17, p = .03$ , and,  $F(1, 71) = 9.94, p < .01$ , respectively. Reported effort in the nonconscious achievement prime and the no achievement prime conditions did not differ from each other,  $F < 1$ . Moreover, reported effort did not correlate with outcome expectancies ( $r = .13, ns$ ).

### Effects on perceived task value

To examine whether the experimental conditions changed participants' perceptions of the value of the task, participants' scores on the perceived task value index were subjected to the same ANOVA. This analysis showed that perceived task value was unaffected by the manipulations ( $M = 4.88, SD = 2.04$ ),  $F < 1$ .

In sum, the results of this experiment suggest that the nonconscious priming of achievement activates higher expectations of success, in the same way as conscious priming does. Furthermore, the findings show that achievement priming had this effect without influencing participants' value of the task and that augmented outcome expectancies were only accompanied by an increase in reported effort in the conscious, but not in the nonconscious, prime condition. Importantly, reported effort was found to be unrelated to outcome expectancies in all conditions. This suggests that increased expectancies in the conscious as well as the nonconscious prime condition were not caused by increases in the effort people anticipated to spend on the task. Moreover, increases in expectancies in the conscious as well as nonconscious achievement prime conditions were not accompanied by increases in the perceived value of the task, which is in line with other studies reporting that achievement priming effects on performance are not accompanied by such increases in task value (Bargh et al., 2001; Fitzsimons & Bargh, 2003).

## Experiment 3

If outcome expectancies are indeed triggered spontaneously upon achievement, this could also change people's experiences of authorship upon perceiving the outcome, as such experiences of agency rely on a match between the actual outcome and mentally accessible outcome information. Such an effect would also provide stronger evidence for the spontaneous nature of the effect of achievement priming on outcome expectancies, as this would indicate that augmented expectancies of successful outcomes also arise when people are not explicitly asked to reflect on them. If the experience of agency indeed involves an authorship ascription process that relies on a comparison between spontaneously activated expectations of higher outcomes and actual outcomes (Aarts et al., 2005; Wegner & Sparrow, 2004), then a match between the observed outcome and the pre-activated outcome should increase this sense of agency, whereas a mismatch should decrease it. In the context of our task, if the observed outcome is higher than chance, participants primed with the concept of achievement should experience more self-agency (that is, they should attribute these successful outcomes to themselves, rather than to another person), as these outcomes match with their personal outcome expectancies. Following the same reasoning, lower agency ratings are predicted for outcomes that are lower than chance, and therefore represent a mismatch to successful outcome expectancies.

To test this idea, we made use of an experimental set-up in which the exclusivity of the cause of the task outcome is ambiguous. Earlier research shows that priming effects on authorship processing are particularly acute when the source of the outcome is

unclear (Aarts, 2007; Aarts et al., 2005; Wegner & Wheatley, 1999). Building on this work, in this experiment we subliminally primed participants with achievement or not, and confronted them with three blocks of a lexical decision task, each followed by outcome feedback varying in the level of success (unbeknownst to participants, the feedback in the three blocks was either 30%, 50%, or 70%, in randomized order). However, participants were told that a fellow participant in a different cubicle was performing the same task and that the outcomes that they would receive after each block would either be their own or that of the other participant. This procedure rendered the exclusivity of the cause of the performance ambiguous. Participants were then asked to indicate their experienced self-agency by reporting whether the observed task outcome was caused by themselves or by the other agent (i.e., the other participant). This comparison between one's own and another person's outcomes made sure that *personal* outcome expectancies were measured.

Based on the findings of Experiments 1 and 2, and our ideas about the authorship ascription process involved in agency ascriptions, we expected that priming achievement would increase perceived self-agency when outcome feedback was relatively high, but would decrease it when outcome feedback was relatively low.

## Method

### Participants

Fifty undergraduates participated in the experiment in exchange for € 3 or extra course credit. They were randomly assigned to either a nonconscious achievement prime or no achievement prime-control condition.

### Procedure

Upon arrival at the laboratory, participants were told that they would take part in research conducted by different investigators that involved performing several tasks on a computer. The computer program provided the instructions, and participants worked in separate cubicles. After some general instructions and practice with the computer program, participants started with the first task of the session.

The first task was the same letter-detection task used as the first task in Experiments 1 and 2. As in Experiment 1, the nonconscious achievement prime and no achievement prime-control conditions were instantiated during this task.

Next, participants were exposed to a second task ostensibly designed to examine experiences of personal causation, and how these experiences come and go. The task and instructions were similar to those used in Experiment 1, with a few critical differences. The experimental task consisted of three blocks, each of which had 20 trials. Participants were told that the words that would be presented would be randomly drawn out of a set of 1000 existing words and 1000 random letter strings, and that the presented words within each block, in principle, could all be existing words or non-existing words. In actuality, half of the letter strings in each block were existing words (none of which were achievement-relevant), and the other half were not. Each trial used the same timing and presentation procedure used in Experiment 1, but after each block participants were provided with feedback that could either represent information about their own performance on that block or information about another participant's performance who took the same task. The feedback was provided in terms of percentage of correct responses, and the following percentages were used: 30%, 50%, or 70%. Each participant received each level of feedback across the three randomly presented blocks. On receipt of the feedback, participants were asked to indicate the

extent to which they felt that the feedback related to their own performance. This perceived agency rating was assessed on a 1 (not at all me) to 10 (absolutely me) scale (see also Aarts et al. (2005), for this measurement).

Following the second task, participants were asked to indicate, on a 1 (not at all) to 9 (absolutely) scale, whether their experiences of agency regarding the feedback were influenced by the initial letter-detection task. Participants' reports on this measure did not differ across conditions,  $F_s < 1$ , suggesting that any influence of achievement priming on perceived agency was likely due to non-conscious sources. Finally, participants received a funnel debriefing as in Experiments 1 and 2. This debriefing indicated that participants did not realize the true nature of the experiment, and had not consciously processed the achievement primes.

## Results and discussion

### Effects on experienced agency

The main dependent variable was participants' experienced self-agency. This variable was subjected to a 2 (Achievement priming: no vs. yes)  $\times$  3 (Outcome level: 30 vs. 50 vs. 70) mixed model ANOVA with achievement priming as a between-participants factor and feedback level as a within-participants factor. This analysis yielded a main effect of outcome level,  $F(2, 96) = 4.95$ ,  $p = .01$ ,  $\eta^2 = .08$ . Participants' experienced agency was lowest when receiving the 30% outcome, increased with the 50% outcome, and then slightly declined with the 70% outcome. The main effect of achievement priming was not significant,  $F < 1.27$ . Most importantly, the outcome level main effect was qualified by a significant Achievement Priming  $\times$  Outcome Level interaction,  $F(2, 96) = 5.89$ ,  $p < .01$ ,  $\eta^2 = .11$ .

To test our specific hypothesis, the effect of the achievement prime on perceived agency was tested for each level of outcome. Participants primed with achievement reported lower experiences of agency ( $M = 3.77$ ,  $SD = 1.73$ ) than nonprimed participants ( $M = 5.00$ ,  $SD = 2.21$ ) when they received the 30% outcome,  $F(1, 48) = 4.86$ ,  $p = .03$ . However, within the 50 and 70% outcome conditions this difference was reversed: Achievement primed participants' experiences of agency ( $M = 6.15$ ,  $SD = 1.91$ ) were somewhat stronger than those of nonprimed participants ( $M = 5.13$ ,  $SD = 2.25$ ) after the 50% outcome,  $F(1, 48) = 3.05$ ,  $p = .09$ , and this effect was more pronounced, and significant after the 70% outcome ( $M = 5.65$ ,  $SD = 1.70$  and  $M = 4.42$ ,  $SD = 1.91$ , respectively),  $F(1, 48) = 5.89$ ,  $p = .02$  (see Fig. 2).

### Effects on task performance

To examine whether the two achievement priming conditions produced differences in the success of detecting the subliminally presented words in the second task, the proportions of correct responses were examined with a  $t$ -test. This analysis showed that the two conditions did not differ from each other on the task performance measure,  $t < 1$ . Furthermore, the average proportion of correctly categorized letter strings across conditions was 0.51 ( $SD = 0.08$ ), and this proportion did not differ from chance,  $t(49) < 1$ .

The results of this experiment show that experiences of self-agency are affected by achievement priming. When outcome feedback was higher than chance, achievement priming increased experienced agency, but when outcome feedback was lower than chance, achievement priming decreased experienced agency. These differential effects show that the effects of achievement priming on self-agency are not a sole effect of priming, but depend on the task outcomes that are encountered. As experienced self-agency is known to arise from a match between pre-activated and observed outcomes, these findings suggest that high outcome expectancies

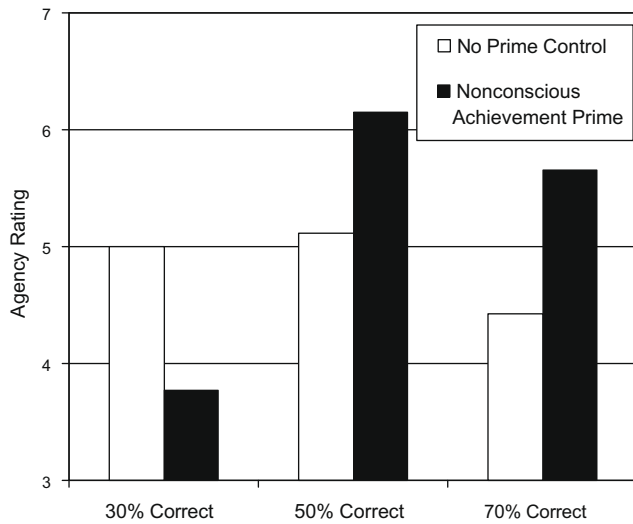


Fig. 2. Perceived agency as a function of feedback level and achievement prime condition (Experiment 3).

were generated spontaneously upon achievement priming, which either increased or decreased experienced agency through a match or mismatch with the observed high or low outcomes (cf. Aarts et al., 2005). Because these effects rely on a match between pre-activated and observed outcomes, these findings demonstrate that outcome expectancies were spontaneously activated by the priming of the achievement construct. Furthermore, the achievement-priming effects on agency experiences were independent of actual performance on the task, suggesting that participants' experiences of self-agency were illusory. Finally, awareness checks indicated that these illusions of agency occurred in the absence of awareness of the cause (i.e., achievement priming) of the effect.

Note that because participants had to ascribe outcomes to themselves or to another participant, these results cannot be explained by expectancies about task difficulty or higher task expectations in general. If achievement priming would, for example, lower participants' perceived task difficulty, this would make success more likely for themselves as well as for the other participant. Any differences in agency ratings would therefore have to be the result of *personal* success expectations, relative to expectations of success for the other participant.

It should be noted that in the 50% outcome condition, in which results were neither above nor below chance, a slight increase in agency was found. Although this effect was not significant, it is in line with earlier reported effects. Aarts (2007) found that when specific information about a match or mismatch was absent, the priming of success increased experienced agency. As the outcome at chance level would neither represent a successful nor an unsuccessful outcome, the evidence for a match or mismatch could be regarded as inconclusive, leading to the increase in experienced agency that was reported previously in the literature.

## General discussion

Three experiments explored the effects of nonconscious priming of the achievement concept on people's expectations of successful outcomes and agency ascriptions. The results of Experiments 1 and 2 showed that achievement priming led participants to expect higher performance outcomes on a subsequent task in which they had no actual control and that produced performance outcomes at chance level. These effects emerged regardless of the nature of the priming effect: subliminal as well as supralim-

inal (conscious) exposure to achievement modulated expectations of success. Importantly, the increase in expectations in the nonconscious achievement prime condition could not be attributed to variations in motivation to perform, perceived task value, or effort. The findings of Experiment 3 revealed that subliminal achievement priming increased the sense of self-agency over task outcomes when outcomes were high, but decreased experienced agency when outcomes were low. This supports the idea that the increased expectancy ratings observed in Experiments 1 and 2 reflect personal outcome expectancies, that are triggered by priming of the achievement construct, and that these expectancies arise in a spontaneous manner in the task at hand and do not have to be triggered by explicit instructions per se. The current effects of achievement priming on expectancies may therefore be explained by, or considered to ensue from, mere associations between achievement and successful outcomes that have developed over time.

### From abstract to specific outcome expectancies

As the concept of achievement may be associated with higher expectations of successful outcomes in general, these expectations – once activated – have to be translated into more concrete outcome expectancies to match the informational context pertaining to the task at hand (i.e., 50% chance). One plausible way in which such higher expectations of success could be translated into more specific outcome expectancies (e.g., higher than chance level outcomes), could be through a construal or interpretation process (e.g., Kay & Ross, 2003). It may be the case that after achievement priming the activation of expectations about higher outcomes led participants to perceive the current experimental tasks as a situation in which they would perform better than chance. In fact, this is exactly what expectancies are all about.

It seems unlikely, however, that expectancies are simply the result of construing the task as an achievement task. As Kay and Ross (2003) have suggested, achievement primes could lead people to perceive an ambiguous task more as an achievement task, which could lead people to decide to work harder on the task, because the task is seen as more meaningful or valuable. The current task, however, was specifically designed to prevent such effects from occurring. That is, the task (detecting subliminally flashed words) was pilot tested not to be diagnostic for achievement. Moreover, the task was explained in much detail to participants, thereby leaving as little room for interpretation as possible. It may therefore not come as a surprise that in the current experiments no effects of nonconscious achievement priming were found on motivation to perform well, reported effort, or task value. Hence, achievement priming did not lead participants to see the task as more valuable or important. Together, this suggests that expectancies about performance are not the result of an interpretational process interacting with the task setting and instructions. Hence, construals may play a role in translating higher expectations into more specific outcome information about the task at hand, but they do not seem to drive the effects of achievement priming on outcome expectancies and self-agency.

### Individual differences

The current findings suggest that achievement priming creates expectancies of successful outcomes through an associative link between the achievement construct and such expectancies. However, the extent to which achievement priming causes these effects is likely to be moderated by the strength of this association. Although exploring these individual differences was beyond the scope of the current research, some predictions are worth noting. For example, for people who have frequently failed to live up to their intended outcomes in achievement settings, achievement

may be associated with expectancies of lower, rather than higher outcomes. Moreover, there may be other individual differences that influence the relation between achievement and outcome expectancies. It is, for instance, known that for dysphoric people such lower outcome expectancies have become associated with the self. Hence, activating the self concept leads them to activate lower outcome expectancies (Aarts, Wegner, & Dijksterhuis, 2006). As experiences of failure to live up to outcomes are most likely to occur in settings in which achievement is at stake, achievement priming may have similar effects as self priming. As such, individual differences in dysphoria may modulate the associations between achievement and expected outcomes, which may yield different effects of achievement priming on outcome expectancies.

This suggests that associations between the achievement concept and outcome expectancies may not always be determined by the objective, but rather by the perceived contingency between the two. Diener and Dweck (1978) have noted that people differ in the extent to which they attribute failure or success to the self. Depending on this individual difference, people may be more or less likely to regard successful outcomes in achievement settings as *personal* outcomes, which may potentially affect the extent to which personal outcome expectancies become associated to, and are activated by, achievement priming. Based on the findings of the current research, however, we would predict that regardless of how associations between achievement and outcome expectancies are formed, the resulting cognitive association determines which outcome expectancies are activated by the achievement concept.

#### *Achievement-priming effects on behavior*

By demonstrating effects of achievement priming on outcome expectancies, the current findings may provide a new perspective on achievement-priming effects on performance. In the present experiments, the task was designed in a way that allowed us to eliminate performance effects, in order to study the effects of outcome expectancies independently of actual performance. The results of our experiments indeed showed that outcome expectancies and experiences of agency did not correspond with actual performance (which was always at chance level), nor with reported effort investment.

We do, however, not exclude the possibility that outcome expectations may in turn affect performance outcomes in tasks other than the one that was used in the current experiments. In tasks in which expectancies may lead people to become more motivated to achieve or perform well – or expend more effort in the task – expectancies could alter people's behavior and consequently influence their task performance. Hence, the current findings suggest that achievement priming may not only alter performance because it directly motivates people to achieve (cf. Bargh et al., 2001), but also through changes in outcome expectations that together with value could influence performance through conscious reflections. It remains an empirical issue, though, whether such expectations may be transformed into a higher level of motivation outside the person's conscious awareness, and hence whether achievement motivation as a function of expected values can arise through non-conscious processes as well (see for evidence in favor of this notion Bijleveld, Custers, & Aarts, *in press*).

However, it could also be the case that expectancies affect behavior through other processes than motivation as a function of expected value. It could, for example, be the case that higher or lower outcome expectancies cause people to behave more or less confidently, or more or less cautious. One specific instance of such a way in which expectancies triggered by the achievement concept may affect performance is stereotype threat. Stereotype

threat refers to the apprehensions people feel when performing in a domain in which their group is stereotyped to lack ability (Steele & Aronson, 1995). Steele and Aronson (1995) demonstrated that participants belonging to stereotyped groups perform worse on a test when this test is presented as diagnostic in the relevant domain. One could argue that in this case, the framing of the task triggers the concept of achievement, which – in combination with the stereotype – creates expectancies of lower task outcomes. Importantly, stereotype threat effects are not necessarily explained in terms of a lower task motivation due to a decreased expected value of the task. In a recent review, Schmader, Johns, and Forbes (2008) conclude that physiological stress responses, a tendency to actively monitor performance, and efforts to suppress negative thoughts may all consume executive resources that cause deteriorated performance. Hence, stereotype threat may be an instance in which expectancies triggered by the achievement concept in a specific setting may trigger outcome expectancies that influence performance not necessarily through task motivation, but through other processes that impinge on performance.

This is not to say that achievement priming never has direct affect on motivation. An important moderator of achievement-priming effects on motivation may be the subjective value or desirability of the achievement concept (McClelland et al., 1953; cf. Custers & Aarts, 2005). Shah (2003), for instance, demonstrated that priming people with the name of another person who would want them to perform well (achieve) on a verbal fluency task, increased persistence on this task compared to a control group to the extent to which they were close to this person. This increase in persistence was accompanied by an increase in task goal commitment, which suggests that the extent to which achievement on that specific task was desirable for the participant in the context of the primed other determined the extent to which achievement priming increased performance. Hence, individual differences in the value of achievement may moderate achievement-priming effects on motivational behavior (cf. Custers & Aarts, 2007), and even do so by altering the value of the task at hand.

#### *Achievement priming and agency*

In addition to providing evidence for the spontaneous generation of outcome expectancies, the effects of achievement priming on experienced self-agency are interesting in their own right. When achievement-related constructs are rendered accessible before engaging in a task, people are more likely to claim authorship for high outcomes and less likely to claim authorship for low outcomes. These differential effects of achievement priming suggest that these experiences of agency are produced by matches or mismatches between expectancies and perceived outcomes. Although earlier studies have shown that priming the concept of success causes people to experience more self-agency over outcomes that are in themselves unrelated to success (e.g., stopping a rotating square on a certain position; Aarts, 2007) the current findings show that expectations of successful outcomes can also interact with outcome information when this information is meaningful in terms of success, causing people to experience more self-agency after matching than after mismatching outcomes.

There seem, however, to be limits to these effects on experienced self-agency. Our findings suggest that people do not claim authorship for outcomes only on the basis of these expectations. Although achievement priming significantly increased experienced self-agency in the 70% outcome condition, participants in this condition experienced less self-agency than in the 50% outcome condition, even though 70% is a better score. Apparently, participants realized that a high degree of success on a chance task is fairly unlikely. Hence, their experience of self-agency was constrained by their understanding of reality (cf. research on constraints in moti-

vated reasoning, Kunda, 1999). Nevertheless, even within in the 70% condition in which experienced self-agency was lower than in the 50% condition, an achievement priming effect was still present. This demonstrates that even though we may try to rely on reality and be objective, our expectations may still alter our self-causation experiences, as the authorship ascription process itself may be influenced by our expectations outside of awareness (Aarts, 2007; Wegner & Sparrow, 2004).

To conclude, the current research reveals novel effects of achievement priming. In addition to the effects reported in the literature on motivation and performance, the current studies demonstrate that achievement priming changes people's perceptions of performance. These effects are explained in terms of a cognitive association between the concept of achievement and augmented experiences of successful outcomes. These findings have important consequences for the interpretation of achievement-priming effects on performance, in that they open up the possibility that some of these effects are caused by changes in outcome expectations. As demonstrating such a chain of effects was not the purpose of the current studies, this possible route for achievement-priming effects on performance remains open for future research. Moreover, the effects on experienced agency demonstrate that achievement priming may determine to what extent people regard outcomes as their own, which can have important consequences for people's assessments of control and responsibility in achievement settings. Hence, activating the concept of achievement may have important psychological consequences, not only because it affects the actual outcomes people produce, but also because it affects the way in which these outcomes are perceived.

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