FlashReport

Goal pursuit is grounded: The link between forward movement and achievement

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ABSTRACT

We tested whether forward movement is cognitively associated with the achievement goal. We exposed participants to simple visual cues of forward movement, or not, and then measured their achievement motivation. The findings show that incidental exposure to forward movement cues nonconsciously activated an achievement goal. In Experiment 1, those primed with forward movement versus control cues showed significantly greater implicit positivity toward the concept of achievement. In Experiment 2, those primed with forward movement versus control cues performed significantly better on word puzzles. There was no effect on participants' conscious achievement motivation. We discuss the implications of the results for the perspective of goal pursuit as grounded cognition.

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What is a goal? Researchers claim that a goal can be defined as a cognitively represented end-state that is desired, and that influences evaluations, emotions, and behaviors (e.g., Bargh, 1990; Custers & Aarts, 2010; Elliot & Fryer, 2008; Fishbach & Ferguson, 2007; Shah & Gardner, 2008; Kruglanski, 1996). Although this definition specifies a variety of types of information (e.g., means, obstacles, affect), it is silent on the recent debate in the social and cognitive literatures concerning the grounded nature of that information.

Classical theories of cognition assume that knowledge representations are amodal, and exist independently of the brain's modal systems for perception, action, and introspection (e.g., Collins & Qullian, 1969; Tulving, 1983). Theories of grounded cognition, on the other hand, assume that the environment, situations, the body, and simulations in the modal systems all influence (or, ground) knowledge representations (Barsalou, 2010; Lakoff & Johnson, 1980; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005; Smith & Semin, 2004; Williams, Huang, & Bargh, 2009). Theories of grounded cognition have been used to explain the burgeoning literature on both embodied and metaphorical cognition (see Landau, Meier, & Keefer, 2010). In this paper, we argue that goal pursuit should be considered as grounded cognition, and offer an initial test of this claim.

Goals as grounded

Like most theory in social psychology (see Niedenthal et al., 2005), the contemporary perspective on goals assumes that cognitive information (i.e., representations) relevant to goals exists in a semantic structure independent of the brain's modal systems. For example, the representations underlying goals are usually described as existing in a semantic associative structure (e.g., Bargh, 1990; Fishbach & Ferguson, 2007; Kruglanski, 1996; Kruglanski et al., 2002), and a propositional knowledge base (e.g., Strack & Deutsch, 2004), both of which have been assumed to be implemented via amodal data structures.

The grounded view of cognition, on the other hand, would suggest that goal relevant information would (also) consist of modality specific representations and input from the environment and the body (e.g., Barsalou, 2010; Niedenthal et al., 2005; Smith & Semin, 2004; Landau et al., 2010). Thus, goal representations should contain modality specific information (e.g., posture, movement, temperature). In addition, links between goals and embodied information should eventually develop into metaphors that go beyond embodied information (Landau et al., 2010). One claim that follows from this perspective is that simple embodied or metaphorical information by itself, outside of any goal context, is sufficient to trigger the associated goal. We predicted that if goals are scaffolded on embodied or metaphorical knowledge (Williams et al., 2009), such embodied or metaphorical knowledge should be sufficient (at least in some cases) to activate the corresponding goal.

Achievement as grounded

As a test case, we examined the goal of achievement and its metaphorical link to movement. We predicted that achievement should be associated with the concept of forward movement. Organisms have to move themselves forward through space in order to attain what they need and want. These experiences that connect in a literal way bodily cues of forward motion with desired end-states (e.g., a loved one, food) might provide the basis for using

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forward movement as a metaphor to understand striving more generally. That is, such early experiences may eventually serve as scaffolding (Ackerman, Nocera, & Bargh, 2010; Williams & Bargh, 2008) for understanding the more conceptual goal of achieving. In this way, forward movement might be metaphorically invoked to understand all kinds of achievement pursuits, even when the striving is orthogonal to moving through space, such as attracting a mate, solving a puzzle, or watching one's waistline.

To test whether simple cues of forward movement would activate a general achievement goal, we identified rudimentary visual cues that are suggestive of forward movement. We selected stimuli with a three-dimensional quality that suggests a path or corridor, and that stretch to a point-perspective. We also identified two kinds of stimuli that meet these criteria, one static and one dynamic. We measured goal activation by assessing people's implicit positivity toward the goal (Ferguson, 2007, 2008; Ferguson & Bargh, 2004; Sherman, Rose, Koch, Presson, & Chassin, 2003), as well as the behavioral pursuit of the goal (e.g., Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trotschel, 2001).

Experiment 1

Method

Participants

One hundred and sixty-seven undergraduates participated in the experiment in exchange for course credit or pay.

Procedure

Visual cues. We created two versions of the static linear perspective. In the first, classic version (SP_1), the two lines converge at a point at the top of the screen. In the other version (SP_2), multiple lines extend from the sides of the screen and converge at the center of the screen. Both of these cues create linear perspective and were expected to induce the goal to achieve (e.g., Andersen, 2007; Damisch, 1994; Kemp, 1992). Our dynamic perspective cue (DP) consisted of a sequential presentation of concentric circles of varying sizes, which was meant to mimic the experience of depth (e.g., a "tunneling" effect).

We included four control conditions. In one (Control-Blank), there were no visual cues presented. In another (Control-Flipped-SP), we presented the upside down version of SP_1. This ensures that there is nothing about the lines per se that induce achievement (the upside down version does not suggest forward movement). In another control condition (Control-Random), we presented small arrows in random areas of the screen to ensure that there is nothing about arrows per se that induces achievement. Finally, in the last control condition (Control-Movement/Focus), we included arrows that moved from the edges of the screen to the middle of the screen. This tested for whether movement of any kind is sufficient to induce achievement, even if it does not signal *forward* movement. This condition also tested for the possibility that inducing attentional focus on a certain area of the screen is sufficient to induce achievement.

Forward movement priming task. Participants were presented with the cues described above in blue or purple color on the computer screen, and were asked to decide whether each is blue or purple by pressing keys labeled as "blue" or "purple." In each condition there was a set of shapes that were shown at random for a total of twenty times.

Measure of implicit positivity. Participants then completed an implicit attitude measure (Ferguson, 2008), in which they were asked to evaluate each of a series of target words on the computer screen as "good" or "bad" as quickly and as accurately as possible. The target stimuli were valenced adjectives (e.g., beautiful, disgusting). Before each target, a prime word was presented briefly. This prime was either

the word *achieve* or a control word unrelated to achievement. Participants were primed 12 times with the word *achieve*, and 28 times with control words. The sequence for each trial was as follows: a centered fixation cross for 3000 ms, a mask ("&!%$)@#%$@!") for 56 ms, the prime word for 28 ms, the same mask for 42 ms, and then the target word.

Demographics survey. Participants completed questions in a demographic survey, including questions about their mood (1 = negative to 11 = positive), and the importance of achieving at school (1 = not at all to 11 = very much).

Finally, participants were asked about the purpose of the experiment, whether they saw any relation between the tasks, or noticed anything unusual. They were then fully debriefed and thanked for their participation.

Results and discussion

Awareness

No participant guessed the hypothesis of the study or the relation between the tasks. One participant was excluded due to learning English only within two years of the current study.

Implicit positivity

Only response times (RTs) to correct responses were analyzed (error rate was 2%). For ease of interpretation, the analyses were conducted on the raw data, but the analyses are identical when using log-transformed data.

To calculate an index of implicit positivity toward achievement, participants' RTs to the positive adjectives that followed the achievement primes were subtracted from their RTs to the negative adjectives that followed the achievement primes (e.g., Ferguson, 2007, 2008). To calculate an index of implicit positivity toward the control words, participants' RTs to the positive adjectives that followed the control primes were subtracted from their RTs to the negative adjectives that followed the control primes.

Participants' positivity toward achievement was entered into a univariate ANCOVA with priming condition as the between-participants factor and positivity toward the control primes as the covariate. As predicted, there was a significant effect of the priming condition on implicit positivity toward achievement, $F(6,158) = 2.38, p = .031$. When performing pairwise comparisons, as predicted, none of the 3 perspective conditions differed from one another, all $ps > .72$. Also, as expected, none of the 4 control conditions differed from each other, all $ps > 39$. However, also as predicted, participants in each of the perspective conditions (SP_1, SP_2, DP), showed significantly or marginally more positivity than those in each of the control conditions (see Fig. 1 for means and standard errors). Specifically, using directional one-tailed
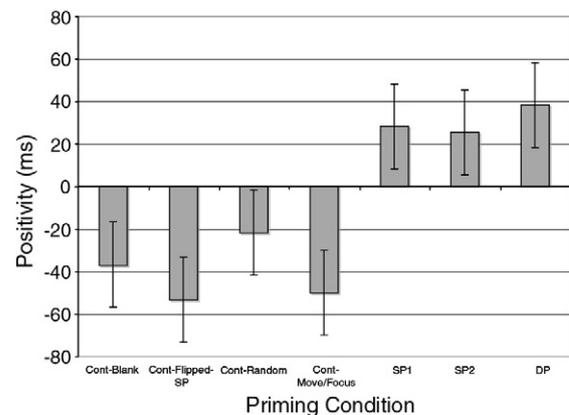
Fig. 1. Implicit positivity toward achievement as a function of priming condition.

tests, those in the SP_1 condition showed significantly or marginally more positivity than those in the Control-Blank condition ($p = .03$), the Control-Flipped-SP condition ($p = .01$), the Control-Random condition ($p = .085$), and the Control-Movement/Focus condition ($p = .015$). Those in the SP_2 condition showed significantly or marginally more positivity than those in the Control-Blank condition ($p = .04$), the Control-Flipped-SP condition ($p = .017$), the Control-Random condition ($p = .10$), and the Control-Movement/Focus condition ($p = .02$). Those in the DP condition showed significantly more positivity than those in all four control conditions ($ps < .05$).

Mood and achievement

There were no effects of the priming condition on self reported mood, $F < 1$, or achievement, $p > .37$.

These findings show that simple visual cues of forward movement were sufficient to nonconsciously activate the goal of achievement. Next, we sought to provide behavioral evidence of the achievement goal.

Experiment 2

Method

Participants

Eighty-six undergraduates participated in the experiment in exchange for course credit or pay.

Procedure

Visual cues. We used only the classic linear perspective cue (SP_1) along with the dynamic cue (DP). We included two controls: one control was the upside down linear perspective (Control-Flipped-SP) and the other cue was a series of ellipses (Control-Ellipse) that were all of the same size. Exposure to ellipses of the same size (i.e., without suggested movement) should be less likely to induce a sense of forward movement through space, and also controls for any effect of curvature on the achievement goal (Bar & Neta, 2006).

Shape priming task. Participants performed a priming task identical in design to that in Experiment 1.

Word puzzle task. Participants were then given a total of 5 min to find as many words as possible in three 10×10 word puzzles themed "Food", "Colors", and "Bugs" (Bargh et al., 2001).

Similar to Experiment 1, participants were asked within a survey about their mood and importance of achievement. They were also asked to rate how focused they were during the experiment, on a scale of 1 (not at all) to 11 (very much). Participants were then asked about the purpose of the experiment, and were fully debriefed and thanked for their participation.

Results and discussion

Awareness

Only one participant was excluded for guessing the purpose of the priming task. Another participant was excluded for not completing the entire experiment.

Puzzle performance

Performance was calculated by the sum of correct words across the puzzles. Performance was entered into a univariate ANOVA, with priming condition as the between-participants factor. As predicted, there was a significant effect of priming condition, $F(3,80) = 3.70$, $p = .015$. We performed contrasts between the perspective and control conditions. As seen in Fig. 2, those in the two perspective conditions (SP, DP) performed significantly better than those in the

two control conditions, $t(80) = 3.033$, $p = .003$. Those in the SP condition performed better than those in the Control-Flipped-SP condition, $t(80) = 1.991$, $p = .05$. Those in the DP condition performed better than those in the Control-Ellipse condition, $t(80) = 2.307$, $p = .024$.

We also ran a control condition separately to assess baseline performance on the puzzle in the absence of any shape cues. According to pair-wise comparisons, participants in this control condition did not differ from those in the two control conditions, both $ps > .42$. Participants in this separate control condition also performed significantly worse than those in both the SP and DP conditions, both $ps < .025$ (one-tailed).

Mood, focus, achievement

There were no effects of priming condition on self-reported mood, $F < 1$, focus, $p > .22$, or achievement, $p > .37$.

These findings show that simple visual cues of forward movement influenced behavioral performance. Participants in the perspective conditions performed better than those in the two control conditions, as well as those in a separate baseline condition.

General discussion

The results show that rudimentary visual cues of forward movement nonconsciously activated the goal to achieve. Participants who were primed with static or dynamic perspective cues showed significantly greater implicit positivity toward achievement, and better behavioral performance on word puzzles, compared with assorted control conditions. This is the first evidence that very simple, visual cues of forward movement increases people's motivation to achieve, even on tasks that are unrelated to spatial movement.

We interpret these findings from the perspective of goals as grounded cognition, which suggests that goal representations should include embodied as well as metaphorical information. The present results show that the achievement goal is metaphorically linked with the concept of forward movement to the degree that simple forward movement cues can activate the general goal. There was nothing embodied about the movement cues, but metaphors are presumed to develop because of initial linkages between bodily experiences and more abstract concepts (Lakoff & Johnson, 1980). We therefore argue that the metaphor between achievement and forward movement developed precisely (and, arguably, only) because initial embodied experiences of moving forward through space to secure desired objects (e.g., one's mother, food), eventually generalizes to a metaphorical link between forward movement and achievement.

It is certainly possible to explain virtually any evidence of embodied or metaphorical cognition using amodal theories of cognition (e.g., Barsalou, 2010; Niedenthal et al., 2005). However, this also means that such amodal theories are often non-falsifiable, which reduces their utility. Moreover, thinking about cognition (including goal pursuit) from a grounded perspective generates predictions that would not be
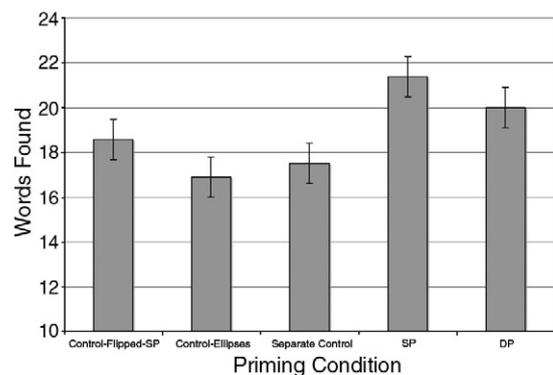

Fig. 2. Puzzle performance as a function of priming condition.

generated a priori from amodal theories. For example, if embodied and metaphorical cues are sufficient to trigger goal pursuit, this opens up an interesting new class of motivational triggers that are more considerably more low level and seemingly goal-irrelevant than has previously been assumed.

The present findings also extend work on embodiment and metaphor by testing the implications of a grounded cognition perspective for (nonconscious) goal pursuit (see also Williams et al., 2009). Previous work has largely focused on showing that embodied or metaphorical cues influence deliberate judgments and decisions (e.g., holding a warm drink increases liking judgments). Here, instead, we show that metaphorical cues can trigger actual goal pursuit (rather than judgments, decisions, or simple behaviors; see Miles, Nind, & Macrae, 2010). Moreover, although past work has shown that people are not consciously aware of the influence of an embodied or metaphorical cue on their judgments, the judgments themselves are almost invariably consciously rendered. Here, we show that metaphorical cues can also influence motivated behavior that proceeds without awareness or intention.

Appendix A. Supplementary data

Supplementary data to this article can be found online at doi:10.1016/j.jesp.2011.06.021.

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