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FlashReport

Planning is for doing: Implementation intentions go beyond the mere creation of goal-directed associations

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ABSTRACT

Studies on implementation intentions so far have mainly pointed towards strengthened cue-behavior associations as the mechanism underlying the effectiveness of this self-regulatory tool. However, we propose that because it triggers people to look into the future and to mentally simulate their future behavior, planning by means of implementation intentions might go beyond the creation of goal-directed associations and thus lead to more enduring effects on behavior. We tested this hypothesis in an experiment using a longitudinal design, where participants formed an intention for a behavior that deviates from their routine, and furnished it either with associative learning of cue and behavior, forming implementation intentions, or nothing at all. Results showed that initially, learning cue-behavior associations led to the same rate of goal completion as forming implementation intentions. However, only the effect of implementation intentions was maintained at the second measurement one week later. These findings suggest that planning does more than merely create goal-directed associations, which might offer a new perspective on the workings and use of this important tool for behavior change.

Social psychologists allocate considerable attention to identifying mechanisms that facilitate the achievement of desired outcomes and that help people to translate their intentions into actual behavior. A highly successful tool in this respect is planning one's behavior by means of implementation intentions (Gollwitzer, 1993; Gollwitzer & Sheeran, 2006). These are concrete plans that specify a situational opportunity for reaching a goal, and the behavior that should be enacted upon encountering that opportunity (Gollwitzer & Brandstätter, 1997). However, although many studies have convincingly demonstrated the effectiveness of implementation intentions for the initiation of goal-directed behavior, surprisingly little empirical attention has been paid to the specific cognitive processes that accompany this conscious act of planning. So far, research has focused on the creation of associations between a situational cue and the relevant behavior as the mechanism underlying the effectiveness of planning (Gollwitzer, 1993; Webb & Sheeran, 2007). We propose, however, that consciously planning one's goal-directed behavior might do more than merely creating cue-behavior associations, and we report a first experiment designed to demonstrate this.

In studies using implementation intentions, participants are asked to plan their future goal-directed behavior in the format like "If situation *Y* occurs, I will initiate goal-directed behavior *X*!" (Gollwitzer & Brandstätter, 1997). Numerous studies on a wide variety of behaviors have shown that this way of planning increases the chances that the desired behavior will actually be enacted, compared to merely forming a goal intention (i.e., an intention in the format "I intend to reach Z!"; see Gollwitzer & Sheeran (2006), for an overview). Research so far indicates that these effects of implementation intentions are not caused by an increase in motivation to achieve the planned goal, but rather by a different cognitive set-up deriving from the act of planning (Aarts & Dijksterhuis, 2000; Aarts, Dijksterhuis, & Midden, 1999; Martijn et al., 2008; Webb & Sheeran, 2007). Specifically, planning creates a strong cognitive association between a situational cue and the goal-directed behavior, so that this planned behavior may be triggered and initiated automatically when the cue signaling the specified situation is encountered (Webb & Sheeran, 2007; Gollwitzer & Brandstätter, 1997). Empirical evidence has supported the idea that cue-behavior associations contribute significantly to the effects of planning on the instigation of behavior directly afterwards (Aarts et al., 1999; Webb & Sheeran, 2007).

However, implementation intentions have been shown to be beneficial not only for the instigation, but also for the maintenance of the desired behavior over a longer time period (e.g., Holland, Aarts, & Langendam, 2006; Milne, Orbell, & Sheeran, 2002; Sheeran & Orbell, 1999). In a recent study, for example, participants who had formed implementation intentions to use the recycle bins in their offices significantly improved their recycling behavior over

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control participants directly after the planning, and, more importantly, they also kept up this new behavior over a period of two months (Holland et al., 2006). To date, however, no studies have examined the mechanisms underlying such long-term effects of planning, so the question remains whether these effects are due to the same mechanism that causes the direct effects of planning. The present study was designed to address this question, and we suggest that the long-term effects of planning might not be caused by cue-behavior associations alone.

Planning is an important human trait that allows us to consciously envision the future and to choose a behavior to enact then (cf. Tolman, 1949). Implementation intentions make use of this trait by asking participants to specify a situation that is suited for goal-directed behavior, and to formulate the behavior that they will perform in that situation. Doing this requires participants to imagine the critical situation and the required behavior, and this process of mental simulation might lead to an enhanced consolidation of the behavior in long-term memory that goes beyond the formation of cue-behavior associations (Driskell, Copper, & Moran, 1994). This might be the reason that planning has an effect on behavior even after a delay, and it might therefore have a more lasting effect than would be caused by the mere creation of associations.

The present study was designed to examine the added benefits of planning in a longitudinal design that compares an implementation intentions condition with a condition in which participants learn associations between a situational cue and a goal-directed behavior, which have been argued to underlie the effects of implementation intentions. We examine the effect of these manipulations on behavior in an immediate test and after a delay of one week. We suggest that although cue-behavior associations might be adequate to enhance goal-directed behavior on the short-term, the effects of actual planning will be superior on the long-term.

Method

Participants and design

Fifty-nine undergraduates participated in this experiment in exchange for a small fee or course credit. Participants were randomly assigned to the control condition, the implementation intentions condition, or the associative learning condition.

Procedure

Participants were greeted by the experimenter and accompanied to the computer laboratory, where they were seated in a cubicle. Participants were run individually and told that they would participate in several studies that were designed by different research teams.

Goal instructions

After a number of unrelated tasks, the second study was announced by the computer. Participants were told that another research team that we were cooperating with was seated in the cafeteria, and that we would like them to visit this team on their way back to the experimenter. Accordingly, all participants received the goal to return to the experimenter at the end of the experiment by walking via the cafeteria (see Aarts et al., 1999, for a similar procedure). Although all participants were familiar with the building, we told them how to get to the cafeteria to ensure that they understood the route that we asked them to use to return to the experimenter ("When you open the door of the laboratory, you have to walk to the right and around the corner to reach the cafeteria".). This behavior deviates from participants' habitual behavior, as they usually turn left upon exiting the laboratory and walk to the experimenter by a different route. In short, they were asked to walk to the usual location by a different route.

In the *associative learning condition*, participants were then exposed to a task in which the computer presented words on the screen. They were told that some of the information presented in this "perceptual task" would be related to this specific research, and some to the daily life experiences of students. Each event consisted of three words belonging together, and it was participants' task simply to observe and to grasp how the words are associated (cf. for a similar association procedure, Schacter & Graf, 1986). After the third word appeared, participants could press the space bar for the next set of words. The task contained three sets of words. The critical set was "returning to the experimenter", "opening door", "turning right". The filler sets were "watching news", "coming home", "switch on TV", and "borrowing book", "counter", "show library card". These sets were presented 15 times each in a random order. In each trial, the first word (i.e., the goal) was presented in the center of the screen, followed after 1000 ms by the second word (cue) just below, and after another 500 ms, the third word (action) just below the other two words. This way, participants encoded the goal together with the cue-behavior association required to reach the goal in an unobtrusive manner.

In the *control condition*, participants received the same associative learning task after the goal instructions, with the critical set of words replaced by another filler set so that it was unrelated to the earlier instructions ("catching up", "weekend", "meeting up").

In the *implementation intentions condition*, participants had to plan the completion of their goal to return to the experimenter by walking via the cafeteria. To facilitate their planning, they were presented with a computerized form that prompted them to describe the cue and their goal-directed action in response to this cue (see also Aarts et al. (1999) for this procedure). Completing the implementation intentions and the association task both took about 3 min.

Next, all participants completed a series of filler tasks to remove the associative learning and planning effects from short-term memory. These filler tasks took 15 min. Finally, participants were told that the experimental session was finished and were asked to return to the experimenter, without further mention of the instruction to pass by the cafeteria.

Participants' behavior upon leaving the computer laboratory was recorded by a camera that was hidden in the ceiling opposite the laboratory door, and it was coded as "0" when they turned left as usual and as "1" when they turned right to walk via the cafeteria. Those participants who walked to the cafeteria received a questionnaire of the other research team, filled it in and then handed it to the experimenter in the reception room. Those participants who walked to the experimenter directly were given the questionnaire by the experimenter, who indicated to have a couple of the questionnaires available by coincidence. Finally, participants were asked to return for another experiment 1 week later, and were paid and thanked.

Forty-one participants returned for the second part of the experiment 1 week later, which again consisted of a set of computerized studies for 45 min. Returning participants did not differ from dropout participants in terms of their behavior at the first measurement, $\chi^2(1) < .7$, $p > .4$. Fifteen minutes before the end of the experiment, participants were told that we were again cooperating with another research team that was seated in the cafeteria, and they were asked to return to the experimenter by walking past the cafeteria. No further planning or learning task was included. Participants' behavior was again recorded by means of a hidden camera. Finally, participants received a short questionnaire including three questions measuring their motivation to comply with our experimental instructions (e.g., "I find it important to participate in this particular study."; $\alpha = .78$). There was no effect of experimental condition on this measure, $F < 1$.

Results

Goal completion

To test our specific hypotheses, we conducted two separate Chi-square tests for the first and the second measurement. The Chi-square test analyzing participants' behavior at the first measurement revealed a significant difference between conditions, $\chi^2(2) = 10.98$, $p < .01$. As Fig. 1 shows, participants in the implementation intentions condition performed better than control participants, $\chi^2(1) = 7.24$, $p < .01$, and participants in the associative learning condition also performed better than control participants, $\chi^2(1) = 8.46$, $p < .01$, in remembering to walk via the cafeteria.

At the second measurement, there was also a significant effect of condition, $\chi^2(2) = 7.02$, $p < .05$. However, as Fig. 1 shows, only participants who had formed an implementation intention now performed better than participants in the control condition, $\chi^2(1) = 4.34$, $p < .05$, whereas participants in the associative learning condition did not perform better than control participants, $\chi^2(1) < .5$, *ns*. Participants in the implementation intentions condition now performed significantly better than participants in the associative learning condition, $\chi^2(1) = 6.15$, $p = .01$.

Ruling out planning effects of additional relevant items

Whereas most participants merely used the cue and action words in their implementation intention form, a few mentioned additional goal-related words (e.g., "cubicle", hallway") that may potentially support effective goal achievement. We therefore tested whether the frequency of additional, potentially goal-relevant words in the implementation intentions condition was responsible for the effect of planning via an implementation intention. Two independent coders coded participants' responses to the planning form to assess the frequency of potentially action-relevant words that had not been mentioned in the instructions. The coders' ratings were highly correlated ($r = .96$), and differences were resolved by discussion. The average of additional potentially action-relevant words was 0.53. After controlling for the number of goal-relevant words, the effect of condition remained significant at both measurements, $\chi^2(2) = 10.84$, $p < .01$, and $\chi^2(2) = 7.43$, $p < .05$, respectively. Moreover, the difference between the implementation intentions condition and the control condition as well as the associative learning condition at the second measurement remained significant, $\chi^2(1) = 4.40$, $p < .05$, and $\chi^2(1) = 6.23$, $p = .01$, respectively. These analyses suggest that increased performance in the implementation intentions condition compared to the other two conditions was not due to the fact that participants in this condition included more goal-relevant words in their action representation.

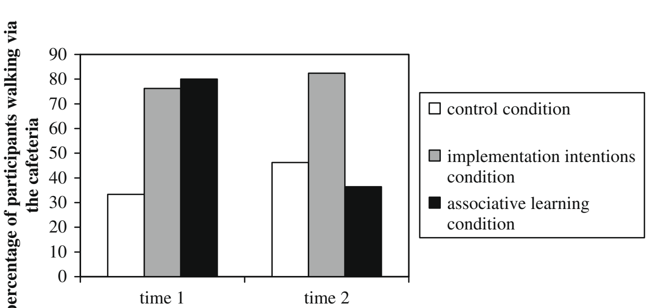

Fig. 1. Percentage of participants walking via the cafeteria as a function of condition and time of measurement.

Discussion

Our findings show that planning by means of implementation intentions leads to higher rates of goal completion than merely encoding goal-directed cue-behavior associations. While these associations triggered the relevant goal-directed behavior in an immediate test, only the effect of implementation intentions was maintained in a second test, one week later. Thus, as in earlier studies (e.g., Holland et al., 2006), planning one's behavior facilitated its performance even after a delay. However, mere cue-behavior associations were then no longer effective. To our knowledge, this is the first study considering the mechanism underlying the long-term effects of implementation intentions. These findings might be a first indication that actual planning does more than create cue-behavior associations, and therefore has lasting effects on behavior.

The present study has not yet provided evidence as to the precise nature of the additional benefits engendered by planning one's behavior, and we can only speculate as to the underlying process. However, based on research on action planning, we would like to suggest that planning might lead to a more solid grounding of representations of goal-directed action, which makes their execution more likely even after a delay. Specifically, in research on the cognitive underpinnings of action planning, it has been suggested that planning integrates sensori-motor information regarding one's future behavior into the action representation (Hommel, Müsseler, Aschersleben, & Prinz, 2001; Hommel, 2006). Thus grounding one's behavioral plans into the mental system of action and cognition enhances their consolidation in long-term memory (Barsalou, 2003; Paivio, 1986). Indeed, encoding an intended behavior by enacting, mentally simulating or mentally practicing the behavior significantly facilitates its recall and performance even after long delays, due to the integration of sensori-motor information (Driskell et al., 1994; Eschen et al., 2007; Freeman & Ellis, 2003; Grèzes & Decety, 2001; Nilsson et al., 2000). A similar process, triggered by the mental simulation of one's prospective behavior, could be underlying the long-term effects of implementation intentions (Eschen et al., 2007).

The present study was designed as a first test of our idea that conscious planning goes beyond cue-behavior associations, and to inspire new questions concerning the precise mechanisms underlying the widely used tool of implementation intentions. We think that considering recent findings from research on action planning can potentially improve our understanding of the workings of implementation intentions and ultimately, enhance their effectiveness as a tool to foster the successful achievement of desired outcomes and behavior change.

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