

Using Mental Imagery to Enhance the Effectiveness of Implementation Intentions

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Abstract Past research shows that forming implementation intentions increases the probability of carrying out goals. The present research proposes that mental imagery can strengthen the effects of implementation intentions on goal achievement. Participants were assigned a mundane goal and were randomly assigned to one of two conditions: implementation intentions only or implementation intentions plus mental imagery. Results support the hypothesis that using mental imagery when forming implementation intentions leads to higher rates of goal achievement.

Keywords Implementation intentions · Mental imagery · Goal achievement

Despite having good intentions, people all too often fail to achieve their goals. Meta-analyses of studies across a wide range of domains have shown that the average correlation between intentions and behaviour is only $r=.53$, that is, intentions on average account for only 28% of the variance in behaviour (Sheeran 2002). Two planning strategies that have separately been shown to be effective in narrowing the intention-behaviour gap are implementation intentions and mental imagery.

Implementation intentions are concrete action plans that specify in an if-then format *when*, *where* and *how* one will act in order to achieve a specific goal (“If situation *Y* occurs, then I will initiate goal-directed behaviour *X*!,” Gollwitzer 1993, 1999; Gollwitzer and Sheeran 2006). They are distinct from goal intentions in that goal intentions only specify what one wants to achieve (“I want to attain *Z*!”). Implementation intentions have been found to be much more effective than relying solely on motivation and willpower expressed in mere goal intentions. A large meta-

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analysis of implementation intentions found medium to large effects of II on goal achievement (Gollwitzer and Sheeran 2006).

Implementation intentions are assumed to enhance goal achievement by virtue of psychological processes related to the if- and the then-component, respectively. First, forming an II activates the mental representation of the critical cues, rendering them cognitively more accessible (Gollwitzer 1999). This increased accessibility makes it easier to detect, attend to, and remember the critical cues when encountered later (for example, Aarts et al. 1999; Webb and Sheeran 2004). Second, the if-then contingency format establishes a strong mental link of causality between the critical cues and the goal-directed response (Oettingen et al. 2000). In effect, forming such if-then links delegates control of the goal-directed response to the specified critical situational cues and the goal-directed response is initiated automatically when the critical cues are encountered (for example, Aarts and Dijksterhuis 2000).

In mental imagery, individuals mentally mimic perceptual, motor, and emotional experiences, resulting in mental representations of the imagined objects, situations, emotions and actions in multiple sensory modalities including, but not limited to, vision (Lang 1979). It is empirically well supported that mental imagery enhances goal achievement. The most recent meta-analysis summarizing the effects of mental practice (which is the repeated use of mental imagery) on performance found moderate average effect sizes (Driskell et al. 1994).

It has been suggested that mental imagery enhances goal achievement because it utilizes rich sensory input and leads to precise, vivid, accessible, and realistic mental representations of stimuli and actions (Lang 1979). According to the theory of functional equivalence and the recently introduced integrative neuro-cognitive theory of imagery (Murphy et al. 2008), imaging an action is equivalent to actually carrying it out as it activates the same areas in the brain (Moran 2004; empirical support: Ehrsson et al. 2003). In other words, the activation of mental representations that are congruent with the actual situation and behaviour is the mechanism through which imagery is assumed to exert its influence on performance (experimental evidence: Beisteiner et al. 1995; Gould and Damarjian 1996).

The research literatures on implementation intentions and mental imagery are largely separate and only few mentions exist of how they might relate to each other. Gollwitzer and Sheeran (2006) briefly point out that mental imagery could be a moderator of the effectiveness of implementation intentions and a few other authors have suggested that implementation intentions and mental imagery might facilitate goal achievement in a similar manner (notably Faude-Koivisto et al. 2008; Taylor and Pham 1996; Schacter et al. 2008). This perception, however, might be due to loose definitions of implementation intentions and mental imagery, which basically regard both strategies as specifying the successive steps necessary to reach a goal, that is when, where, how planning.

Relying on the more stringent definitions of mental imagery and implementation intentions presented above, we propose that strategically adding mental imagery to implementation intentions can compound the latter's effectiveness. Specifically, while when, where, how planning can be a part of mental imagery *and* implementation intentions, what is *unique* to mental imagery is that multiple sensory inputs are being used to generate mental representations of objects, situations, emotions, or goal-directed actions. This presumably leads to more

realistic representations of actual stimuli and actions and has been shown to result in stronger memory traces, which in turn benefits actual perception of stimuli and execution of actions (for example, Beisteiner et al. 1995).

Imagery, however, is not an explicit element of forming implementation intentions. Rather, forming implementation intentions relies on creating a verbal if-then statement, that is, it relies mainly on verbally-based cognitive processing. We propose that the effectiveness of implementation intentions for goal achievement can be increased by using mental imagery when forming implementation intentions that specifically targets the critical cues and the cue-response link. Mental imagery targeted on critical cues should make people even more ‘perceptually ready’ for action (Neisser 1978) because it adds rich multi-sensory information to the mental representation activated by the verbal implementation intention. Imagery-enriched implementation intentions should render the critical cues more cognitively accessible, creating a heightened sensory sensitivity to the critical situation, and this should lead to higher goal performance. The strength of the cue-response link may benefit from mental imagery because it functions like a mental rehearsal of the real execution of the link between cues and action, rendering the individual more ‘behaviourally ready’ to act. This should support the implementation intention-inherent process of automating the goal-directed response (cf. Gollwitzer and Sheeran 2006). In sum, we propose that targeted mental imagery adds sensory information to implementation intentions, leading to sensory-enriched activation of relevant mental representations and a rehearsal-based stronger cue-response link.

This pilot study served to provide initial empirical evidence for the hypothesis that explicitly instructing individuals to use mentally imagery of the crucial components of implementation intentions, namely critical cues and the cue-response link, enhances goal achievement. While the study does not test the proposed underlying mechanisms, it is the first to show that mental imagery increases the effectiveness of implementation intentions. In the study, participants were given the goal of picking up five dollars, and were randomly assigned to one of two conditions: an implementation intention only condition (II), or an implementation intention plus mental imagery condition (II+MI). We predicted a higher rate of goal achievement in the II+MI condition.

Method

Participants

Participants were recruited through online advertisements and on-campus flyers at a large North American university inviting participation in a study on plan making. Forty-eight individuals participated in the study. Ethics approval for conducting the study was received by the Research Ethics Board of McGill University.

Procedure

The advertisements and flyers stated that interested participants should email the researchers to sign up for the study. Upon emailing the researchers, participants were

sent a reply asking them to complete the following task: “Your goal will be to go to the Department of Psychology in the Stewart Biological Sciences Building to collect a sum of five dollars on Thursday or Friday of this week between 10 am and 5 pm.” Instructions on how to plan picking up the five dollars varied depending on the experimental condition as described below. All participants were sent the email either Wednesday evening or Thursday morning, so that all participants could either complete the goal on Thursday or Friday.

Participants randomly assigned to the II condition (twenty-three participants) received instructions to form an implementation intention to achieve the goal to pick up the five dollars. To form the implementation intention, participants were asked to write out on a piece of paper *when* (that is, time of day), *where* (that is, describing the exact location in the building in which the researchers’ lab is housed), and *how* (for example, route of walking or driving to the building) they would come to the lab to collect the five dollars.

Participants in the II+MI condition (twenty-five participants) received the same instructions to write out the implementation intention on a piece of paper (that is, when, where, and how they would collect the five dollars compensation). In addition they were instructed to close their eyes and vividly imagine when and where (that is, day and time and context: critical cues) they would pick up the five dollars and to vividly imagine what they will do when realizing that the critical day/time/context has arisen (cue-response link). Goal achievement was measured by recording which participants came to the lab within the given time frame. We also recorded the time at which participants arrived at the lab.

Results

To examine the hypothesis that participants in the II+MI condition would be more likely to complete the goal, the number of participants who came to the lab to collect the five dollars was compared between the two conditions using a chi-square test. More of the participants assigned to the II+MI condition came to the lab than participants in the II condition: 88 percent (twenty-two out of twenty-five) of participants from the II+MI condition completed the goal, while only 60.1 percent (fourteen out of twenty-three) of the participants from the II condition completed the goal. This difference is statistically significant ($\chi^2=4.70, p<.03$). The results thus provide initial support for the hypothesis that mental imagery increases the effectiveness of implementation intentions.

We also explored whether participants in the II+MI condition would complete the goal faster than those in the II condition, that is, whether II+MI participants would arrive at the lab earlier than II participants. Controlling for the time at which participants were sent the email, it was found that those participants in the II+MI condition who came to the lab did so on average almost four hours ($M=3.94$) sooner than participants in the II condition. However, this difference was not statistically significant, $F(1, 33)=1.29, p=.28$. This finding should, however, be interpreted in the light that the goal intention did not include instructions to come to pick up the five dollars as soon as possible. It only specified the time frame in which the money could be picked up. In the absence of such a requirement, the goal for both

conditions was to simply pick up five dollars—and consistent with our hypothesis, participants in the implementation intention plus mental imagery condition were more successful.

Discussion

The present study is the first to examine whether the effectiveness of implementation intentions can be enhanced by refurbishing them systematically with mental imagery. The results support our hypothesis that using mental imagery when forming implementation intentions increases goal achievement—that is, more participants in the II+MI condition came to the lab to pick up five dollars than participants in the II condition. The results thus provide initial support for the hypothesis that mental imagery is a moderator of the effectiveness of implementation intentions, and furthermore, that instructing individuals to use mental imagery when forming an implementation intention improves goal achievement.

We realize that the current empirical demonstration is based on a simple experimental design and can serve only as an initial step in providing evidence that mental imagery enhances the effectiveness of implementation intentions. Specifically, two limitations of the current experimental design must be considered in interpreting the results. First, the proposed mediating processes (heightened cognitive accessibility of critical cues and stronger cue-response link) were not assessed. Second, it is possible that the two experimental conditions were not equivalent in terms of the saliency of the goal, the critical cues, and the cue-response link. Participants in the II+MI condition received more exposure to the critical cues and cue-response link because they were asked to use mental imagery when forming the implementation intention. Future studies need to compensate for the additional exposure and thereby potentially increased familiarity with the cues and cue-response link by asking participants in the II condition to rehearse the implementation plan.

We hope this report will encourage future research using more controlled experimental designs to examine the ways in which mental imagery can compound the effectiveness of implementation intentions.

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