

## CHAPTER 14

## Goal Implementation

### THE BENEFITS AND COSTS OF IF-THEN PLANNING

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Although the relationship between goals and behavior is substantial (Webb & Sheeran, 2006), even very motivated individuals at times fail to act on their goals. In this chapter, we discuss the role of plans in linking goals with actual behavior. We focus specifically on a certain type of plan, an if-then plan known as an implementation intention, and review its place in the course of goal striving. We review the mechanisms underlying the effects of implementation intentions. Then, we address the benefits and costs associated with these mechanisms of implementation intentions, as well as if-then planning in general. Last, we discuss what personal and situational factors moderate the effectiveness of implementation intentions, as well as the formation of implementation intentions.

#### Implementation Intentions and the Rubicon Model of Action Phases

The relationship between goals, planning, and behavior is outlined in the “Rubicon model of action phases” (Heckhausen & Gollwitzer, 1987; Gollwitzer, 1990). In this model, goal striving is temporally organized into four phases, which differ in both the tasks that are to be accomplished and the mind-sets associated with these tasks. The first predecisional phase involves

considering the desirability and feasibility of various unattained wishes and desires. Its associated deliberative mind-set is associated with open-mindedness and even-handed consideration of alternatives, such as when deciding between various wishes to pursue or even the choice between action and inaction (Heckhausen & Gollwitzer, 1987; Beckmann & Gollwitzer, 1987). This predecisional stage culminates in a *goal intention*, a desired end-state the individual is committed to achieve: “I intend to perform Behavior X/to reach Outcome X” (e.g., to exercise regularly, to get an “A” in Introductory Psychology). This transformation from considering unattached wishes and desires to forming a goal intention is described as “crossing the Rubicon,” because it is at this point that goal pursuit begins; from this point, one can either succeed or fail in achieving the goal intention. However, most goal-directed actions do not flow directly from this goal intention; often individuals fail to initiate any goal-directed behaviors after forming their goal intention. This may occur because individuals forget to act on their goal after it is formed, they miss good opportunities to act toward their goal, or they succumb to initial reluctance to act as is the case with goals that require overcoming unpleasant experiences at the start (e.g., starting to exercise; Gollwitzer & Sheeran, 2006). But even if people succeed with starting to act on their goals, there is always a risk that they will be derailed by difficulties, distractions, and disruptions (Gollwitzer, Bayer, & McCulloch, 2005). These problems associated with starting and continuing to act toward one’s goals can be ameliorated by planning out how one’s goals may be reached.

The time for planning comes in the preactional phase of goal pursuit, where the individual may arrange when, where, and how to act to realize the committed goal. Such planning is associated with an implemental (i.e., means-oriented) mind-set. This mind-set has been found to focus attention on information relevant to goal achievement (Beckmann & Gollwitzer, 1987) and away from the pros and cons of the selected or nonselected goals (Taylor & Gollwitzer, 1995; Gollwitzer, Heckhausen, & Steller, 1990). Ideally, this implementation-focused reasoning may result in one or more if-then plans, known as *implementation intentions* (Gollwitzer, 1993, 1999). This type of plan specifies an anticipated concrete situation that may signal an appropriate time to initiate goal-directed behaviors, and a response that could be used to work toward achieving the goal intention (i.e., an instrumental goal-directed response).

In the third stage of the model, the action phase, the goal-directed actions are actually initiated. This may involve enacting one planned behavior (e.g., getting the oil changed in the car as intended) or maintaining a number of goal-directed responses over a period of time. For example, to achieve an “A” in Introductory Psychology as intended, a student must carry out numerous studying behaviors, or enact one planned study

behavior numerous times throughout the semester. Thus, the action phase may be short or long in duration.

Finally, in the postactional phase, the outcomes of the goal-directed actions are evaluated against what was desired when the goal intention was formed (e.g., the student compares the final grade with the desired "A"). If there is still a gap between the desired state and the current situation, the individual may start to engage in new planning on how to reach the goal, or even in new deliberation on whether the goal should be given up and other goals should be pursued instead.

Thus, it is in the preactional phase that implementation intentions are formed, but they are then carried by the individual into the action phase. From there, implementation intentions drive goal pursuit "in the moment" in a largely automatic fashion. The automaticity of the goal-directed behaviors carried out in the action phase resulting from a plan determined in the preactional phase make implementation intentions a resource-saving strategy when the opportunity to act has arrived.

Why is the temporal placement of goals and plans important? Implementation intentions are not merely a strategy that one appends to a desire to facilitate goal achievement, but a concrete plan for how to implement a selected goal pursuit. Indeed, research has demonstrated that implementation intentions facilitate goal achievement only when the related goal intention is activated. Sheeran and colleagues found that their participants benefited greatly from implementation intentions when they were linked to a strong goal intention, but not when the goal intention was weak (Sheeran, Webb, & Gollwitzer, 2005). So implementation intentions affect behavior only when they plan out the implementation of a valued goal intention. How do they accomplish this? Because of the if-then structure of implementation intentions, their underlying mechanisms may differ from some other types of plans (e.g., the "rational" planning and organization behaviors assessed by the Galotti-Simons Planning Survey; Simons & Galotti, 1992). We review the unique contributions of these underlying mechanisms next.

### The Mechanisms Underlying the Effects of Implementation Intentions

To form an implementation intention, the individual identifies a future goal-relevant situational cue (i.e., the if-component) and a related planned response to that cue (i.e., the then-component). Whereas a goal intention specifies the desired event in the form of "I intend to perform Behavior X/ to reach Outcome X" (e.g., to exercise regularly/ to get an "A" in Introductory Psychology), an implementation intention specifies both an anti-

ated goal-relevant situation and a proper goal-directed response. Thus, an implementation intention that served the goal intention to "get an 'A' in Introductory Psychology" would follow the form "If Situation Y arises (e.g., when I'm going to bed on Sunday night), then I will perform Behavior Z (e.g., set my alarm early to read the textbook before lecture)." An implementation intention is subordinate to its related goal intention, as it exists only to aid goal achievement (Gollwitzer, 1993, 1999). The added benefit of an implementation intention is clear: A meta-analysis by Gollwitzer and Sheeran (2006) involving over 8,000 participants in 94 independent studies reported an effect size of  $d = 0.65$ . This medium-to-large effect size (Cohen, 1992) represents the additional facilitation of goal achievement by implementation intentions compared to goal intentions alone. As goal intentions by themselves already have a positive effect on behavior enactment (Webb & Sheeran, 2006), the size of this effect is quite astounding.

How do implementation intention effects come about? The theory of implementation intentions separates the effects of the if-component from those of the then-component, as the theory proposes two processes associated with these components through which implementation intentions facilitate goal attainment (Gollwitzer, 1993). First, specifying an anticipated goal-relevant situational cue in the if-component is proposed to increase the accessibility of the critical situation. Secondly, linking a specified goal-directed response to this cue in the then-component is proposed to automate the execution of this response upon contact with the specified cue. By forming implementation intentions, people can strategically switch from conscious and effortful action initiation (guided by goal intentions in the action phase) to having their goal-directed responses automatically elicited by the specified situational cues (through the implementation intention formed during the preactional phase). We review evidence for the heightened activation of the situational cue specified in the if-component (i.e., the if-process), and the automaticity of performing the response specified in the then-component (i.e., the then-process).

#### The If-Process

Specifying a goal-relevant situation in the if-component of an implementation intention is proposed to increase the activation of the mental representation of this situation, thereby making the situational cues more accessible (Gollwitzer, 1999). Research has directly tested this accessibility hypothesis by investigating whether the cues associated with the critical situation are more accessible in individuals who have formed implementation intentions relative to those with mere goal intentions.

Aarts, Dijksterhuis, and Midden (1999) found support for the idea that implementation intentions increase the accessibility of the situational cues

related to the goal by employing a lexical decision task. First, all participants were given the goal to redeem a coupon in the middle of a mundane behavioral script (i.e., walking through the cafeteria to the building exit), as well as information about expected situational cues that would signal an opportunity to act on that goal. Half of the participants were asked to organize this information into an if-then plan. Before participants were given the opportunity to act on their goal, they completed a lexical decision task. Aarts and colleagues found that individuals who had formed if-then plans identified words related to the anticipated situational cue faster than individuals who merely had the goal to redeem the coupon. In addition, the formation of the implementation intention significantly increased participants' redemption of the coupon. Importantly, the faster lexical decision latencies for these critical words (i.e., their heightened accessibility) mediated the relationship between planning and goal attainment. This study provides support for the hypothesis that the if-process of implementation intentions increases the accessibility of the situational cues.

### *The Then-Process*

Specifying a goal-directed response in the then-component of an implementation intention has been shown to automate the initiation of the planned behavior upon contact with the situational cue, thereby allowing for goal pursuit that exhibits features of automaticity (Bargh, 1994). The automaticity of the response specified in the then-component has been supported in several studies demonstrating its immediacy (Gollwitzer & Brandstätter, 1997; Orbell & Sheeran, 2000), efficiency (Brandstätter, Lengfelder, & Gollwitzer, 2001; Lengfelder & Gollwitzer, 2001), and initiation without conscious intent (Bayer, Achtziger, Gollwitzer, & Moskowitz, in press). We will review evidence for each of these features of automaticity in turn.

The immediacy of the response specified in the implementation intention relative to responses guided by goal intentions alone has been supported by a laboratory experiment by Gollwitzer and Brandstätter (1997, Study 3). All participants were given the goal to express counterarguments to a proponent of discrimination against foreigners in Germany (presented in a video clip), and some were asked to form implementation intentions to specify a plan for how to do so. They found that participants with implementation intentions initiated the counterargument more quickly (without a cost to the quality of the arguments presented) than the participants who had merely formed the goal to counterargue. Orbell and Sheeran (2000) also found support for the immediacy of action initiation through implementation intentions in a field study of patients who had undergone joint replacement surgery. Patients who had formed implementation intentions about their recovery behaviors engaged in activities sooner than those who had not. The formation of implementation intentions mediated the

relationship between expectations of recovery and the speed of action initiation. These two studies provided evidence that the initiation of the response specified in the then-component of an implementation intention exhibits immediacy.

A second feature of automaticity has been supported by Brandstätter and colleagues, who used a go/no-go task to test the efficiency of the initiation of the response specified in an implementation intention (Brandstätter et al., 2001). Participants formed the goal intention to press a button as quickly as possible when a number appeared on the screen, but not to respond when a letter appeared. Participants in the implementation intention condition additionally formed a plan to press the response button particularly quickly if the number "3" was presented. This go/no-go task was then completed by participants merely as a secondary task in a dual-task paradigm. The efficiency of implementation intentions was supported by evidence that the response latencies to the number "3" were reduced in the implementation intention condition compared to the goal-only group, regardless of whether the simultaneous primary task was easy or difficult to perform. Brandstätter et al. found that the speed-up of the response specified in the implementation intention was unaffected by the cognitive demand of the primary task to be performed at the same time (e.g., a memorization task in Study 3 and a tracking task in Study 4). These findings provide support for the hypothesis that performing the behavior specified in the then-component of implementation intentions in response to encountering the situational cue specified in the if-component does require minimal cognitive resources.

Last, two studies by Bayer et al. (in press) tested whether implementation intentions could allow an individual to respond in a goal-directed manner without conscious intent. This line of research investigated whether implementation intentions, formed consciously in the preactional phase of goal striving, can automatically guide behavior in the action phase without a second conscious act of will. In Study 1, all participants had the goal to confront a rude individual. When the face of the rude individual was presented subliminally in a sequential priming task (in which participants were asked to read target words as quickly as possible), the words to be used in complaining to her about her rude behavior (e.g., offensive, mean, and conceited) were read more quickly by implementation intention participants than goal-only participants. This suggests that the subliminally presented situational cue enabled participants to begin bolstering themselves to act toward their goal, preparing the response specified in the then-component, even without conscious awareness of the cue. Study 2 further examined whether implementation intentions could enable actual action initiation without conscious intent. In this experiment, participants were assigned the goal to classify various figures into two categories: round or angular. Those in the implementation intention condition formed a plan

about one of these angular figures (e.g., "If I see a triangle, then I will press the right button particularly fast."). Bayer et al. found that participants in the implementation intention condition had faster response latencies for the angular figures (but not the rounded figures) when the specified situational cue (i.e., the triangle) was first presented subliminally than when it was not; no such effect was observed with goal intention participants. These subliminal priming effects suggest that the goal-directed behavior specified in an implementation intention is triggered by the anticipated situational cue without the need for a further conscious intention. Action initiation without conscious intent satisfies a central criterion for automatic action control.

The research reviewed above suggests that the two components of an implementation intention produce distinguishable effects during goal striving: The if-component heightens the activation of the specified situational cue, whereas the linked then-component automates the planned behavioral response upon contact with the cue. Often these two processes work together to enhance goal attainment. Webb and Sheeran (2007) simultaneously tested the impact of the cue accessibility associated with the if-component and the automatic response initiation associated with the then-component of the implementation intention on goal attainment. In their study, participants were either instructed to familiarize themselves with a target nonword (*avenda*) so they could respond quickly to that item (the goal-only condition), or to form a plan to respond quickly to this target nonword (the implementation intention condition). Participants were told that they would be searching for this nonword (along with others) in a word-search puzzle. Before they completed the word search, a sequential priming paradigm was used to measure the accessibility of this target nonword (i.e., the if-process) as well as the association between the target nonword and the planned response (i.e., the then-process). They found that the strength of each of these processes associated with implementation intentions independently mediated the effect of implementation intentions on goal attainment. In this experimental paradigm, both the if-process and the then-process facilitated goal attainment. However, depending on the goal being pursued and what behaviors are needed to act effectively toward that goal, these processes may help or hinder goal pursuit. The next section examines the potential benefits and costs of the if- and then-processes of implementation intentions.

### The Benefits and Costs of Implementation Intentions

What are the implications of these two mechanisms of implementation intentions for goal pursuit? In terms of goal-related outcomes, there are benefits and costs of both the heightened activation of the specified cue

afforded by the if-component (the if-process), and the automatization of the response afforded by the linked then-component (the then-process).

### The Benefits and Costs Associated with the If-Process

#### Benefits

One outcome of the heightened accessibility of the specified situational cues is that these cues are more easily identified. In an early investigation of facilitated cue detection, participants searched for a figure in an embedded figures task (Steller, 1992). Participants exhibited superior detection of the figures specified in the if-part of an implementation intention. Webb and Sheeran (2004) investigated whether this improvement in cue identification was due to increased activation or response bias. They found that participants with implementation intentions responded faster to critical cues than did goal participants but were not more likely to respond to similar but inappropriate cues (Webb & Sheeran, 2004, Study 3), supporting the heightened accessibility explanation of the enhanced identification. Thus, the if-component of implementation intentions may help individuals to quickly recognize goal-relevant opportunities when they arise.

One self-regulatory problem that this enhanced cue identification may help solve is the failure to seize a goal-relevant opportunity when it is available (Gollwitzer & Sheeran, 2006). Missing potential opportunities to act is particularly a problem for behaviors that must be initiated during a certain window of opportunity (i.e., short-fuse behaviors; Dholakia & Bagozzi, 2003). In daily life, one must act during a limited frame of time to catch a plane, vote, attend a meeting, pick up dry cleaning, or attend an exercise class. It is clear, even from this short list of examples, that many common goals are served by short-fuse behaviors. Research has shown that implementation intentions do help individuals seize the opportunity to act when it is presented briefly; in their study of short-fuse behaviors, Dholakia and Bagozzi (2003) found 70% of participants who had formed implementation intentions took advantage of the opportunity during the allotted time compared to only 33% of participants with goals alone. In a meta-analysis of 20 tests of seizing opportunities (with over 2,000 participants), Gollwitzer and Sheeran (2006) found a medium-to-large effect size of implementation intentions relative to mere goals ( $d = 0.61$ ).

Another benefit of the heightened accessibility of the situational cues specified in implementation intentions is the superior recall of the planned opportunities. In one study, research participants formed implementation intentions specifying when, where, and how they would perform an experimental task from numerous predesigned options. Immediately, or 48 hours later, participants were given a surprise task to recall all of the situational cues they had been provided. Those cues specified in implemen-

tation intentions were more successfully recalled than nonspecified cues, whether recall was tested immediately or at a later point in time (i.e., 2 days later; Achtziger, Bayer, & Gollwitzer, 2008).

Facilitated recall of specified opportunities may be especially beneficial for goal striving when opportunities to work toward the goal are rarely encountered. Sheeran and Orbell (1998) reported a strong negative correlation between the latency to act and goal achievement, illustrating that the longer the time interval between the goal intention and the opportunity to act, the less likely it is that intentions will be realized. In these cases, goal achievement may be prevented simply because individuals fail to recall how they wanted to act on their goal intention (Gollwitzer & Sheeran, 2006). For example, in an intervention designed to promote breast self-examination, 64% of women who had formed an implementation intention did perform a breast self-exam, whereas only 14% of those in the control group did. Of the participants in the control group who failed to perform a self-exam, 70% blamed their failure on forgetting to act on their goal (Orbell, Hodgkins, & Sheeran, 1997). Thus, people who have specified select opportunities in which to act on their goals will more easily recall when and where they wanted to act on them, and thus will be more likely to act in these situational contexts (e.g., a page to be marked in a booklet; Chasteen, Park, & Schwarz, 2001). According to Gollwitzer and Sheeran (2006), in their meta-analysis of 11 studies associated with remembering to act, the impact of implementation intentions was medium-to-large in size ( $d = 0.54$ ).

Another benefit of the heightened accessibility of the situational cues in the if-component is that they may be observed even when one is busy with other things. The heightened accessibility means that the specified cues command attention, disrupting even attention that is focused elsewhere. Using a dichotic-listening paradigm, Gollwitzer et al. (2002) found that words related to a specified anticipated situation presented in the unattended channel were more disruptive to focused attention for implementation intention participants than goal intention participants. Individuals who had formed a plan specifying the anticipated goal-relevant situation showed a reduction in their performance in the primary task when they heard cue-related words. The disruption of focused ongoing activity demonstrates the heightened accessibility of these cues; even when endeavoring to ignore them, the cues specified in the if-component of an implementation intention readily capture attention. This disruption of otherwise-focused attention is clearly a benefit for goal pursuits that involve unexpected opportunities to act as goal-relevant cues may appear when one is engaged in another activity or thought.

In addition, situational cues may be especially easy to miss when one is engaged in a mundane behavioral script that requires little attention to the environment. In the Aarts et al. (1999) study described earlier, participants

were presented with the opportunity to act while walking through a commonly used cafeteria to the building exit—a mundane behavioral script that required little attention to the external environment for the students. Aarts and colleagues argued that it is the increased accessibility of the situational cues that allowed participants to interrupt their mundane behavioral script and recognize the opportunity to act toward their goal. Thus, implementation intentions disrupt attention focused on goal-irrelevant topics, whether they are external or internal. These two examples represent very common situations that may impede recognition of the opportunity to act in real life. These studies provide examples of ways that the heightened accessibility of the situational cue afforded by the if-component of implementation intentions can provide benefits to goal pursuit.

### Costs

The heightened activation of the situational cue specified in a plan can also result in costs for goal pursuit. When there are multiple possible situations or various appropriate opportunities in which to engage in a given goal pursuit, this heightened activation of one approach to the goal may become a liability for overall goal pursuit. Parks-Stamm, Gollwitzer, and Oettingen (2007, Study 1) found that the facilitated identification of the planned situation specified in the if-component of an implementation intention is associated with a reduced identification of alternative goal-relevant situations relative to goal-only participants. In this study, participants were given the goal to identify all the five-letter words in a story by typing in the first letter of the word. Thus, the if-process (i.e., counting letters in words to identify the goal-relevant situation) was difficult and required much cognitive capacity, but the then-process (i.e., typing in the first letter of the word to respond) was quite easy. Because implementation intentions only aid in difficult tasks, the effect of implementation intentions on the if-process would be seen in this task. Participants were then given information about two anticipated situational cues (“Laura” and “mouse”), which would account for only half of the presented opportunities to act toward the goal. Half of the participants formed implementation intentions with these situational cues (e.g., “And if I hear Laura, then I will press L,” “And if I hear mouse, then I will press M”), and the goal participants merely familiarized themselves with these target words and the correct response. As one might expect, individuals who formed implementation intentions about these situational cues were better at identifying the situational cues specified in their implementation intentions. However, they were also worse than goal-only participants at identifying alternative, nonspecified cues that were equally valid means to achieve the desired goal.

Thus, when there are many routes to a goal, and one’s implementation intention only specifies one or two of these opportunities, the heightened

accessibility of the planned route may draw attention away from novel opportunities to act, harming overall goal pursuit. For example, if I have the goal intention to include more vegetables in my diet, and I make an implementation intention specifying broccoli as my situational cue (e.g., "if I see broccoli on the menu, then I will order that plate!"), this should increase my broccoli intake in restaurants. However, this may lead me to pass over the salads, carrots, and mixed vegetable plates. This plan may actually harm my ability to recognize other, possibly more valuable, goal-relevant situations in which to work toward my goal.

In addition to costs in identifying alternative goal-relevant opportunities to act in any given goal pursuit, planning one goal pursuit may also result in costs to other concurrent goal pursuits. The heightened accessibility of the cues specified in the if-component of implementation intentions may create costs because these cues automatically attract attention even when they are not relevant to one's current focal goal. As described above, Achtziger and colleagues (2008) showed in a dual-task paradigm that the heightened accessibility of the specified cues presented in an unattended channel disrupted performance on a primary task. The heightened accessibility of the situational cues specified for one goal pursuit thereby impeded a concurrent goal pursuit in this dual-task paradigm. This suggests that the heightened accessibility of the situational cues could result in a cost in pursuing alternative goals, as well.

Costs to alternative concurrent goal pursuits should be especially pronounced when there is an overlap between the planned situational cues and the cues currently encountered. Wieber and Sassenberg (2006) explored the effect of implementation intentions when a current (alternative) goal pursuit requires one to attend to different cues, but the specified situational cues were still present. Thus, the cues specified in the if-component of the implementation intentions for one task were actually distractors for the second task. In two studies, participants showed costs in their performance when pursuing a secondary goal because attention was drawn to the now-irrelevant cues from the prior implementation intention. Their results suggest that these costs are a result of implementation intentions drawing away limited attentional resources, rather than a derivative of the motor response system. These findings illustrate the costs planning may have for concurrently pursued goal pursuits. It also suggests that costs may be especially likely when the selected cues are commonly encountered in goal-irrelevant situations. If the cues are relevant to other goal pursuits, or are best left ignored to pursue other goals, the increased accessibility of these cues could be especially distracting.

However, even this cost has its limitations. The extent to which actual behavior is affected by an implementation intention appears to depend on the activation of the respective superordinate goal. There is evidence

that implementation intentions do not compulsorily affect behavior any time the critical situation specified in the if-part of the implementation intention is encountered, but only when its respective superordinate goal is activated (Sheeran et al., 2005, Study 2). It appears then that the heightened accessibility of the situational cues specified in the if-component of an implementation intention may automatically capture attention away from a focal goal pursuit only if the nonfocal goal that had been furnished with an implementation intention is also activated.

### ***The Benefits and Costs Associated with the Then-Process***

#### ***Benefits***

The automaticity afforded by the then-component of an implementation intention provides clear benefits for goal pursuit. Individuals are able to initiate the specified goal-directed behaviors immediately (Gollwitzer & Brandstätter, 1997; Orbell & Sheeran, 2000), efficiently (Brandstätter et al., 2001; Lengfelder & Gollwitzer, 2001), and without a second conscious act of will (Bayer et al., in press). Through implementation intentions, planned goal-directed behaviors essentially become habits that are initiated effortlessly (Aarts & Dijksterhuis, 2000). The possible benefits associated with each of these features of automaticity will be addressed individually below.

There are certain goal pursuits for which response immediacy is important and beneficial. For example, short-fuse behaviors (Dholakia & Bagozzi, 2003) must be performed in a given window of time. In these cases, responding quickly can be a benefit to goal pursuit. If people delay, considering their options and responses, the window of opportunity could pass without goal striving being initiated. Responding quickly is also particularly important for behaviors and responses that are always enacted immediately. Emergency room doctors and nurses often need to make split-second decisions in life-threatening cases, where deliberating about what response to enact could waste precious time. Providing these practitioners with implementation intentions that specify a response that can be initiated immediately when these dangerous situations are encountered could save lives when time is limited.

One benefit deriving from the efficiency of the then-response is that acting with an implementation intention allows an individual to work toward a goal without tiring as quickly as one acting on goal intentions alone. Muraven and Baumeister (2000) proposed that self-regulation failure often occurs because self-control is a limited resource, and the exertion of self-control leads to a reduction (or "depletion") of these resources. The result is a state known as *ego depletion*. In a typical demonstration of ego depletion, participants who were first asked to suppress certain thoughts

(a difficult self-regulatory task) later gave up more quickly (i.e., were able to persevere for less time) on a subsequent anagram task (Muraven, Tice, & Baumeister, 1998, Study 2). What becomes of individuals who are self-regulating based on an implementation intention?

Because of the efficiency of the response specified in the then-component, implementation intentions provide a reduction in these ego-depletion effects, improving long-term self-regulation. Webb and Sheeran (2003) found that participants who acted based on implementation intentions on a first cognitive task (i.e., a Stroop task) showed greater persistence on a second cognitive task (i.e., an anagram task) than individuals who were only acting on goals in the first task. Bayer, Trötschel, Sumner, and Gollwitzer (2006) replicated this finding, showing that even when the first task did not challenge similar cognitive resources (i.e., participants had to control their emotions while watching a movie in the first task, and solve difficult anagrams as a second task), ego depletion was reduced as evidenced in a heightened anagram performance. In a second study, Webb and Sheeran (2003) found that implementation intentions helped participants perform better after being ego depleted. The automaticity that implementation intentions afford therefore not only preserves energy for other goal pursuits (or toward maintenance of the necessary goal-directed behaviors), but also allows individuals to work efficiently toward their goals even when tired from earlier self-regulatory exertions (i.e., when in a state of ego depletion). Accordingly, in their meta-analysis, Gollwitzer and Sheeran (2006) found a particularly large effect of implementation intentions when participants were ego depleted ( $d = 1.28$ ). It does not come as a surprise then that patients with schizophrenia (who are burdened by uncontrollable thoughts) and persons in a state of withdrawal from a substance to which they are addicted (who are burdened by unwanted thoughts related to the drug urge) were found to benefit much in their action control by forming implementation intentions (Brandstätter et al., 2001, Studies 1 and 2).

A third benefit deriving from the automaticity afforded by the then-component of implementation intentions is that responses need not be considered at the time of behavior enactment. Because implementation intentions plan out a goal-directed response in advance, a second conscious act of will (or thinking up a possible response) is unnecessary. As was seen in the Bayer et al. (in press) studies, even subliminally presented critical cues were able to activate the responses specified in the then-component. Thus, even without conscious awareness of the cue, the response specified in the then-component of the implementation intention can be initiated. This automaticity would be very beneficial for individuals encountering dangerous situations in which complex thinking and decision making is not possible. For example, military personnel and police officers often must

respond to dangerous and emotional situations. Rather than formulating a viable response in situ, these individuals may enact their planned responses through implementation intentions directly.

Like a habitual response formed through repeated pairing, the behavior specified in the then-component is directly triggered by the situational cue (Aarts & Dijksterhuis, 2000). The benefits of such "strategic automaticity" (Gollwitzer, 1999) created by forming implementation intentions are similar to the benefits of positive habits for daily self-regulation. Because habitual behaviors are enacted automatically, they take up little cognitive resources, so that even when a person is ego depleted they can be maintained (Neal, Wood, & Quinn, 2006). Research has also demonstrated that behaviors controlled by habits are enacted without necessitating the prefrontal regions associated with more reflective or effortful cognitive action control (Owen, 1997). The Lengfelder and Gollwitzer (2001) finding that frontal lobe patients benefit in their action control as much from forming implementation intentions as control patients or college students suggests that the prefrontal cortex is less involved in action control by implementation intentions as well.

Recently, Gilbert, Gollwitzer, Cohen, Oettingen, and Burgess (2008) tested this hypothesis more directly in an fMRI study. In two comparable prospective memory tasks (pressing the space bar whenever a critical stimulus configuration appeared in a classification task as part of a dual task) performed consecutively in the scanner, each participant formed an implementation intention for performing one prospective memory task and a goal intention for the other. Activation was then compared within participants across these counterbalanced tasks. The results indicated that in these two tasks, the behavioral data were in line with past research in that prospective memory performance was enhanced by implementation intentions, and that this enhanced performance did not compromise the performance on the ongoing dual task. Most important, in the goal-intention condition, successful prospective memory performance was found to be based on the activation of the frontal-parietal network that is known to be associated with working memory and high-level cognitive control. In contrast, in the implementation intention condition, successful prospective memory performance was based on the activation of the premotor cortex involved in low-level motor planning and located at more posterior parietal areas of the cerebral cortex.

How does automating one planned goal-directed response affect alternative possible goal-directed responses that might be equivalently instrumental to attaining the intended goal? Unlike the process associated with the if-component, the process associated with the then-component of implementation intentions does not reduce one's use of alternative routes to the desired goal (Parks-Stamm et al., 2007, Study 2). Because forming

an implementation intention automates the initiation of the planned goal-directed response, enacting the behavior specified in the then-component of an implementation intention requires a reduced amount of time, cognitive capacity, and willpower. This efficient response allows the individual to initiate alternative goal-directed responses with the same ease as is possible for individuals without a plan. In this study, participants were given the goal to count the number of letters in every word that began with a "D." Thus, the if-process (i.e., identifying words starting with a "D" to identify the goal-relevant situation) was quite easy, but the then-process (i.e., typing in the number of letters of the word to respond) was difficult and required cognitive capacity. Because implementation intentions only aid in difficult tasks, the effect of implementation intentions on the then-process would be seen in this task. Participants were told that the two most common D-words they would encounter would be "Danny" and "dragon," which consist of five and six letters, respectively. Those in the goal condition merely memorized this information, whereas those in the implementation intention condition formed if-then plans involving this information (e.g., "If I hear 'Danny,' then I will press the 5," "If I hear 'dragon,' I will press the 6"). However, responding to these two target words represented only half of the available responses to achieve the overarching goal. In this study, participants with implementation intentions responded more frequently to the two target words than those with a goal intention, without exhibiting a cost in their response to alternative D-words. Thus, the then-component processes lead to increased initiation of the planned behavior without costs to alternatives; the automaticity associated with the then-component does not result in reductions in one's ability to enact nonspecified goal-directed behaviors.

### Costs

The automaticity of the planned goal-directed behavior in response to the specified situational cue (i.e., the then-process) may lead to costs with respect to a different aspect of goal pursuit. When the implementation intention specifies a suboptimal approach to the goal, or the planned response is no longer applicable, it might be difficult for individuals to disengage from a plan that occurs immediately, efficiently, and without a second act of will. To explore this possibility, Jaudas, Achtziger, and Gollwitzer (2006) gave participants a faulty plan and examined participants' ability to disengage from the plan. All participants were given the goal to find the shortest possible way through various mazes. They were also told that a green arrow would appear at some junctions to indicate a shortcut. Participants in the implementation intention condition additionally formed an if-then plan involving the green arrow, "And if the green

arrow appears, then I'll quickly press the button." This plan then turned out to be a poor plan for achieving their goal: The green arrow correctly indicated a shortcut only 30% of the time. As compared to participants with mere goal intentions, costs in terms of a reluctance to give up the faulty plan emerged among participants with implementation intentions when no explicit failure feedback was given (i.e., participants needed to evaluate the effectiveness of their plan by themselves). The automaticity of the response (in this case, not an instrumental response) thus appears to make it more difficult to disengage from a faulty plan, perhaps because the planned response is enacted quickly and without conscious thought, thus precluding a reevaluation of the plan. This interpretation of the participants' sluggishness to disengage from the faulty plan is supported by an additional observation in the present study. When the experimenter gave explicit failure feedback (to trigger evaluative thought) sluggish disengagement from the plan was no longer observed.

Another possible cost of the automatic then-processes includes the enactment of planned responses when the situation has changed, or when the goal is no longer present. Would response initiation occur automatically, even when the environment dictates this planned response is no longer appropriate? Further research is needed on this topic. However, because of the goal-dependent automaticity of implementation intentions, it seems possible that this type of rigidity would not be observed. Seehausen, Bayer, and Gollwitzer (1994) found that when participants were told that they no longer needed to reach an assigned goal, the effect of the former implementation intention disappeared, and Sheeran et al. (2005) reported that implementation intention effects require that the respective superordinate goal is still strong (i.e., people feel strongly committed) and in a state of high activation.

Recent work by Achtziger (2003) on prejudicial feelings toward soccer fans also indicates that implementation intentions can be applied flexibly, as their application depends upon the situation. In this study, a sequential priming paradigm was used in which pictures of soccer fans served as primes and relevant person attributes served as targets (e.g., rowdy, comradely) that had to be read as quickly as possible. Participants were given an implementation intention to block negative feelings toward soccer fans (e.g., "if I see a soccer fan, then I will not evaluate him negatively!"). Half of the pictures of soccer fans were accompanied by a tone, and participants were told that the implementation intention would only apply when the tone was heard. Implementation intention effects (i.e., relevant positive attributes were read faster than negative attributes) were observed only when the depiction of soccer fans was accompanied with a signal tone. This research suggests that implementation intentions may be applied flexibly, depending on the situation in which the situational cues are encoun-

tered. Still, the rigidity-related costs of the automaticity afforded by the then-component of implementation intentions demand further research.

### *Other Benefits and Costs of Implementation Intentions*

In addition to the benefits and costs that come directly from each of the component processes that make up implementation intentions (i.e., the if-process and the then-process), forming an if-then plan itself may have benefits and costs for goal pursuit. The following section therefore lists some other benefits and costs of if-then plans that cannot be attributed to either the if- or the then-process triggered by having formed an implementation intention. Benefits of if-then planning include ameliorating dysfunctional thoughts and emotional responses as well as overcoming strong unwanted behavioral tendencies (such as bad habits), whereas costs include rigidity associated with the sense of obligation resulting from committing to a plan.

### *Ameliorating Dysfunctional Cognitive and Emotional Responses*

One benefit of if-then planning is that it seems to reduce the planning fallacy. The planning fallacy describes the finding in which people believe they will accomplish their goals more quickly than they actually do (Kahneman & Tversky, 1979). Koole and Spijker (2000) found that individuals with implementation intentions completed their goals faster than those with a goal intention only, and that because of this performance enhancement the unrealistic optimism (actual minus the predicted rate of goal completion) was significantly less in the implementation intention condition. In fact, those with implementation intentions did not exhibit an optimistic bias at all as they fully achieved the predicted optimistic rate of goal completion.

Research by Kruger and Evans (2004) suggests another mechanism by which implementation intentions may reduce the planning fallacy, especially when more than one implementation intention is formed. They reported that breaking down a goal into subcomponents (as is necessary when concretely planning) resulted in longer predicted times for completion and thus less optimistically biased estimates. It was also found that the more complex the task, the greater the influence of considering each of its subcomponents on planning time.

Bayer and Gollwitzer (2007) combated dysfunctional beliefs in difficult academic tasks (e.g., taking the Raven intelligence test). Even when people begin a test with high self-efficacy beliefs, encountering a difficult test item may lead to weakened self-efficacy beliefs for subsequent test items. To counter such self-doubts, Bayer and Gollwitzer asked participants to form implementation intentions specifying a self-efficacy strengthening

response: "And if I start a new test item, then I'll tell myself: I can solve it!" Participants in the implementation intention condition performed better than those with mere high-achievement goal intentions or those with a self-efficacy strengthening goal intention alone. This work suggests that in addition to the typical behavioral or cognitive responses normally specified in the then-component of implementation intentions, motivation-enhancing inner speech can also be specified and thus automated through if-then planning. Thus, another benefit of if-then plans is that they may be used to address dysfunctional motivational thought (in the present case, self-doubts in the form of reduced self-efficacy beliefs):

Recent research has also explored whether adding implementation intentions to emotion-regulation goals would make these goals more effective (Schweiger Gallo, Keil, McCulloch, Rockstroh, & Gollwitzer, in press). In one study, participants were exposed to a series of pictures used to elicit disgust. When participants formed a response-focused implementation intention ("if I see disgusting scenes, then I'll stay calm and relaxed"), they exhibited a reduction in arousal compared to a control group. As anticipated, participants who operated on mere goals to not get disgusted could not willfully reduce their arousal to the disgusting pictures. A second study analyzed the control of spider fear in people with spider phobias. Both participants with response-focused implementation intentions ("if I see a spider, then I will stay calm and relaxed") and antecedent-focused implementation intentions ("if I see a spider, then I'll ignore it") experienced less negative affect in the face of spider pictures than a no self-regulation control group; again, mere goal intentions to not get frightened failed to achieve this effect. Moreover, people with spider phobias using implementation intentions even managed to control their fear to the low level observed with a sample of participants who were preselected on the basis of having no fear of spiders at all. In a final study using dense-array electroencephalography, the effectiveness of ignore-implementation intentions for the control of spider fear in people with spider phobias was replicated, and the obtained electrocortical correlates revealed that those participants who furnished their goal intention with an ignore-implementation intention showed a significantly reduced early visual activity in response to spider slides, as reflected in a smaller P1. The ignore-implementation intention seemed to function in the first 120 milliseconds after the spider pictures were presented. As conscious efforts to inhibit the activation of the mental representation of a presented stimulus are commonly assumed to show their effects no earlier than 300 milliseconds after stimulus presentation (overview by Bargh & Chartrand, 2000), the smaller P1 produced by ignore-implementation intentions also supports the hypothesis that implementation intentions lead to strategic automation of the goal-directed responses spelled out in their then-part.

A final way that planning can ameliorate dysfunctional thought is by blocking its influence on action control. For example, in negotiations the framing of potential negotiation outcomes as losses commonly leads to both suboptimal negotiation outcomes (when both parties operate under a loss frame rather than a gain frame) and unfair negotiation outcomes (when one of the parties operates under a loss frame and the other under a gain frame). These negative consequences of loss frames are observed even when the negotiators are assigned prosocial goals (to cooperate, to be fair). However, when Trötschel and Gollwitzer (2007) assigned prosocial goals to negotiators and then asked them to supplement them with implementation intentions, the negative effects of loss frames on negotiation outcomes were blocked. Forming if-then plans allowed negotiators to recruit cognitively more complex negotiation strategies which in turn facilitated the discovery of integrative solutions which served the different interests of the negotiation parties equally well.

#### *Breaking Unwanted Behavioral Orientations*

Another benefit of planning is that plans are able to break old habits and create new ones (Holland, Aarts, & Langendam, 2006). In general, breaking bad habits is very difficult to do. Even when individuals have strong intentions to change habitual health behaviors, these interventions are usually unsuccessful (Aarts, Paulussen, & Schaalma, 1997). For example, Verplanken and Faes (1999) found that implementation intentions formed to serve the goal of eating in a healthy manner did increase healthy food intake but did not reduce the habitual intake of unhealthy food. However, when implementation intentions are formed that compete with habitual behaviors, the planned behavior is able to replace the habit. For example, Holland and colleagues (2006) found that implementation intentions designed to replace environmentally unfriendly disposal habits with recycling were effective in reducing unwanted habits. The new habits replaced these past habitual behaviors even 2 months after the implementation intention was formed.

But implementation intentions can be used to break unwanted behavioral tendencies not only when these responses are based on habits but also when they originate from task sets. After having performed one task for a while, individuals experience costs in terms of errors and reaction times when they attempt to switch to a new task (Rogers & Monsell, 1995). In such cases, successful performance of the new task is only possible when responding in terms of the old task is effectively inhibited. Commonly, such inhibition is insufficient and switch costs (reduced performance on the new task) arise even when individuals have a full second to prepare for responding to the new task (Allport, Styles, & Hsieh, 1994). Could imple-

mentation intentions also be applied here, to ease the difficulty individuals experience in switching to the different responses required for the new task? Cohen, Bayer, Jaudas, and Gollwitzer (2008, Study 1) found that implementation intentions do indeed reduce switch costs. Participants only had to specify the behavior demanded in the new task and link it to an anticipated critical cue (stimulus) to respond immediately to the new task.

Finally, implementation intentions have been shown to allow the execution of a new response even in situations that have always been responded to in a different manner. Cohen et al. (2008, Study 2) used the Simon task that takes advantage of such ingrained responses: stimuli presented on the left side of a person are commonly responded to by the left arm, whereas stimuli presented on the right side are responded to by the right arm. In the Simon task, tones are presented which simultaneously feature relevant (low or high pitch) and irrelevant (left or right location) attributes. For example, the participants must answer if a tone's pitch is low or high by pressing a key with their left or right hand, respectively. In this example, responses to low-pitch tones presented on the left side (and high-pitch tones presented on the right side) are typically faster compared to responses to high-pitch tones presented on the left side and low-pitch tones presented on the right side. This congruence effect on response times is termed the "Simon effect."

The Simon effect is a robust phenomenon that can be replicated for different stimuli and in different modalities (for an overview see Lu & Proctor, 1995); it is commonly explained by so-called two-route models. One of the most cited two-route models is the dimensional overlap model (Kornblum, Hasbroucq, & Osman, 1990). According to this model, the stimulus attributes (relevant and irrelevant) are processed along two different routes. The processing of the irrelevant attribute (spatial location) is automatic and thus immediately activates a respective response. The relevant stimulus attribute is processed by the slower, more controlled processes instigated by the task goal. If processing along both routes activates the same response, one finds shorter reaction times. On the other hand, when the responses activated by the two routes are different (or incongruent) then this results in a conflict that produces longer reaction times. This "race" between information processing along the automatic and task goal routes is supported by experiments investigating the temporal relationship between coding of the irrelevant stimulus attribute and coding of the relevant attribute (e.g., De Jong, Liang, & Lauber, 1994). Cohen et al. (2008) found that forming implementation intentions designed to focus the individual on the relevant stimulus attributes (i.e., pitch of the tone) reduced the effect of spatial location for the cue specified in the implementation intention. Thus, implementation intentions eliminated the Simon effect in terms of error rates and reaction times for the critical stimulus specified in the implementation intention.

Finally, implementation intentions can be used to break a behavioral tendency that has been described as “throwing good money after bad,” or the escalation of commitment. Henderson, Gollwitzer, and Oettingen (2007) investigated the effectiveness of implementation intentions in overcoming the tendency to remain committed to a failing course of action. Participants who had chosen a certain strategy for a given goal either formed an implementation intention that specified a complex reflection response (“If I receive disappointing feedback, then I’ll think about how things have been going with my strategy!”) or a more simple action response (“If I receive disappointing feedback, then I’ll switch my strategy!”), or merely the goal to always use the best strategy available. Henderson et al. (2007) observed that action-implementation intentions facilitated disengagement as a response to experienced failure no matter whether there were signs that things were picking up or that they would continue to stay bleak. Reflection-implementation intention participants, on the other hand, integrated information about recent improvement in forming their disengagement decision (i.e., they were less willing to disengage when things were picking up). In sum, these studies show that implementation intentions can be used to curb the escalation of behavioral commitment commonly observed when people experience failure with a chosen strategy of goal striving. Using reflection-implementation intentions (as compared to action-implementation intentions) even allows for flexible disengagement in the sense that recent turns to the better are respected in one’s decision to switch (or not) to a different goal-striving strategy.

#### *Rigidity from Social Obligation*

Costs from forming implementation intentions may originate when people feel that by having formed this particular plan they are now socially obligated to act as planned, which may obstruct individuals from taking advantage of alternative opportunities to achieve their goals. Häfner (2000) explored this question by asking participants to fill out a questionnaire at the end of the experiment. Then, during the experiment, the computer “unexpectedly crashed.” The experimenter then informed the participants that it would take about 5 minutes for the computer technician to come by to fix the problem, which was enough time to fill out the questionnaire lying on the table next to the computer monitor. Significantly more participants in the goal intention condition used this unexpected opportunity than in the implementation intention condition (57% vs. 34%), demonstrating that the implementation intention hampered participants in their goal striving by binding them to the specified opportunity. A post-test questionnaire revealed that although 98% of participants responded that they noticed that the computer breakdown offered a good opportu-

nity to complete the questionnaire, 38% reported that they felt that the experimenter would not want them to complete it during that time. When these participants were excluded, there was no longer a difference between the goal intention condition and the implementation intention condition. Thus, assuming that one is obligated to act on one’s goals as specified in one’s implementation intention may very well create a burden to overall goal attainment as it prevents people from taking advantage of unexpected (unplanned) opportunities.

### **Moderators of Implementation Intention Effects**

There are numerous moderators to this relationship between planning and goal attainment including features of the goal itself and characteristics of the individual. One characteristic of the goal that moderates the success of implementation intentions is the extent to which it reflects the individual’s actual interests and values. Koestner et al. (2006) show that the positive effects of implementation intentions on goal attainment are partially dependent on whether they are formed in the service of intrinsic (high-autonomy) versus extrinsic (low-autonomy) goals. Implementation intentions that furnish intrinsic goals are more effective than those that furnish extrinsic goals. Another characteristic of the goal that moderates the effectiveness of implementation intentions is its difficulty. It is commonly found that difficult rather than easy goals are benefited by implementation intentions (Gollwitzer & Brandstätter, 1997).

As implementation intentions are subordinate to goal intentions, the strength of implementation intention effects should also be moderated by the activation of the related goal. Sheeran et al. (2005, Study 2) tested this assumption by implicitly priming half of their participants with speed-related words, thereby activating a speed goal in one condition. After the speed goal had been activated (or not), all participants formed an implementation intention on how to be fast in solving puzzles. Sheeran and colleagues found that the if-then plan only increased the speed of solving puzzles when the superordinate goal of being fast had been activated. Analogously, Seehausen et al. (1994) found that when participants were told that they no longer needed to reach an assigned goal, the effect of the related implementation intention disappeared. Once the goal was no longer activated, the common implementation intention effect of enhanced memory for the critical situation specified in the if-part of the implementation intention could not be observed any more.

Another moderator of the effect of implementation intentions is the strength of the underlying goal intention. For instance, Orbell et al. (1997) found that forming implementation intentions that specified when and

where participants wanted to perform a breast self-exam in the coming month resulted in an increased occurrence only in those participants who held a strong goal intention to perform a breast self-exam. Following up on this finding, Sheeran et al. (2005, Study 1) investigated the moderation of implementation intention effects depending on the strength of the goal intention to study. They found a significant interaction between goal-intention strength (i.e., number of intended study hours) and the effect of implementation intentions. When the goal intention to study was weakly held, the presence or absence of implementation intentions did not predict behavior; when it was moderate, implementation intentions increased their predictive validity; and when the goal intention was strong, the prediction of behavior by implementation intentions was at its highest.

In addition to features of the goal, characteristics of the individual can moderate the relationship between if-then planning and goal attainment. Implementation intentions have been found to be especially useful for individuals with poor self-regulatory abilities. People with schizophrenia, substance addicts in withdrawal (Brandstätter et al., 2001, Studies 1 & 2), and frontal lobe patients (Lengfelder & Gollwitzer, 2001) have been found to benefit as much (or even more) from forming implementation intentions than respective control groups. This is also true for children with attention-deficit/hyperactivity disorder (ADHD) who are known to have difficulties with tasks that require response inhibition (e.g., go/no-go tasks). First, it was observed that response inhibition performance of children with ADHD in the presence of stop signals can be improved by forming implementation intentions (Gawrilow & Gollwitzer, 2008). Second, this improved response inhibition is even reflected in the P300 component of electroencephalogram data (Paul et al., 2007). Typically, the P300 component invoked by no-go stimuli has greater amplitude than the P300 invoked by go stimuli. This difference is less pronounced in children with ADHD. Paul et al. (2007) found that if-then plans improved response inhibition and increased the P300 difference (go/no-go) in children with ADHD. These recent findings encourage the application of the self-regulation technique of making if-then plans in addition (or even as an alternative) to common medical therapy of ADHD.

There is one group of individuals in whom implementation intentions have been found to have a negative effect. Socially prescribed perfectionists characterized by self-critical tendencies, rejection of external control, and hypersensitivity to criticism actually experience reductions in goal attainment after having formed implementation intentions (Powers, Koestner, & Topciu, 2005). For these individuals, planning was associated with negative affect. However, the authors reported that in individuals whose perfectionism is driven by personal standards (as is the case with perfectionists who are self-oriented) implementation intentions do not obstruct but

rather facilitate goal progress. In sum, both characteristics of the goal (e.g., difficulty, activation, strength) and characteristics of the individual (e.g., perfectionism) moderate the effectiveness of implementation intentions.

What, on the other hand, moderates the formation of implementation intentions? More research is needed to explore the circumstances under which people are most likely to form if-then plans. Because implementation intentions are formed during the preactional phase of goal pursuit, it is likely that the individual's anticipation of difficulties in striving for one's goal will influence whether he/she can and wants to make plans (i.e., whether implementation intentions are formed or not). In a recent intervention study geared at changing middle-aged women's eating and exercise behavior, these women were first taught to mentally contrast a desired future of healthy eating and regular exercise with impediments (obstacles) of present reality (for details of the mental contrasting technique see Oettingen, Pak, & Schnetter, 2001). Only then they were asked to form implementation intentions that linked these perceived obstacles (if-part) to relevant goal-directed behaviors (then-part). In comparison to control participants who received persuasive information that depicted a healthy diet and regular exercise as highly desirable and feasible, women in the intervention group (mental contrasting plus implementation intentions) showed an immediate increase in healthiness of diet and regular exercise that was still observed 4 months later (Stadler, Oettingen, & Gollwitzer, in press).

Because implementation intentions require focusing on the low-level features of the goal striving (i.e., the when, where, and how of the implementation), it is also likely that being in a concrete mind-set during the preactional phase of goal pursuit that focuses on how things are done will facilitate forming implementation intentions (Freitas, Gollwitzer, & Trope, 2004). An abstract mind-set that focuses on why things are done, on the other hand, would likely draw the individual away from forming if-then plans. In the latter case, people should be in a worse position to detect obstacles and think of instrumental behaviors that are then linked together by making concrete if-then plans.

The formation of implementation intentions may also be moderated by characteristics of the individual. Implementation intentions may be more likely to be formed by some individuals than others because they differ in their ability to create links between anticipated situations and planned behaviors. Grant, Gollwitzer, and Oettingen (2006) developed a behavior-based diagnostic test of individual differences in forming strong if-then links. In this test, individuals were asked to plan out how to achieve their goals in different domains (e.g., academic, personal), including situational cues (i.e., when and where) and planned responses (i.e., how). Participants were then presented with each situation they had listed as a cue and were asked to recall the planned behavior they had generated. The response

latency for this response was taken as an indication of the individual's capability of forming strong implementation intentions. This approach was validated by a separate study, which demonstrated that those in an implemental mind-set (i.e., a mind-set focused on goal implementation) were faster in recalling the behavior portion of their implementation intentions when cued with the corresponding situation than those in the deliberative mind-set condition (i.e., a mind-set focused on estimating the feasibility and desirability of goals). This individual difference measure of the chronic tendency to form strong if-then links in implementation intentions showed discriminant, convergent, and predictive validity, and it was found to be stable over time.

### Conclusion

Implementation intentions are a powerful tool that can facilitate goal striving, but they must be formed thoughtfully. It is clear that forming implementation intentions are associated with great benefits, but they also can result in costs for goal striving. Because the enhanced activation of opportunities to act toward the goal is associated with a reduced identification of alternative cues (Parks-Stamm et al., 2007), one must be careful to select cues that have a high frequency of appearance. If one selects an infrequently encountered cue in the if-component of an implementation intention, this may actually hinder taking advantage of the majority of opportunities to act toward the goal that are encountered. To maximize the benefits that are afforded by the if-process of implementation intentions, individuals planning a goal pursuit should consider how effective the planned situational cue is.

Second, because the if-process results in automatic attentional capture of the situational cues specified in the if-component of implementation intentions, these cues can be distracting to alternative goal pursuits (Wieber & Sassenberg, 2006). If an individual specifies a situational cue in the if-component of an implementation intention that is often encountered in non-goal-relevant situations, this cue will be distracting and therefore result in costs in alternative goal pursuits. This suggests that individuals planning their goal pursuit should be careful to select cues that arise in situational contexts that are conducive to initiating goal striving. For example, to serve the student's goal of achieving an "A" in his Introductory Psychology course, he might make the implementation intention, "If I see my book, then I will begin reading it!" However, it is not appropriate for students to read their Intro book every time it is perceived, and this cue will only serve as a distraction when it is encountered in a non-goal-relevant situation. During lecture, it is possible the book will distract him,

resulting in costs for his current goal to pay attention to his professor. Thus, the student should specify a situational cue that is most likely to be encountered when a good opportunity to act has really arrived.

Third, because the response specified in the then-component is associated with automaticity, individuals with implementation intentions are sometimes more delayed in realizing when a plan is not effective. Two solutions to this problem have been offered above. First, participants may pay attention to feedback because feedback has been shown to eliminate this effect. Second, participants may form "reflection"-implementation intentions (Henderson et al., 2007). Implementation intentions that specify a more complex, reflective response in the then-component may allow individuals to consider the effectiveness of the current course of action. Third, considering the effectiveness of a chosen course of action (i.e., its instrumentality) before forming implementation intentions could eliminate this cost before it is encountered. Again, forming implementation intentions thoughtfully before goal striving begins could eliminate these costs and allow for the many benefits from implementation intentions to aid in goal achievement.

By returning to the Rubicon model, we can see that possible costs of if-then planning can be alleviated by taking much care in forming proper implementation intentions in the preactional stage of goal pursuit. By thoughtfully selecting situational cues and responses in the service of the desired goal, the individual can ensure that implementation intentions are optimally effective.

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