

CHAPTER 9

Planning Promotes Goal Striving

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Determining the factors that promote successful goal striving is one of the fundamental questions studied by self-regulation and motivation researchers (Bargh, Gollwitzer, & Oettingen, 2010; Gollwitzer & Moskowitz, 1996; Oettingen & Gollwitzer, 2001). A number of theories, and supporting empirical data, suggest that the type of goal chosen and the commitment to that goal are important determinants in whether an individual carries out the behaviors necessary for goal attainment (e.g., Ajzen, 1985; Bandura, 1997; Carver & Scheier, 1998; Elliot, 2008; Locke & Latham, 2006; Molden & Dweck, 2006; Oettingen, Pak, & Schnetter, 2001). Within these models, choosing or accepting a goal or standard is the central act of will in the pursuit of goals. We agree with this contention but argue in this chapter that further acts of will should facilitate goal attainment, in particular, when goal striving is confronted with implemental problems (e.g., difficulties getting started because of failure to use opportunities to do so; sticking to ongoing goal striving in the face of distractions, temptations, and competing goals). Such acts of will can take the form of making plans that specify when, where, and how an instrumental goal-directed response is to be enacted. More specifically, the person may take control over (i.e., self-regulate) goal striving by making if-then plans (i.e., form implementation intentions) that specify an anticipated critical situation and link it to an instrumental goal-directed response.

IMPLEMENTATION INTENTIONS: STRATEGIC AUTOMATICITY IN GOAL STRIVING

Gollwitzer (1993, 1999) has proposed a distinction between goal intentions and implementation intentions. *Goal intentions* (goals) have the structure of “I intend to reach Z!” whereby Z may relate to a certain outcome or behavior to which the individual feels committed. *Implementation intentions* (plans) have the structure of “If situation X is

encountered, then I will perform the goal-directed response Y!” Both goal and implementation intentions are set in an act of will: The former specifies the intention to meet a goal or standard; the latter refers to the intention to perform a plan. Commonly, implementation intentions are formed in the service of goal intentions because they specify the where, when, and how of a respective goal-directed response. For instance, a possible implementation intention in the service of the goal intention to eat healthy food could link a suitable situational context (e.g., one’s order is taken at a restaurant) to an appropriate behavior (e.g., asking for a low-fat meal). As a consequence, a strong mental link is established between the critical cue of the waiter taking the order and the goal-directed response of asking for a low-fat meal.

Accordingly, to form an implementation intention, one needs to identify a future goal-relevant situational cue (e.g., a good opportunity to act, an obstacle to goal pursuit) and link a related goal-directed response to that cue (e.g., how to respond to the opportunity, how to overcome the obstacle). Whereas goal intentions merely specify desired end states (“I want to achieve goal X!”), the if-component of an implementation intention specifies when and where one wants to act on this goal, and the then-component of the plan specifies how this will be done. Implementation intentions thus delegate control over the initiation of the intended goal-directed behavior to a specified opportunity by creating a strong link between a situational cue and a goal-directed response.

Implementation intentions have been found to help people close the gap between setting goals and actually realizing these goals. Evidence that forming if-then plans enhances rates of goal attainment and behavioral performance has now been obtained in several studies. A recent meta-analysis (Gollwitzer & Sheeran, 2006) involving over 8,000 participants in 94 independent studies revealed a medium-to-large effect size ($d = 0.65$) of implementation intentions on goal achievement in a variety of domains (e.g., interpersonal, environmental, health) on top of the effects of mere goal intentions. The size of the implementation intention effect is noteworthy given that goal intentions by themselves already have a facilitating effect on behavior enactment (Webb & Sheeran, 2006).

Mechanisms of Implementation Intention Effects

Research on the underlying mechanisms of implementation intention effects has discovered that implementation intentions facilitate goal attainment on the basis of psychological mechanisms that relate to the anticipated situation (specified in the if-part of the plan), the intended behavior (specified in the then-part of the plan), and the mental link forged between the if-part and the then-part of the plan. Because forming an implementation intention implies the selection of a critical future situation, the mental representation of this situation becomes highly activated and hence more accessible (Gollwitzer, 1999). This heightened accessibility of the if-part of the plan has been observed in several studies testing this hypothesis by using different experimental paradigms. For instance, Webb and Sheeran (2004, Studies 2 and 3) observed that implementation intentions improve cue detection (fewer misses and more hits), without stimulating erroneous responses to similar cues (false alarms and correct rejections). Using a dichotic listening paradigm, Achtziger, Bayer, and Gollwitzer (2010) found that words describing the anticipated critical situation were highly disruptive to focused attention in implementation-intention participants compared to mere goal-intention participants (i.e., the shadowing performance

of the attended materials decreased in implementation-intention participants). Moreover, in a cued recall experiment they observed that participants more effectively recalled the available situational opportunities to attain a set goal given that these opportunities had been specified in if-then links (i.e., in implementation intentions).

In a study by Parks-Stamm, Gollwitzer, and Oettingen (2007), participants had to identify five-letter words in a recorded story that was quickly read aloud. Before listening to the story, all participants familiarized themselves with the two most common five-letter words *Laura* and *mouse*. In the implementation-intention condition, they additionally included these words in if-then plans (“If I hear the word *Laura*, then I will immediately press the *L*; if I hear the word *mouse*, then I will immediately press the *M*”). It was predicted and found that implementation intentions would not only increase performance in response to the two critical five-letter words but also inhibit responses to the remaining five-letter words. Finally, Wieber and Sassenberg (2006) wondered whether critical cues would attract attention when they occurred during the pursuit of an unrelated goal (similar to the dichotic listening study by Achtziger et al. [2010] reported earlier). In two studies, the disruption of attention through implementation intentions was investigated by presenting critical situations (stimuli that were part of an implementation intention for an unrelated task) as task-irrelevant distractors along with task-relevant stimuli in a so-called flanker paradigm (Eriksen & Eriksen, 1974). In the first study, participants had to perform a categorization task (flowers vs. insects). Half of the participants formed implementation intentions (“If I see the word *flower*, then I will press the left control key!” and “If I see *insect*, then I will press the right control key!”). The other half of the participants formed control intentions (mere goal intentions; e.g., “I will respond to *flower* as quickly and accurately as possible!” and “I will respond to *insect* as quickly and accurately as possible!” and “I will press the left control key as quickly and accurately as possible!” and “I will press the right control key as quickly and accurately as possible!”). Next, participants worked on the ostensibly unrelated flanker task, in which they had to make word versus nonword decisions while both neutral and critical stimuli were presented as task-irrelevant distractors. The results indicated that the presence of a critical stimulus slowed down participants’ responses; however, this effect only occurred when they had formed implementation intentions, not when they had formed mere goal intentions. In the second study, these findings were replicated using a flanker task with vowel versus consonant classifications.

There are even some studies testing whether the heightened accessibility of the mental representation of critical cues as specified in an implementation intention mediates the attainment of the respective goal intention. For instance, Aarts, Dijksterhuis, and Midden (1999), using a lexical decision task, found that the formation of implementation intentions led to faster lexical decision times for those words that described the specified critical situation. Furthermore, the heightened accessibility of the critical situation (as measured by faster lexical decision responses) mediated the beneficial effects of implementation intentions on goal attainment. More recent studies indicate that forming implementation intentions not only heightens the activation (and thus the accessibility) of the mental presentation of the situational cues specified in the if-component but it also forges a strong associative link between the mental representation of the specified opportunity and the mental representation of the specified response (Webb & Sheeran, 2007, 2008). These associative links seem to be quite stable over time (Papies, Aarts, & de Vries, 2009), and they allow for priming the mental representation of the specified

response (the plan's then-component) by subliminal presentation of the specified critical situational cue (if-component) (Webb & Sheeran, 2007). Moreover, mediation analyses suggest that cue accessibility and the strength of the cue–response link together mediate the impact of implementation intention formation on goal attainment (Webb & Sheeran, 2007, 2008).

Gollwitzer (1999) suggested that the upshot of the strong associative (critical situation goal-directed response) links created by forming implementation intentions is that—once the critical cue is encountered—the initiation of the goal-directed response specified in then-component of the implementation intention exhibits features of automaticity, including immediacy, efficiency, and redundancy of conscious intent. When people have formed an implementation intention, they can act *in situ*, without having to deliberate on when and how they should act. Evidence that if–then planners act quickly (Gollwitzer & Brandstätter, 1997, Experiment 3), deal effectively with cognitive demands (i.e., speed-up effects are still evidenced under high cognitive load; Brandstätter, Lengfelder, & Gollwitzer, 2001), and do not need consciously to intend to act in the critical moment is consistent with this idea (i.e., implementation intention effects are observed even when the critical cue is presented subliminally [Bayer, Achtziger, Gollwitzer, & Moskowitz, 2009] or when the respective goal is activated outside of awareness [Sheeran, Webb, & Gollwitzer, 2005, Study 2]).

With respect to *immediacy* of action initiation, for instance, Gollwitzer and Brandstätter (1997, Study 3) observed that participants who had been induced to form implementation intentions that specified viable opportunities for presenting counterarguments to a series of racist remarks made by a confederate did initiate counterarguments sooner than participants who had formed the mere goal intention to counterargue. To test the postulated *efficiency* of action initiation, Brandstätter and colleagues (2001, Studies 3 and 4) used a go/no-go task embedded as a secondary task in a dual-task paradigm. Participants formed the goal intention to press a button as fast as possible if numbers appeared on the computer screen, but not if letters were presented. Participants in the implementation-intention condition additionally made the plan to press the response button particularly fast if the number 3 was presented. Implementation-intention participants showed a substantial increase in speed of responding to the number 3 compared to the control group, regardless of whether the simultaneously demanded primary task (a memorization task in Study 3 and a tracking task in Study 4) was either easy or difficult to perform. Apparently, the immediacy of responding induced by implementation intentions is also efficient in the sense that it does not require much in the way of cognitive resources (i.e., can be performed even when demanding dual tasks have to be performed at the same time). Finally, with respect to the postulated *redundancy of conscious intent*, Bayer and colleagues (2009) conducted experiments in which the critical situation specified in the if-component was presented subliminally. Results indicated that subliminal presentation of the critical situation led to a speed-up in responding in implementation-intention but not in mere goal-intention participants. These effects suggest that when planned via implementation intentions, the initiation of goal-directed responses becomes triggered by the presence of the critical situational cue, without the need for further conscious intent.

The postulated and observed component processes underlying implementation intention effects (enhanced cue accessibility, strong cue–response links, automation of responding) mean that if–then planning allows people to see and to seize good opportunities to move toward their goals. Fashioning an if–then plan thus *strategically automates* goal

striving; people intentionally make if-then plans that delegate control of goal-directed behavior to preselected situational cues, with the explicit purpose of reaching their goals. This delegation hypothesis has recently been tested by studies that collected brain data (electroencephalography [EEG], functional magnetic resonance imaging [fMRI]).

Schweiger Gallo, Keil, McCulloch, Rockstroh, and Gollwitzer (2009, Study 3) used dense-array EEG. Behavioral data indicated that implementation intentions specifying an ignore response in the then-component helped control fear in response to pictures of spiders in participants with spider phobia; importantly, the obtained electrocortical correlates revealed that those participants who bolstered their goal intention to stay calm with an ignore-implementation intention showed significantly reduced early activity in the visual cortex in response to spider pictures, as reflected in a smaller P1 (assessed at 120 milliseconds [msec] after a spider picture was presented). This suggests that implementation intentions indeed lead to strategic automation of the specified goal-directed response (in the present case, an ignore response) when the critical cue (in the present case, a spider picture) is encountered, as conscious effortful action initiation is known to take longer than 120 msec (i.e., at least 300 msec; see Bargh & Chartrand, 2000).

Further support for the delegation hypothesis was obtained in an fMRI study reported by Gilbert, Gollwitzer, Cohen, Oettingen, and Burgess (2009), in which participants had to perform a prospective memory task on the basis of either goal or implementation intention instructions. Acting on the basis of goal intentions was associated with brain activity in the lateral rostral prefrontal cortex, whereas acting on the basis of implementation intentions was associated with brain activity in the medial rostral prefrontal cortex. Brain activity in the latter area is known to be associated with bottom-up (stimulus) control of action, whereas brain activity in the former area is known to be related to top-down (goal) control of action (Burgess, Dumontheil, & Gilbert, 2007).

Finally, the delegation hypothesis concerning the operation of implementation intentions has also been supported by studies using critical samples—that is, individuals with poor self-regulatory abilities, such as people with schizophrenia or substance abuse disorders (Brandstätter et al., 2001, Studies 1 and 2), people with frontal lobe damage (Lengfelder & Gollwitzer, 2001), and children with attention-deficit/hyperactivity disorder (ADHD) (Gawrilow & Gollwitzer, 2008; Paul et al., 2007). For instance, Brandstätter and colleagues (2001, Study 1) asked hospitalized opiate addicts under withdrawal to write a short curriculum vitae (CV) before the end of the day; whereas half of the participants formed relevant implementation intentions (they specified when and where they would start to write what), the other half (control group) formed irrelevant implementation intentions (when and where they would eat what for lunch). Eighty percent of the relevant implementation-intention participants had written a short CV at the end of the day, whereas none of the participants with the irrelevant implementation intention succeeded in doing so.

Implementation intentions have also been found to benefit children with ADHD, who are known to have difficulties with tasks that require response inhibition (e.g., go/no-go tasks). For example, it was observed that the response inhibition performance in the presence of stop signals can be improved in children with ADHD by forming implementation intentions (Gawrilow & Gollwitzer, 2008, Studies 1 and 2). This improved response inhibition is reflected in electrocortical data as well (Paul et al., 2007). Typically, the P300 component evoked by no-go stimuli has greater amplitude than the P300 evoked by go stimuli. This difference is less pronounced in children with ADHD. Paul and colleagues

(2007) found that if–then plans improved response inhibition and increased the P300 difference (no-go/go) in children with ADHD.

Potential Alternative Mechanisms

Additional process mechanisms to the stimulus perception and response initiation processes documented in the findings described earlier have been explored. For instance, furnishing goals with implementation intentions might produce an increase in goal commitment or self-efficacy, which in turn causes heightened goal attainment. However, this hypothesis has not received any empirical support. For instance, when Brandstätter and colleagues (2001, Study 1) analyzed whether heroin addicts suffering from withdrawal benefit from forming implementation intentions to submit a newly composed CV before the end of the day, they also measured participants' commitment to do so. Whereas the majority of the implementation-intention participants succeeded in handing in the CV in time, none of the goal-intention participants succeeded in this task. These two groups, however, did not differ in terms of their goal commitment (“I feel committed to compose a CV” and “I have to complete this task”), measured after the goal- and implementation-intention instructions had been administered. This finding was replicated with young adults who participated in a professional development workshop (Oettingen, Hönig, & Gollwitzer, 2000, Study 2), and analogous results were reported in research on the effects of implementation intentions on meeting health promotion and disease prevention goals (e.g., Orbell, Hodgkins, & Sheeran, 1997). Indeed, a recent meta-analysis of 66 implementation intention studies that assessed goal commitment or self-efficacy after the formation of if–then plans revealed negligible effects on both of these variables (Webb & Sheeran, 2008); accordingly, neither an increase in goal commitment nor self-efficacy qualify as potential mediators of implementation intention effects.

IMPLEMENTATION INTENTIONS AND OVERCOMING THE TYPICAL PROBLEMS OF GOAL STRIVING

Successful goal striving is not secured solely by strongly committing oneself to appropriate goals (i.e., goals that are desirable and also feasible). There is always the second issue of implementing a chosen goal (i.e., goal striving), and one wonders what people can do to enhance their chances of being successful at this phase of goal pursuit. The answer we suggest in this chapter is the following: People need to prepare themselves in advance, so that their chances to overcome arising difficulties of goal implementation are kept high. But what are these difficulties or problems? At least four problems stand out. These problems include getting started with goal striving, staying on track, calling a halt, and not overextending oneself. For all of these problems, the self-regulation strategy of forming implementation intentions has been shown to be beneficial (see meta-analysis by Gollwitzer & Sheeran, 2006).

Given that forming implementation intentions automates goal striving, people who form implementation intentions should actually have it easier when they are confronted with these four central problems of goal implementation. Indeed, numerous studies suggest that problems of *getting started* on one's goals can be solved effectively by forming implementation intentions. For instance, Gollwitzer and Brandstätter (1997, Study 2)

analyzed a goal intention (i.e., writing a report about how the participants spent Christmas Eve) that had to be performed at a time when people are commonly busy with other things (i.e., during the subsequent 2 days, which are family holidays in Europe). Still, research participants who had furnished their goal intention with an implementation intention that specified when, where, and how they wanted to get started on this project were about three times as likely actually to write the report as mere goal-intention participants. Similarly, Oettingen and colleagues (2000, Study 3) observed that implementation intentions helped students to act on their task goals (i.e., performing math homework) on time (e.g., at 10:00 A.M. every Wednesday over the next 4 weeks).

Other studies have examined the ability of implementation intentions to foster striving toward goals involving behaviors that are somewhat unpleasant to perform. For instance, goals to perform regular breast examinations (Orbell et al., 1997) or cervical cancer screenings (Sheeran & Orbell, 2000), to resume functional activity after joint replacement surgery (Orbell & Sheeran, 2000), to eat a low-fat diet (Armitage, 2004), to recycle (Holland, Aarts, & Langendam, 2006), and to engage in physical exercise (Milne, Orbell, & Sheeran, 2002) were all more readily acted upon when people had developed implementation intentions—even though there is an initial reluctance to execute these behaviors. Moreover, implementation intentions were associated with goal attainment in domains where it is easy to forget to act (e.g., regular intake of vitamin pills: Sheeran & Orbell, 1999; the signing of worksheets by older adults: Chasteen, Park, & Schwarz, 2001).

But many goals cannot be accomplished by a simple, discrete, one-shot action because they require that people keep striving over an extended period of time. Such *staying on track* may become very difficult when certain internal stimuli (e.g., being anxious, tired, overburdened) or external stimuli (e.g., temptations, distractions) interfere with and potentially derail ongoing goal pursuit. Implementation intentions can suppress the negative influence of interferences from outside the person (e.g., disruptions by attractive video shows; Gollwitzer & Schaal, 1998). These suppression-oriented implementation intentions may take very different forms. For instance, if a person wants to avoid being unfriendly to a friend who is known to make outrageous requests, she can form suppression-oriented implementation intentions, such as “And if my friend approaches me with an outrageous request, then I will not respond accordingly!” The then-component of suppression-oriented implementation intentions does not have to be worded in terms of not showing the critical behavior; it may alternatively specify an antagonistic behavior (“ . . . , then I will respond in a friendly manner!”) or focus on ignoring the critical cue (“ . . . , then I’ll ignore her request!”).

Interestingly, suppression-oriented implementation intentions can be used not only to shield ongoing goal pursuits from disruptive external stimuli but also to curb the negative effects of interfering inner states. Achtziger, Gollwitzer, and Sheeran (2008) report two field experiments concerned with dieting (i.e., reduce snacking; Study 1) and athletic goals (i.e., win a competitive tennis match; Study 2), in which goals were shielded by suppression-oriented implementation intentions geared toward controlling potentially interfering inner states (i.e., cravings for junk food in Study 1, and disruptive thoughts, feelings, and physiological states in Study 2). An alternative way of using implementation intentions to protect ongoing goal striving from derailment is to form implementation intentions geared toward stabilizing the ongoing goal pursuit at hand (Bayer, Gollwitzer, & Achtziger, 2010). Using, again, the example of a person approached by her friend with

an outrageous request, let us assume that the recipient of the request is tired or irritated, and thus particularly likely to respond in an unfriendly manner. If this person has stipulated in advance in an implementation intention what she will converse about with her friend, the interaction may come off as planned, and being tired or irritated should fail to affect the person's behavior toward her friend.

Bayer and colleagues (2010) tested this hypothesis in a series of experiments in which participants were asked to make plans (i.e., form implementation intentions) or not regarding their performance on an assigned task. Prior to beginning the task, participants' self-states were manipulated, so that the task at hand became more difficult (e.g., a state of self-definitional incompleteness prior to a task that required perspective taking: Gollwitzer & Wicklund, 1985; a good mood prior to a task that required evaluation of others nonstereotypically: Bless & Fiedler, 1995; and a state of ego depletion prior to solving difficult anagrams: Baumeister, 2000; Muraven, Tice, & Baumeister, 1998). The results suggested that the induced critical self-states negatively affected task performance only for those participants who had not planned out work on the task at hand via implementation intentions (i.e., had only set themselves the goal to come up with a great performance). In other words, implementation intentions that spelled out how to perform the task at hand were effective in protecting the individual from the negative effects associated with the induced detrimental self-states.

These findings provide a new perspective on the psychology of self-regulation. Commonly, effective self-regulation is understood in terms of strengthening the self, so that the self can meet the challenge of being a powerful executive agent (Baumeister, Heatherton, & Tice, 1994). Therefore, most research on goal-directed self-regulation focuses on strengthening the self in such a way that threats and irritations become less likely, or on restoring an already threatened or irritated self. It is important to recognize that all of these maneuvers focus on changing the self, so that it becomes a better executive. The findings of Bayer and colleagues (2010) suggest a perspective on goal-directed self-regulation that focuses on facilitating action control without changing the self. It assumes that action control becomes easier if a person's behavior is directly controlled by situational cues, and that forming implementation intentions achieves such direct action control. As this mode of action control circumvents the self, it no longer matters whether the self is threatened or secure, agitated or calm because the self is effectively disconnected from its influence on behavior. The research by Bayer and colleagues supports this line of reasoning by demonstrating that task performance (i.e., taking the perspective of another person, judging people in a nonstereotypical manner, solving difficult anagrams) does not suffer any impairment because of the respective detrimental self-states (i.e., self-definitional incompleteness, mood, and ego depletion, respectively) if performing these tasks has been planned out in advance via implementation intentions.

The self-regulatory problem of *calling a halt* to a futile goal striving (i.e., disengaging from a chosen but noninstrumental means or from a chosen goal that has become unfeasible or undesirable) can also be ameliorated by forming implementation intentions. People often fail to disengage readily from chosen means and goals that turn out to be faulty because of a strong self-justification motive (i.e., we tend to adhere to the irrational belief that decisions we have made deliberately must be good; Brockner, 1992). Such escalation effects of sticking with a chosen means or goal, even if negative feedback on goal progress mounts, are reduced effectively, however, by the use of implementation intentions. These implementation intentions only have to specify receiving negative feed-

back as the critical cue in the if-component and switching to available alternative means or goals as the appropriate response in the then-component (Henderson, Gollwitzer, & Oettingen, 2007).

Finally, the assumption that implementation intentions subject behavior to the direct control of situational cues (i.e., strategic automation of goal striving; Gollwitzer, 1999) implies that the person does not have to exert deliberate effort when behavior is controlled via implementation intentions. As a consequence, the self should not become depleted (Muraven & Baumeister, 2000) when task performance is regulated by implementation intentions; thus, for individuals using implementation intentions, *not overextending* themselves should become easier. Indeed, using different ego-depletion paradigms, research participants who used implementation intentions to self-regulate in one task did not show reduced self-regulatory capacity in a subsequent task (e.g., Webb & Sheeran, 2003).

WHEN THE GOING GETS TOUGH: LIMITS OF ACTION CONTROL BY IMPLEMENTATION INTENTIONS?

As we pointed out earlier in the section on what implementation intentions are and how they work, implementation intentions can help people to overcome the common problems of goal striving (i.e., getting started, staying on track, disengage when things have been loused up, and preventing ego depletion). However, it would speak for the self-regulation strategy of if-then planning if it even fares well under conditions in which action is determined primarily by factors that do not appear to be amenable to self-regulation. This question and a respective recent line of research have been stimulated by Aristotle's concept of *akrasia* (lack of willpower) because any willful strategy of goal striving (e.g., if-then planning) has to prove itself under conditions in which people commonly fail to demonstrate willpower. Such conditions are manifold; thus, this research has focused on the following three situations: (1) situations in which a person's knowledge and skills constrain performance, such as taking academic tests; (2) situations in which an opponent's behavior limits one's performance, such as negotiation settings; and (3) situations in which the wanted behavior (e.g., no littering) runs into conflict with habits favoring an antagonistic response.

Performance on academic tests (math tests, general intelligence tests) is by design determined primarily by a person's knowledge, analytic capability, and cognitive skills. Thus, to increase test scores by willpower, a person may want to focus on motivational issues, such as concentrating on the various test items throughout the test or reducing worry cognitions (e.g., "Did I find the right answer on the last item?") and self-doubts (e.g., "Do I have the skills to find the right solution for the item at hand?"). Bayer and Gollwitzer (2007, Study 1) asked female high school students to take a math test (composed by high school math teachers) under one of two different instructions. Half of the participants were asked to form the mere achievement goal intention "I will correctly solve as many tasks as possible!" The other half of the participants had to furnish this goal intention with the self-efficacy-strengthening implementation intention "And if I start a new task, then I will tell myself: I can solve this task!" Participants in the implementation-intention group showed better performance in the math test (in terms of number of tasks solved correctly) than participants in the mere goal-intention condition,

indicating that self-efficacy-strengthening implementation intentions facilitate successful goal striving in a challenging achievement situation.

Implementation intentions are usually constructed by specifying a situational cue in the if-component and linking it to goal-directed cognitive or behavioral responses in the then-component. In this study (Bayer & Gollwitzer, 2007, Study 1), a critical situational cue (i.e., starting a new test item) in the if-component was linked to a motivational response (i.e., a self-efficacy-strengthening statement) in the then-part. Interestingly, this preprogrammed, inner self-motivating speech sufficed to produce better test performance. This suggests that implementation intentions can also be used to ameliorate motivational problems of goal implementation (e.g., self-doubts), thus increasing a person's willpower (i.e., the potential to exert self-control).

This manipulation to increase willpower was particularly parsimonious because it comprised only asking participants to form a plan in respect to when they would have to execute an inner self-efficacy-strengthening statement. Still, these findings leave open a pressing question: Does this inner speech need to take the format of an implementation intention? Maybe that participants simply form a goal intention geared toward holding up self-efficacy will suffice, such as "And I will tell myself: I can solve these problems!" To explore this possibility, a follow-up study included this further control condition (i.e., a self-efficacy-strengthening goal-intention condition). Using the Raven Intelligence Test, Bayer and Gollwitzer (2007, Study 2) found that performance on the test improved only when participants were instructed to form self-efficacy-strengthening implementation intentions; self-efficacy-enhancing goal intentions did not work. This finding is important for several reasons. First, many of the field and laboratory studies investigating the benefits of implementation intentions (e.g., on health behaviors, job safety, and environment protection; see meta-analysis by Gollwitzer & Sheeran, 2006) do not use an additional condition that spells out the then-part of the implementation intention in terms of a goal intention (for an exception, see Oettingen et al., 2000). Therefore, in these studies, the benefits of implementation intentions compared to mere goal intentions could potentially be based on having access to additional information on how to act. With this study, however, we can confidently rule out this alternative account because specifying the strategy of strengthening one's self-efficacy in terms of forming a goal intention did not lead to higher test scores. Only when this strategy was suggested to participants in the format of an if-then plan did positive effects on test performance emerge.

Often our *performances are constrained by others* who are competing with us for positive outcomes. Typical examples are negotiations in which a common good has to be shared between two opposing parties. In such situations, exerting willpower involves effectively protecting one's goal striving from unwanted influences generated by the competitive situation. Negotiations are cognitively very demanding tasks in which a large amount of information has to be processed online and the course of events is hard to predict because one is performing a task not alone but conjointly with an opponent. Thus, negotiations can be understood as the prototype of a complex situation in which striving for desired goals can easily become derailed. Therefore, analyzing whether the beneficial effects of implementation intentions found in previous research also hold true in negotiations is of great interest to assess whether needed willpower accrues from if-then planning (see also Martin, Sheeran, Slade, Wright, & Dibble, 2009).

In their negotiation research, Trötschel and Gollwitzer (2007) explored whether the self-regulation strategy of forming implementation intentions enables negotiators to reach

agreement even if they have to operate under the adverse conditions of a *loss frame* (i.e., participants see how many points they lose rather than win during each round and are thus reluctant to make concessions; e.g., Bottom & Studt, 1993). In one of their experiments, pairs of negotiators were assigned roles as representatives of two neighboring countries (i.e., the blue and the orange nations) and asked to negotiate the distribution of a disputed island (i.e., its regions, villages, and towns). One group of pairs of negotiators was asked to form the mere prosocial goal “I want to cooperate with my counterpart!” and the other group to furnish this goal with the respective implementation intention “And if I receive a proposal on how to share the island, then I will make a cooperative counterproposal!” Both groups were then subjected to a frame manipulation, whereby both members of the pairs received a loss frame manipulation (i.e., each region’s value is expressed in points lost when the region is given away). In addition, two control conditions were established: A first control condition contained pairs of negotiators who were not assigned prosocial goals and were asked to negotiate under a loss frame; the second control condition’s pairs of negotiators who were not assigned prosocial goals but were asked to negotiate under a *gain frame* (i.e., each region’s value is expressed in points won when the region is kept). These two control conditions were used to establish the negative influence of loss versus gain frames on joint profits. In addition, the loss frame control condition served as a comparison group for the two critical experimental groups (i.e., the prosocial goal group and the prosocial goal plus implementation-intention group).

In the agreements achieved (i.e., level of joint outcomes), Trötschel and Gollwitzer (2007) observed that pairs of loss frame negotiators with a prosocial goal intention managed to reduce somewhat the resistance to concession making that arose from the loss frame negotiation context, but only negotiators who furnished their prosocial goal intentions with respective implementation intentions were successful in completely abolishing the negative impact of the loss frame negotiation context (i.e., showed a negotiation performance that did not differ from that of gain frame negotiators). In addition, action control via implementation intentions was found to be very efficient (i.e., implementation intentions abolished the negative effects of loss framing by leaving the negotiators’ cognitive capacity intact); negotiators who had formed implementation intentions were more likely to use the cognitively demanding integrative negotiation strategy of *logrolling* (i.e., making greater concessions on low- rather than high-priority issues).

The self-regulation of one’s goal striving becomes difficult when *habitual responses* conflict with initiating and executing the needed goal-directed responses that are instrumental to goal attainment (e.g., Wood & Neal, 2007). In such cases, having willpower means asserting one’s will to attain the chosen goal against unwanted habitual responses. But can the self-regulation strategy of forming if–then plans help people to let their goals win out over their habitual responses? By assuming that action control by implementation intentions is immediate and efficient, and adopting a simple racehorse model of action control (Gurney, Prescott, & Redgrave, 2001a, 2001b), people might be in a position to break habitualized responses by forming implementation intentions (e.g., if–then plans that spell out a response contrary to the habitualized response to the critical situation; Holland et al., 2006).

Cohen, Bayer, Jaudas, and Gollwitzer (2008, Study 2; see also Miles & Proctor, 2008) explored the suppression of habitual responses by implementation intentions in a laboratory experiment using the Simon task. In this paradigm, participants are asked to respond to a nonspatial aspect of a stimulus (i.e., whether a presented tone is high or low)

by pressing a left or right key, and to ignore the location of the stimulus (i.e., whether it is presented on one's left or right side). The difficulty of this task is in ignoring the spatial location (left or right) of the tone in one's classification response (i.e., pressing a left or right response key; Simon, 1990). The cost in reaction times is seen when the location of the tone (e.g., right) and required key press (e.g., left) are incongruent because people habitually respond to stimuli presented at the right or left side with the corresponding hand. Cohen and colleagues (2008, Study 2) found that implementation intentions eliminated the Simon effect for the stimulus that was specified in the if-component of the implementation intention. Reaction times for this stimulus did not differ between the congruent and incongruent trials (i.e., they were fast throughout).

Automatic cognitive biases, such as stereotyping, represent another type of habitualized responses that can be in opposition to one's goals. Although one may have the goal to be egalitarian, automatic stereotyping happens quickly and unintentionally; some attempts to control automatic stereotyping have even resulted in backfire effects. Extending earlier work by Gollwitzer and Schaal (1998), Stewart and Payne (2008) examined whether implementation intentions designed to counter automatic stereotypes (e.g., "When I see a black face, I will then think 'safe' ") could reduce stereotyping towards a category of individuals (versus a single exemplar). They used the process dissociation procedure (PDP; Jacoby, 1991) to estimate whether the reduction in automatic stereotyping came about by reducing automatic stereotyping, increasing control, or a combination of these two processes. It was found that implementation intentions reduced stereotyping in a weapon identification task (Studies 1 and 2) and an Implicit Association Test (IAT) (Study 3) by reducing automatic effects of the stereotype (without increasing conscious control). This reduction in automatic race bias held even for new members of the category (Study 2). These studies suggest that implementation intentions are an efficient way to overcome automatic stereotyping. Recent research by Mendoza, Gollwitzer, and Amodio (2010) has added to this insight that implementation intentions can also be used to suppress the behavioral expression of implicit stereotypes. In their research, Mendoza and colleagues examined whether two different types of implementation intentions could improve response accuracy on the shooter task (Correll, Park, Judd, & Wittenbrink, 2002), a reaction time measure of implicit stereotyping. In Study 1, participants used a distraction-inhibiting implementation intention designed to engage control over the perception of goal-irrelevant stimuli (e.g., race). In Study 2, participants used a response-facilitating implementation intention designed to promote goal-directed action (i.e., to shoot people carrying a weapon but not those carrying a tool). Across studies, implementation intentions improved accuracy, thereby limiting the behavioral expression of implicit stereotypes. Furthermore, process dissociation analyses indicated that the distraction-inhibiting implementation intention increased controlled processing, while reducing automatic stereotype activation, whereas the response-facilitating implementation intention increased only controlled processing.

Still, one wonders whether forming implementation intentions will always block habitual responses. Using a racehorse metaphor, the answer has to be "no." Whether the habitual response or the if-then guided response will win the race depends on the relative strength of the two behavioral orientations. If the habitual response is based on strong habits (Webb, Sheeran, & Luszczynska, 2009) and the if-then guided response is based on weak implementation intentions, then the habitual response should win over the if-then planned response; and the reverse should be true when weak habits are sent into a race with strong implementation intentions.

This implies that controlling behavior based on strong habits requires the formation of strong implementation intentions. Such enhancement of if–then plans can be achieved by various measures. One pertains to creating particularly strong links between situational cues (if-component) and goal-directed responses (then-component). A promising strategy has been suggested by Knäuper, Roseman, Johnson, and Krantz (2009; see also Papies et al., 2009). They asked participants to use mental imagery when linking situational cues to goal-directed responses in their if–then plans, and found that the rate of initiation of the planned response increased by almost 50%. Alternatively, Adriaanse, de Ridder, and de Wit (2009) suggested tailoring the critical cue specified in the if-part of an implementation intention to personally relevant reasons for the habitual behavior one wants to overcome, then link this cue to an antagonistic response. In their research, they asked participants who wanted to stop eating unhealthy snacks to form implementation intentions that used either situational cues (e.g., at home, at school, with friends) or motivational cues (to be social, feeling bored, distraction) in the if-part, and taking a healthy snack in the then-part. They found that the latter implementation intentions had a stronger effect on behavior change than did the former.

Also, it seems possible that certain formats of implementation intentions are better suited to fight habits than others. For instance, an implementation intention that specifies the *critical cue* (i.e., one or many features of the context that commonly elicit the habitual behavior) in its if-part and an ignore response in its then-part should have a good change to break even strong habits because the *specified response* (i.e., ignoring the critical cue) already fights the detection of the critical cue—the trigger of the habitual response (Schweiger Gallo et al., 2009). An implementation intention that specifies the critical cue and links it to an antagonistic response, on the other hand, sends this response into competition with the habitual response; here, it seems possible that a very strong habitual response could potentially outrun the antagonistic response specified in the implementation intention if participants are not strongly committed to the if–then plan and the respective goal intention. The worst format of an implementation intention for fighting habits seems to be the following: The if-part specifies the critical cue, whereas the then-part specifies the negation of the habitual behavior. Here, it seems possible that monitoring processes associated with the suppression of the habitual response may even lead to ironic effects (Wegner, 1994) in the sense that the habitual response gets strengthened.

So far, there is no systematic research on the effects of the format of implementation intentions on their potential to fight habits of different strengths. Such research is definitely needed. On the other hand, one should not forget that behavior change is possible also without changing bad habits; one can focus as well on the building of new habits in new situational contexts. With respect to this latter approach, implementation intentions can guide goal striving without having to outrun habitual responses. The “delegation of control to situational cues principle,” on which implementation intention effects are based, can unfold its facilitative effects on goal striving in an undisturbed manner.

MODERATORS OF IMPLEMENTATION INTENTION EFFECTS

Whenever people set out to use implementation intentions to improve goal striving, it is important to be aware of the moderators of implementation intention effects discovered so far. These pertain to commitment to the respective goal intention and the if–then plan

at hand, self-efficacy, and the personality attributes of socially prescribed perfectionism and conscientiousness.

Commitment

For implementation intention effects to occur, people need to be strongly committed to the superordinate goal intention (e.g., Gollwitzer 1999; Orbell et al., 1997; Sheeran et al., 2005, Study 1; Verplanken & Faes, 1999); also, the goal should be self-concordant (Koestner, Lekes, Powers, & Chicoine, 2002) and the goal needs to be in a state of activation (e.g., Sheeran et al., 2005, Study 2). These prerequisites help to prevent mechanistic plan enactment when people have already disengaged from the respective goal or find themselves pursuing different goals; in other words, the automaticity achieved by implementation intentions is a goal-dependent automaticity (Bargh, 1989). For example, in a puzzle task on the goal-dependence of implementation intentions (Sheeran et al., 2005, Study 2), implementation intentions that specified how to be fast in solving the puzzles did not lead to faster responses when the goal to be accurate rather than fast was being activated. However, when the goal to be fast rather than accurate was activated, these implementation intentions in fact did produce faster responses.

Moreover, the commitment to the formed implementation intention needs to be strong (e.g., Achtziger et al., 2010, Study 2) as well. When one doubts the appropriateness of the formed implementation intentions, no implementation intention effects can be expected. In line with this assumption, Achtziger and colleagues (2010, Study 2) observed weaker implementation intention effects in participants who had been told they had the type of personality that facilitates goal attainment by staying flexible (low plan commitment) compared to participants who had been told that they had the type of personality that facilitates goal attainment by sticking to one's plans (high plan commitment). There may also be ways the individual can increase the commitment to an if-then plan he or she has already made (e.g., making one's if-then plans public; Deutsch & Gerard, 1955); future research needs to explore such ways and their moderators. In any case, the requirement of commitment to the if-then plan supports the effectiveness of implementation intentions, by ensuring that incidental if-then plans do not impair flexibility for goal attainment (e.g., Gollwitzer, Parks-Stamm, Jaudas, & Sheeran, 2008).

Self-Efficacy

Perceived *self-efficacy* is also found to moderate implementation intention effects; it is defined as “the belief in one's capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 3). Koestner and colleagues (2006) asked whether the effects of implementation intentions on the attainment of self-generated personal goals can be bolstered for the long haul by simultaneously boosting self-efficacy. In this study, participants were randomly assigned to one of three treatment conditions. In the control condition, they completed an irrelevant goal task. In the implementation-intention condition, participants planned when, where, and how to pursue their most important New Year's resolution. In the implementation-intention plus self-efficacy boost condition, participants were additionally required to reflect on their actual New Year's resolutions using three different tasks designed to boost their self-efficacy: They had to think of past mastery experiences (i.e., situations in which they achieved a

similar goal), vicarious experiences (i.e., situations in which a similar individual attained a similar goal), and means of social support (i.e., an individual who encouraged their goal). Measuring goal progress via questionnaires e-mailed 20 weeks later, participants reported a significantly higher level of goal progress in the implementation-intention plus self-efficacy boosting condition compared to the control condition, as well as to the mere implementation-intention condition. In a recent study by Wieber, Odenthal, and Gollwitzer (2010), high versus low self-efficacy was manipulated by asking participants to solve low- or high-difficulty goal-relevant tasks. It was observed that high-self-efficacy participants showed stronger implementation intention effects than low-self-efficacy participants, and this was true in particular when goal striving was difficult rather than easy.

Personal Attributes

Socially Prescribed Perfectionism

In the first set of studies (Powers, Koestner, & Topciu, 2005) on the interaction between personality traits and if-then planning, perfectionism was examined such that socially prescribed perfectionism was distinguished from self-oriented perfectionism. Similar to self-oriented perfectionism, socially prescribed perfectionism entails setting high personal standards and evaluating oneself stringently. But whereas the standards for self-oriented perfectionists are set by the people themselves, socially prescribed perfectionists try to conform to standards and expectations that are prescribed by others. A high level of socially prescribed perfectionism is related to depression, anxiety disorders, and obsessive-compulsive symptoms (e.g., Powers, Zuroff, & Topciu, 2004). It was observed that participants who scored high on the Socially Prescribed Perfectionism subscale of the Multidimensional Perfectionist Scale (MPS; Hewitt, Flett, Turnbull-Donovan, & Mikail, 1991) reported poorer progress after 2 and 4 weeks on their New Year's resolutions (i.e., three personal goals) when they formed implementation intentions rather than receiving control instructions. Participants with high scores on socially prescribed perfectionism who formed implementation intentions also reported lower levels of satisfaction with goal progress (as perceived in their own view and in the presumed view of others) than participants who formed implementation intentions but scored low on this subscale. Importantly, for participants who scored high on self-oriented perfectionism, forming implementation intentions actually did improve goal progress (Powers et al., 2005). Possibly, social perfectionists fail to commit to implementation intentions because they may feel that the expectations and standards prescribed by others often change unexpectedly, and flexibly responding to such changes may be hindered by strong commitments to a given if-then plan.

Conscientiousness

A second line of research on personal attributes examined conscientiousness (Webb, Christian, & Armitage, 2007). In an experimental study using undergraduate students, attendance in class was studied as a function of conscientiousness, openness to experience, goal intentions, and implementation intentions. Most importantly, the implementation intention effects were moderated by participants' personality trait of conscientiousness. While class attendance of highly conscientious students was not changed by the forma-

tion of implementation intentions because it was high to begin with and stayed high, low and moderately conscientious people significantly benefited from planning when, where, and how they would attend class (their class attendance rates were low to begin with and increased to high when implementation intentions were formed). If one assumes that being on time is easy for people with high conscientiousness but difficult for people who are low on this personal attribute, this finding is in line with the general observation (Gollwitzer & Sheeran, 2006) that in particular it is the difficult goals that benefit from the formation of implementation intentions; easy goals can be striven for effectively without having to prepare goal striving by forming implementation intentions.

IMPLEMENTATION INTENTIONS: PAST AND FUTURE

Past: Conceptual Roots

The concept of implementation intentions grew out of a more comprehensive approach to goal pursuit: the mindset theory of action phases (Gollwitzer, 1990). The mindset model of action phases sees successful goal pursuit as solving a series of successive tasks: deliberating on wishes (potential goals) and choosing between them; planning and initiating goal-directed actions; bringing goal pursuit to a successful end; and evaluating its outcome. This task notion implies that people can activate cognitive procedures (*mindsets*) that facilitate task completion simply by getting heavily involved with the task at hand. Whereas deliberating between potential goals (i.e., wishes) activates cognitive procedures (i.e., a *deliberative mindset*) that facilitate decision making, engaging in planning activates those procedures (i.e., an *implemental mindset*) that support the implementation of goals.

Researchers have found that when participants are asked to plan the implementation of a set goal, an implemental mindset with the following attributes develops (review by Gollwitzer, in press). Participants become closed-minded to distracting, goal-irrelevant information while processing information related to implementing goals more effectively (e.g., information on the sequencing of actions). Moreover, relevant desirability-related information is processed in a partial manner, favoring pros over cons, and relevant feasibility-related information is analyzed in a manner that favors illusory optimism. Self-perception of possessing important personal attributes (e.g., cheerfulness, smartness, social sensitivity) is strengthened, whereas perceived vulnerability to both controllable and uncontrollable risks is lowered (e.g., developing an addiction to prescription drugs or losing a partner to an early death, respectively). Thus, the implemental mindset facilitates goal attainment by focusing individuals on implementation-related information and by preventing the waning of commitment to the chosen goal.

Traditionally, implemental mindsets have been analyzed primarily in terms of their cognitive features, without direct testing of these features' effects on actual implementation of goals. Armor and Taylor (2003), however, reported that an implemental mindset facilitates better task performance (in a scavenger hunt to be performed on campus), and that this effect is mediated by the cognitive features of the implemental mindset (e.g., enhanced self-efficacy, optimistic outcome expectations, perceiving the task as easy). This finding suggests that the positive expectations associated with the implemental mindset do indeed lead to more effective self-regulation and better outcomes. Participants' per-

formance expectations in the Armor and Taylor study, however, were for an immediate, imminent task. One wonders, therefore, whether the temporal distance of the performance at issue may moderate the beneficial effects of the implemental mindset. This assumption is supported by long-term performance data collected by Gagné and Lydon (2001). In their study, long-term relationship survival was not affected by implemental mindset participants' optimistic predictions of a stable relationship. It appears, then, that whenever actual goal implementation is assessed further and further away from the induction of the implemental mindset, the positive effects of its various cognitive features on goal implementation may no longer be observed. From a self-regulation point of view, it seems wise therefore not to rely on the beneficial effects of getting involved with planning in general when the goal that is striven for demands acting on the goal in not only the near but also the distant future; rather, one should resort to the self-regulation strategy of making specific if-then plans (i.e., form implementation intentions) because the beneficial effects of such plans on goal attainment have been found to accrue over vast periods of time (i.e., several months; see the meta-analysis by Gollwitzer & Sheeran, 2006).

Future: Intervention Research

In everyday life, people may not succeed in forming effective implementation intentions for various reasons related to putting the wrong critical situation into the if-part of the plan and specifying a response that is not very instrumental to goal attainment in the then-part. Moreover, people may forget about the preliminaries of implementation intention effects, such as a strong commitment to the superordinate goal and a strong willingness to commit to a possible if-then plan. It seems appropriate, therefore, that research turns to the question of how the self-regulation strategy of forming implementation intentions is taught best in interventions geared at helping people to strive for their goals more effectively.

There is a way of thinking about the future that prepares people maximally for forming implementation intentions. This mental strategy, spelled out in Oettingen's (2000; Oettingen et al., 2001) theory of fantasy realization, has been referred to as *mental contrasting*. It works like this: If, for instance, a person has the wish of "getting to know someone I like" or of "improving the relationship to my partner," mental contrasting requires that one first mentally elaborate the positive future of having successfully solved this issue, and right after that elaborate the negative reality impeding the attainment of the positive future. As a result, when forming goal commitments, people discriminate according to their expectations of success: They arrive at strong goal commitments when expectations of success are high, and they refrain from such commitments when expectations of success are low. Moreover, mental contrasting allows insights on what stands in the way of reaching the desired future, thus preparing one to plan how to overcome these obstacles. In other words, mental contrasting not only provides the commitment for the pursuit of promising goals but it also puts into people's heads the intricacies of striving for goal attainment. Not surprisingly, then, Oettingen and colleagues (2001, Study 3) found that research participants who were led to contrast a desired future outcome mentally subsequently engaged in more if-then planning than control participants—that is, participants who only dwelled on obstacles of reality or only indulged in the desired positive future.

That mental contrasting is indeed a sophisticated problem-solving strategy is attested by a recent study using continuous magnetoencephalography (MEG), a brain imaging technique measuring magnetic fields produced by electrical activity in the brain (Achtziger, Fehr, Oettingen, Gollwitzer, & Rockstroh, 2009). Mental contrasting as compared to indulging in a desired positive future or simply resting produced heightened brain activity in areas associated with working memory, episodic memory, intention maintenance, action preparation, and vivid visualization. That is, mental contrasting implied vividly imagining a desired future and contrasting it with the reality that stands in the way of realizing this future. The brain activity associated with indulging, on the other hand, did not differ from resting.

Recent research has also discovered a further mediating process pertaining to the energization of effort (Oettingen, Mayer, Sevincer, et al., 2009). Specifically, mentally contrasting an achievable desired future with obstacles of present reality leads to energization, which in turn creates goal commitments strong enough to lead to effective goal striving and successful goal attainment. These mediating effects of energization on goal commitment are shown on physiological indicators of energization (i.e., systolic blood pressure), as well as experiential indicators (self-report of feeling energized). Moreover, mental contrasting does not have to pertain to the attainment of a positive future; people can also fantasize about a negative future, then contrast it with elaborations of the positive reality. Oettingen, Mayer, Thorpe, Janetzke, and Lorenz (2005) created tolerance and support toward foreigners in a group of xenophobic high school students by having them elaborate on their fears that social conflicts would arise if foreign youths moved into their neighborhood and contrast these fears with positive aspects of present reality standing in the way of the feared future.

It appears, then, that mental contrasting prepares people cognitively and motivationally to engage in if-then planning for the purpose of making goal striving more effective. Oettingen and colleagues (Adriaanse et al., in press; Christiansen, Oettingen, Dahme, & Klinger, 2010; Oettingen & Gollwitzer, 2010; Oettingen & Stephens, 2009; Stadler, Oettingen, & Gollwitzer, 2009, 2010) thus developed an intervention that combines mental contrasting and formation of implementation intentions into one meta-cognitive strategy called MCII (i.e., mental contrasting with implementation intentions). In order to unfold their beneficial effects, implementation intentions require that strong goal commitments be in place (Sheeran et al., 2005, Study 1), and mental contrasting creates such strong commitments (Oettingen et al., 2001, 2009; Oettingen, Mayer, Stephens, & Brinkmann, in press; Oettingen, Mayer, & Thorpe, in press). Additionally, mental contrasting guarantees the identification of those critical obstacles that do indeed hinder goal striving. These very obstacles can then be addressed with if-then plans by specifying them as critical situations in the if-component that link them to goal-directed responses specified in the then-component. In this way, the idiosyncratic critical obstacle will be linked to an idiosyncratic, instrumental goal-directed response.

Indeed, in a recent intervention study with middle-aged women (Stadler, Oettingen, & Gollwitzer, 2009), participants were taught only the individual steps and cognitive principles of the MCII self-regulation strategy, and to apply it by themselves whenever possible to the wish of exercising more (hence, MCII is referred to as a meta-cognitive self-regulation strategy). Participants were free to choose whatever form of exercising they wished and were encouraged to anticipate exactly those obstacles that were person-

ally most relevant and link them to exactly those goal-directed responses that personally appeared to be most instrumental. As dependent measures, participants maintained daily behavioral diaries to keep track of the amount of time they exercised every day. Overall, participants using the MCII technique exercised more than control participants given information on the beneficial health effects of exercising; this effect showed up immediately after the intervention and remained stable throughout the entire period of the study (16 weeks after the intervention). More specifically, participants in the MCII group exercised nearly twice as much: an average of 1 hour more per week than participants in the information-only control group.

Conducting the same MCII intervention to promote healthy eating in middle-aged women (i.e., eating more fruits and vegetables) also produced the desired behavior change effects, and these persisted even over the extensive time period of 2 years (Stadler, Oettingen, & Gollwitzer, 2010). Moreover, an MCII study by Adriaanse and colleagues (in press) targeted the negative eating habit of unhealthy snacking in college students. MCII worked for students with both weak and strong habits, and it was more effective than mental contrasting or formulating implementation intentions alone.

Finally, MCII seems to facilitate behavior change even when there is an initial reluctance to engage in the targeted behavior. Christiansen and colleagues (2010) promoted physical mobility in chronic back pain outpatients from a rehabilitation center in Germany by teaching them MCII. Participants were randomly assigned to either a control group (i.e., outpatient cognitive-behavioral therapy back pain program) or an intervention group (i.e., this program plus MCII intervention). The MCII intervention improved physical mobility more than the standard treatment only as observed 2 weeks and 3 months after the intervention, and as assessed by subjective and objective measures. These effects were independent of participants' experienced pain, which did not differ between conditions during and after treatment. In summary, research suggests that MCII interventions are a very useful self-regulation technique when it comes to meeting one's goals.

REFERENCES

- Aarts, H., Dijksterhuis, A., & Midden, C. (1999). To plan or not to plan?: Goal achievement or interrupting the performance of mundane behaviors. *European Journal of Social Psychology, 29*, 971–979.
- Achtziger, A., Bayer, U. C., & Gollwitzer, P. M. (2010). *Committing to implementation intentions: Attention and memory effects for selected situational cues*. Manuscript submitted for publication.
- Achtziger, A., Fehr, T., Oettingen, G., Gollwitzer, P. M., & Rockstroh, B. (2009). Strategies of intention formation are reflected in continuous MEG activity. *Social Neuroscience, 4*, 11–27.
- Achtziger, A., Gollwitzer, P. M., & Sheeran, P. (2008). Implementation intentions and shielding goal striving from unwanted thoughts and feelings. *Personality and Social Psychology Bulletin, 34*, 381–393.
- Adriaanse, M. A., de Ridder, D. T. D., & de Wit, J. B. F. (2009). Finding the critical cue: Implementation intentions to change one's diet work best when tailored to personally relevant reasons for unhealthy eating. *Personality and Social Psychology Bulletin, 35*, 60–71.
- Adriaanse, M. A., Oettingen, G., Gollwitzer, P. M., Hennes, E. P., de Ridder, D. T. D., & de Witt,

- J. B. F. (in press). When planning is not enough: Fighting unhealthy snacking habits by mental contrasting with implementation intentions (MCII). *European Journal of Social Psychology*.
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 11–39). Berlin: Springer-Verlag.
- Armitage, C. J. (2004). Evidence that implementation intentions reduce dietary fat intake: A randomized trial. *Health Psychology, 23*, 319–323.
- Armor, D. A., & Taylor, S. E. (2003). The effects of mindset on behavior: Self-regulation in deliberative and implemental frames of mind. *Personality and Social Psychology Bulletin, 29*, 86–95.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bargh, J. A. (1989). Conditional automaticity: Varieties of automatic influence in social perception and cognition. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought* (pp. 3–51). New York: Guilford Press.
- Bargh, J. A., & Chartrand, T. L. (2000). The mind in the middle: A practical guide to priming and automaticity research. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (pp. 253–285). New York: Cambridge University Press.
- Bargh, J. A., Gollwitzer, P. M., & Oettingen, G. (2010). Motivation. In S. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology* (5th ed., Vol. 1, pp. 268–316). New York: Wiley.
- Baumeister, R. E. (2000). Ego-depletion and the self's executive function. In A. Tesser, R. B. Felson, & J. M. Suls (Eds.), *Psychological perspectives on self and identity* (pp. 9–33). Washington, DC: American Psychological Association.
- Baumeister, R. E., Heatherton, T. E., & Tice, D. M. (1994). *Losing control: How and why people fail at self-regulation*. San Diego, CA: Academic Press.
- Bayer, U. C., Achtziger, A., Gollwitzer, P. M., & Moskowitz, G. (2009). Responding to subliminal cues: Do if–then plans cause action preparation and initiation without conscious intent? *Social Cognition, 27*, 183–201.
- Bayer, U. C., & Gollwitzer, P. M. (2007). Boosting scholastic test scores by willpower: The role of implementation intentions. *Self and Identity, 6*, 1–19.
- Bayer, U. C., Gollwitzer, P. M., & Achtziger, A. (2010). Staying on track: Planned goal striving is protected from disruptive internal states. *Journal of Experimental Social Psychology, 146*, 505–514.
- Bless, H., & Fiedler, K. (1995). Affective states and the influence of activated general knowledge. *Personality and Social Psychology Bulletin, 21*, 766–778.
- Bottom, W. P., & Studt, A. (1993). Framing effects and the distributive aspect of integrative bargaining. *Organizational Behavior and Human Decision Processes, 56*, 459–474.
- Brandstätter, V., Lengfelder, A., & Gollwitzer, P. M. (2001). Implementation intentions and efficient action initiation. *Journal of Personality and Social Psychology, 81*, 946–960.
- Brockner, J. (1992). The escalation of commitment to a failing course of action: Toward theoretical progress. *Academy of Management Review, 17*, 39–61.
- Burgess, P. W., Dumontheil, I., & Gilbert, S. J. (2007). The gateway hypothesis of rostral PFC (Area 10) function. *Trends in Cognitive Sciences, 11*, 290–298.
- Carver, C. S., & Scheier, M. E. (1998). *On the self-regulation of behavior*. New York: Cambridge University Press.
- Chasteen, A. L., Park, D. C., & Schwarz, N. (2001). Implementation intentions and facilitation of prospective memory. *Psychological Science, 12*, 457–461.
- Christiansen, S., Oettingen, G., Dahme, B., & Klinger, R. (2010). A short goal-pursuit intervention to improve physical capacity: A randomized clinical trial in chronic back pain patients. *Pain, 149*, 444–452.
- Cohen, A.-L., Bayer, U. C., Jaudas, A., & Gollwitzer, P. M. (2008). Self-regulatory strategy and

- executive control: Implementation intentions modulate task switching and Simon task performance. *Psychological Research*, 72, 12–26.
- Correll, J., Park, B., Judd, C. M., & Wittenbrink, B. (2002). The police officer's dilemma: Using ethnicity to disambiguate potentially threatening individuals. *Journal of Personality and Social Psychology*, 83, 1314–1329.
- Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influences upon individual judgment. *Journal of Abnormal and Social Psychology*, 51, 629–636.
- Elliot, A. J. (2008). *Handbook of approach and avoidance motivation*. Mahwah, NJ: Erlbaum.
- Eriksen, B. A., & Eriksen, C. W. (1974). Effects of noise letters upon the identification of a target letter in a nonsearch task. *Perception and Psychophysics*, 16, 143–149.
- Gagné, E. M., & Lydon, J. E. (2001). Mindset and close relationships: When bias leads to (in) accurate predictions. *Journal of Personality and Social Psychology*, 81, 85–96.
- Gawrilow, C., & Gollwitzer, P. M. (2008). Implementation intentions facilitate response inhibition in ADHD children. *Cognitive Therapy and Research*, 32, 261–280.
- Gilbert, S., Gollwitzer, P. M., Cohen, A.-L., Oettingen, G., & Burgess, P. W. (2009). Separable brain systems supporting cued versus self-initiated realization of delayed intentions. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 35, 905–915.
- Gollwitzer, P. M. (1990). Action phases and mind-sets. In T. E. Higgins & R. M. Sorrentino (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (Vol. 2, pp. 53–92). New York: Guilford Press.
- Gollwitzer, P. M. (1993). Goal achievement: The role of intentions. *European Review of Social Psychology*, 4, 141–185.
- Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist*, 54, 493–503.
- Gollwitzer, P. M. (in press). Mindset theory of action phases. In P. Van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology*. London: Sage.
- Gollwitzer, P. M., & Brandstätter, V. (1997). Implementation intentions and effective goal pursuit. *Journal of Personality and Social Psychology*, 73, 186–199.
- Gollwitzer, P. M., & Moskowitz, G. B. (1996). Goal effects on action and cognition. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 361–399). New York: Guilford Press.
- Gollwitzer, P. M., Parks-Stamm, E. J., Jaudas, A., & Sheeran, P. (2008). Flexible tenacity in goal pursuit. In J. Y. Shah & W. L. Gardner (Eds.), *Handbook of motivation science* (pp. 325–341). New York: Guilford Press.
- Gollwitzer, P. M., & Schaal, B. (1998). Metacognition in action: The importance of implementation intentions. *Personality and Social Psychology Review*, 2, 124–136.
- Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. *Advances in Experimental Social Psychology*, 38, 69–119.
- Gollwitzer, P. M., & Wicklund, R. A. (1985). Self-symbolizing and the neglect of others' perspectives. *Journal of Personality and Social Psychology*, 56, 531–715.
- Gurney, K., Prescott, T. J., & Redgrave, P. (2001a). A computational model of action selection in the basal ganglia I: A new functional anatomy. *Biological Cybernetics*, 84, 401–410.
- Gurney, K., Prescott, T. J., & Redgrave, P. (2001b). A computational model of action selection in the basal ganglia II: Analysis and simulation of behaviour. *Biological Cybernetics*, 84, 411–423.
- Henderson, M. D., Gollwitzer, P. M., & Oettingen, G. (2007). Implementation intentions and disengagement from a failing course of action. *Journal of Behavioral Decision Making*, 20, 81–102.
- Hewitt, P. L., Flett, G. L., Turnbull-Donovan, W., & Mikail, S. F. (1991). The Multidimensional Perfectionism Scale: Reliability, validity, and psychometric properties in psychiatric samples. *Psychological Assessment*, 3, 464–468.

- Holland, R. W., Aarts, H., & Langendam, D. (2006). Breaking and creating habits on the working floor: A field experiment on the power of implementation intentions. *Journal of Experimental Social Psychology, 42*, 776–783.
- Jacoby, L. L. (1991). A process dissociation framework: Separating automatic from intentional uses of memory. *Journal of Memory and Language, 30*, 513–541.
- Knäuper, B., Roseman, M., Johnson, P., & Krantz, L. (2009). Using mental imagery to enhance the effectiveness of implementation intentions. *Current Psychology, 28*, 181–186.
- Koestner, R., Horberg, E. J., Gaudreau, P., Powers, T. A., Di Dio, P., Bryan, C., et al. (2006). Bolstering implementation plans for the long haul: The benefits of simultaneously boosting self-concordance or self-efficacy. *Personality and Social Psychology Bulletin, 32*(11), 1547–1558.
- Koestner, R., Lekes, N., Powers, T. A., & Chicoine, E. (2002). Attaining personal goals: Self-concordance plus implementation intentions equals success. *Journal of Personality and Social Psychology, 83*, 231–244.
- Lengfelder, A., & Gollwitzer, P. M. (2001). Reflective and reflexive action control in patients with frontal brain lesions. *Neuropsychology, 15*, 80–100.
- Locke, E. A., & Latham, G. P. (2006). New directions in goal-setting theory. *Current Directions in Psychological Science, 15*, 265–268.
- Martin, J., Sheeran, P., Slade, P., Wright, A., & Dibble, T. (2009). Implementation intention formation reduces consultations for emergency contraception and pregnancy testing among teenage women. *Health Psychology, 28*, 762–769.
- Mendoza, S. A., Gollwitzer, P. M., & Amodio, D. M. (2010). Reducing the expression of implicit stereotypes: Reflexive control through implementation intentions. *Personality and Social Psychology Bulletin, 36*, 512–523.
- Miles, J. D., & Proctor, R. W. (2008). Improving performance through implementation intentions: Are preexisting response biases replaced? *Psychonomic Bulletin and Review, 15*, 1105–1110.
- Milne, S., Orbell, S., & Sheeran, P. (2002). Combining motivational and volitional interventions to promote exercise participation: Protection motivation theory and implementation intentions. *British Journal of Health Psychology, 7*, 163–184.
- Molden, D. C., & Dweck, C. S. (2006). Finding “meaning” in psychology: A lay theories approach to self-regulation, social perception, and social development. *American Psychologist, 61*, 192–203.
- Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin, 126*, 247–259.
- Muraven, M., Tice, D. M., & Baumeister, R. F. (1998). Self-control as a limited resource: Regulatory depletion pattern. *Journal of Personality and Social Psychology, 74*, 774–789.
- Oettingen, G. (2000). Expectancy effects on behavior depend on self-regulatory thought. *Social Cognition, 18*, 101–129.
- Oettingen, G., & Gollwitzer, P. M. (2001). Goal setting and goal striving. In A. Tesser & N. Schwarz (Eds.), *The Blackwell handbook of social psychology* (pp. 329–347). Oxford, UK: Blackwell.
- Oettingen, G., & Gollwitzer, P. M. (2010). Strategies of setting and implementing goals: Mental contrasting and implementation intentions. In J. E. Maddux & J. P. Tangney (Eds.), *Social psychological foundations of clinical psychology* (pp. 114–135). New York: Guilford Press.
- Oettingen, G., Hönig, G., & Gollwitzer, P. M. (2000). Effective self-regulation of goal attainment. *International Journal of Educational Research, 33*, 705–732.
- Oettingen, G., Mayer, D., Sevincer, A. T., Stephens, E. J., Pak, H., & Hagenah, M. (2009). Mental contrasting and goal commitment: The mediating role of energization. *Personality and Social Psychology Bulletin, 35*, 608–622.
- Oettingen, G., Mayer, D., Stephens, M. E. J., & Brinkmann, B. (in press). Mental contrasting and the self-regulation of helping relations. *Social Cognition*.

- Oettingen, G., Mayer, D., & Thorpe, J. (in press). Self-regulation of commitment to reduce cigarette consumption: Mental contrasting of future and reality. *Psychology and Health*.
- Oettingen, G., Mayer, D., Thorpe, J. S., Janetzke, H., & Lorenz, S. (2005). Turning fantasies about positive and negative futures into self-improvement goals. *Motivation and Emotion, 29*, 237–267.
- Oettingen, G., Pak, H.-J., & Schnetter, K. (2001). Self-regulation of goal setting: Turning free fantasies about the future into binding goals. *Journal of Personality and Social Psychology, 80*, 736–753.
- Oettingen, G., & Stephens, E. J. (2009). Fantasies and motivationally intelligent goal setting. In G. B. Moskowitz & H. Grant (Eds.), *The psychology of goals* (pp. 135–178). New York: Guilford Press.
- Orbell, S., Hodgkins, S., & Sheeran, P. (1997). Implementation intentions and the theory of planned behavior. *Personality and Social Psychology Bulletin, 23*, 945–954.
- Orbell, S., & Sheeran, P. (2000). Motivational and volitional processes in action initiation: A field study of the role of implementation intentions. *Journal of Applied Social Psychology, 30*, 780–797.
- Papies, E., Aarts, H., & de Vries, N. K. (2009). Grounding your plans: Implementation intentions go beyond the mere creation of goal-directed associations. *Journal of Experimental Social Psychology, 45*, 1148–1151.
- Parks-Stamm, E., Gollwitzer, P. M., & Oettingen, G. (2007). Action control by implementation intentions: Effective cue detection and efficient response initiation. *Social Cognition, 25*, 248–266.
- Paul, I., Gawrilow, C., Zech, F., Gollwitzer, P. M., Rockstroh, B., Odenthal, G., Kratzer, W., et al. (2007). If-then planning modulates the P300 in children with attention deficit hyperactivity disorder. *NeuroReport, 18*, 653–657.
- Powers, T. A., Koestner, R., & Topciu, R. A. (2005). Implementation intentions, perfectionism, and goal progress: Perhaps the road to hell is paved with good intentions. *Personality and Social Psychology Bulletin, 31*, 902–912.
- Powers, T. A., Zuroff, D. C., & Topciu, R. A. (2004). Covert and overt expressions of self-criticism and perfectionism and their relation to depression. *European Journal of Personality, 18*, 61–72.
- Schweiger Gallo, I., Keil, A., McCulloch, K. C., Rockstroh, B., & Gollwitzer, P. M. (2009). Strategic automation of emotion control. *Journal of Personality and Social Psychology, 96*, 11–31.
- Sheeran, P., & Orbell, S. (1999). Implementation intentions and repeated behavior: Augmenting the predictive validity of the theory of planned behavior. *European Journal of Social Psychology, 29*, 349–369.
- Sheeran, P., & Orbell, S. (2000). Using implementation intentions to increase attendance for cervical cancer screening. *Health Psychology, 19*, 283–289.
- Sheeran, P., Webb, T. L., & Gollwitzer, P. M. (2005). The interplay between goal intentions and implementation intentions. *Personality and Social Psychology Bulletin, 31*, 87–98.
- Simon, J. R. (1990). The effects of an irrelevant directional cue on human information processing. In R. W. Proctor & T. G. Reeve (Eds.), *Stimulus-response compatibility: An integrative perspective* (pp. 31–86). Amsterdam: North Holland.
- Stadler, G., Oettingen, G., & Gollwitzer, P. M. (2009). Physical activity in women. Effects of a self-regulation intervention. *American Journal of Preventive Medicine, 36*, 29–34.
- Stadler, G., Oettingen, G., & Gollwitzer, P. M. (2010). Intervention effects of information and self-regulation on eating fruits and vegetables over two years. *Health Psychology, 29*, 274–283.
- Stewart, B. D., & Payne, B. K. (2008). Bringing automatic stereotyping under control: Implementation intentions as efficient means of thought control. *Personality and Social Psychology Bulletin, 34*, 1332–1345.

- Trötschel, R., & Gollwitzer, P. M. (2007). Implementation intentions and the willful pursuit of prosocial goals in negotiations. *Journal of Experimental Social Psychology, 43*, 579–589.
- Verplanken, B., & Faes, S. (1999). Good intentions, bad habits, and effects of forming implementation intentions on healthy eating. *European Journal of Social Psychology, 29*, 591–604.
- Webb, T. L., Christian, J., & Armitage, C. J. (2007). Helping students turn up for class: Does personality moderate the effectiveness of an implementation intention intervention? *Learning and Individual Differences, 17*, 316–327.
- Webb, T. L., & Sheeran, P. (2003). Can implementation intentions help to overcome ego-depletion? *Journal of Experimental Social Psychology, 39*, 279–286.
- Webb, T. L., & Sheeran, P. (2004). Identifying good opportunities to act: Implementation intentions and cue discrimination. *European Journal of Social Psychology, 34*, 407–419.
- Webb, T. L., & Sheeran, P. (2006). Does changing behavioural intentions engender behavior change?: A meta-analysis of the experimental evidence. *Psychological Bulletin, 132*, 249–268.
- Webb, T. L., & Sheeran, P. (2007). How do implementation intentions promote goal attainment?: A test of component processes. *Journal of Experimental Social Psychology, 43*, 295–268.
- Webb, T. L., & Sheeran, P. (2008). Mechanisms of implementation intention effects: The role of intention, self-efficacy, and accessibility of plan components. *British Journal of Social Psychology, 47*, 373–395.
- Webb, T. L., Sheeran, P., & Luszczynska, A. (2009). Planning to break unwanted habits: Habit strength moderates implementation intention effects on behavior change. *British Journal of Social Psychology, 48*, 507–523.
- Wegner, D. M. (1994). Ironic processes of mental control. *Psychological Review, 101*, 34–52.
- Wieber, F., Odenthal, G., & Gollwitzer, P. M. (2010). Self-efficacy feelings moderate implementation intention effects. *Self and Identity, 9*, 177–194.
- Wieber, F., & Sassenberg, K. (2006). I can't take my eyes off of it: Attention attraction effects of implementation intentions. *Social Cognition, 24*, 723–752.
- Wood, W., & Neal, D. T. (2007). A new look at habits and the habit–goal interface. *Psychological Review, 114*, 842–862.