8 How to Maximize Implementation Intention Effects

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How do people turn their intentions into behavior? This miracle is clarified in the present chapter by analyzing how if-then planning (i.e., implementation intentions; Gollwitzer, 1993, 1999) supports the translation of intentions into actions. In addition, we will examine how if-then plans should be worded best to maximize their effectiveness. Subsequently, we will address the importance of the if-then format when wording implementation intentions by inspecting the extension of such plans into an if-then-why format, and by inspecting upward counterfactuals as an if-then format directed at past goal pursuits.

IMPLEMENTATION INTENTIONS AND DIFFICULT GOAL STRIVING

Whereas goal intentions merely specify desired end states ("I want to achieve goal X!"), implementation intentions in the format "If situation Y arises, then I will initiate behavior Z!" additionally specify when, where, and how a person intends to pursue a goal. Implementation intentions 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. For example, a person who has the goal to become physically fit can form the implementation intention "If

I come home after work on Friday, then I will immediately go for a 30 min run!" Implementation intentions have been found to be beneficial with respect to four major obstacles that have to be overcome to bridge the gap from initial goal setting and meeting that goal [i.e., not getting started to act on one's goals, getting derailed during goal striving, not disengaging when courses of action are failing, and overextending oneself during goal striving). Recent meta-analyses revealed a medium-to-large effect size (Cohen, 1992) of implementation intentions on goal achievement on top of the effects of mere goal intentions (Gollwitzer & Sheeran, 2006; Webb & Sheeran, 2008).

Knowing this, can implementation intentions clarify the miraculous translation of intentions (goals) into behavior, even in situations that do not seem responsive to self-regulation? Indeed, implementation intentions have been found to help overcome several problems people might encounter during goal realization. Implementation intentions are capable of prompting particular motivational states or efforts. For example, in a study on solving analytic reasoning tasks, they improved participants' performance by strengthening self-efficacy (Bayer & Gollwitzer, 2007). Secondly, implementation intentions helped people protect themselves from inner states that interrupt goal striving. In a study by Achtziger, Gollwitzer, and Sheeran (2008), implementation intentions were shown to help tennis players regulate disruptive cognitive, motivational, physiological, and emotional states in order to better compete against an opponent. Implementation intentions also support peoples' attainment of prosocial goals in cognitively demanding situations. For example, when people find themselves in loss-framed negotiations, implementation intentions can support the use of more integrative negotiation strategies (Trätschel & Gollwitzer, 2007). Moreover, implementation intentions can be used to replace bad behavioral habits that threaten the realization of attractive goals (e.g., wasteful recycling behaviors for people with the goal to protect the environment) with more appropriate behaviors (e.g., recycling; Holland, Aarts, & Langendam, 2006).

Lastly, there are three ways in which unwanted automatic processes that cause problems for goal realization can be controlled by using implementation intentions. First, these plans help suppress unwanted cognitive responses. For example, they can reduce automatic stereotyping by automating counterstereotypic thoughts (Stewart & Payne, 2008). Second, they ean improve emotion regulation in aversive and fear-triggering situations. For example, implementation intentions were shown to reduee arousal when fear or disgust-triggering stimuli were presented (Schweiger Galle, Keil, MeCulloeh, Rockstroh. & Gollwitzer, 2009). That this strategie emotion regulation by if-then plans operates in an automatie fashion was supported by evidenee from early electrocortical

correlates. Finally, implementation intentions can enhance behavioral inhibition. For example, inhibition performance in a neuropsychological task (i.e., stop task) was improved among children with ADHD by using implementation intentions (Gawrilow & Gollwitzer, 2008).

HOW ARE IMPLEMENTATION INTENTIONS WORDED MOST EFFECTIVELY?

The implementation intentions used in the reported experimental research were always found to be highly effective; other research has demonstrated that this effectiveness does not produce costs in terms of rigidity (Gollwitzer, Parks-Stamm, Jaudas, & Sheeran, 2008) or ego depletion (Bayer & Gollwitzer, 2009; Webb & Sheeran, 2003). Does this connote that implementation intentions are always effective in terms of meeting one's goals? Severallimits of the effectiveness of implementation intentions have been found in terms of goal attributes, self-beliefs, and personality factors. First, a weak commitment to the respective goal intention limits the effectiveness of implementation intentions (Sheeran, Webb, & Gollwitzer, 2005). This goal-dependence of implementation intentions may generally protect people from rigidly enacting plans directed at goals that are obsolete or not vitally important. However, it may also occasionally counter people's intentions. For example, when a person has the goal of becoming physically fit but has rather weak goal commitment, even implementation intentions will not work wonders. Second, low self-efficacy beliefs concerning the respective goal intention have been demonstrated to limit the effectiveness of implementation intentions (Wieber, Odenthal, & Gollwitzer, in press). Although low self-efficacy beliefs may often represent a correct indication that a goal cannot be successfully realized, they may also limit people's goal striving. For instance, when a person unwarrantedly doubts his or her ability to run for 30 minutes, a relevant implementation intention may not support goal attainment. Moreover, individuals who preferably evaluate their behavior according to others' standards (i.e., people who score high on socially prescribed perfectionism; Powers, Koestner, & Topciu, 2005) do not seem to benefit from forming implementation intentions. Possibly, the personality attribute of socially prescribed perfectionism hinders full comrnitment to if-then plans, thus reducing the effectiveness of these plans. Finally, the personality trait of conscientiousness has been found to limit implementation intentions' effectiveness (Webb, Christi an, & Armitage, 2007). Whereas persons with a low level of conscientiousness immensely benefited from

forming implementation intentions, those with a high level of conscientiousness did not; the superior performance of high conscientious individuals left little room for improvement (ceiling effect; Webb etal., 2007).

In addition to the limitations caused by these moderators of implementation intention effects, attributes of implementation intentions themselves (name1y the wording and format of these plans) might limit their effects on goal-striving behavior. In everyday life, people may not succeed in forming effective implementation intentions either because the if-component or the then-component is specified suboptimally or because the format of the implementation intention as a whole is inappropriate. The remainder of this chapter will inspect these potential limits and how implementation intentions should be formed to maximize goal attainment.

How to Word the If-Component of Implementation Intentions?

According to the theory of intentional action control (Gollwitzer, 1993; 1999), planning a situation in which one intends to act on a goal via the formation of an implementation intention leads to heightened cognitive accessibility of the mental representation of the situation. This accessibility persists over time until the plan is enacted or the goal is achieved or dismissed. The heightened activation of the critical situation helps people to easily recall the specified situation (Achtziger, Bayer, & Gollwitzer, 2009, Study 1) and leads to swift attention when the situation arises (Aarts, Dijksterhuis, & Midden, 1999; Achtziger et al., 2009, Study 2). For example, Webb and Sheeran (2004, Study 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). However, because attentional and cognitive resources are limited (Wegner & Bargh, 1998), the increased readiness to attend to an implementation intention's critical cues should reduce attention to other cues (Broadbent, 1958; Kahneman, 1973). Given this consequence, can specifying situational cues in the implementation intention's if-component both support and hamper goal attainment? Three studies tested this hypothesis.

Cue Detection During Goal Pursuit. In a Story Listening Study (Parks-Stamm, Gollwitzer, & 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 themse1ves 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!"). The facilitated detection of the critical five-letter words would indicate a shift in attention to the implementation intention cues. As attentional resources are limited, it was predicted that implementation intentions would increase performance in response to the two critical five-letter words but impair performance in response to the remaining five-letter words. In line with these assumptions, implementation intentions increased performance in response to the critical words but at the cost of reduced performance in response to the remaining five-letter words. Thus, preferring one situational means by including it in an implementation intention may compromise the use of alternative means to the goal.

Attention Attraction During the Pursuit of Unrelated Goals. Will critical cues even attract attention when they occur during the pursuit of an unrelated goal? To test this, Wieber and Sassenberg (2006) conducted two attention disruption studies. In both 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, 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 ("I will respond to 'flower' as quickly and accurately as possible!", "I will respond to 'insect' as quickly and accurately as possible!", "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!"). These intentions were directed at the goal of performing well on a subsequent categorization task (a flower vs. insect implicit association task). 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 control intentions. In the second study, these findings were replicated using a flanker task with vowel versus consonant classifications.

Taken together, these findings imply that critical situations will not escape a person's attention when they have been included in an

implementation intention, regardless of whether the implementation intention is goal relevant or not. This may, however, compromise attention to other goal-relevant cues, as attention is a limited resource. Thus, one has to be careful which critical situational cues one includes in the if-component of an implementation intention.

One way to prevent missing alternative opportunities would be to formulate rather inclusive situational descriptions in the if-component of one's implementation intentions. For example, to ensure one uses an unexpected good opportunity on Tuesday to go for a run, one may simply specify "Once a week after work" in the if-component instead of "If 1 arrive at horne after work on Fridays at Spm". However, a potential problem of using more inclusive formulation is that the critical situation may not acquire a sufficiently high state of activation and thus not allow effortless identification of the situation once it occurs. Consequently, more inclusively formulated if-components might not ensure that a good opportunity to act is captured, especially when an immediate recognition of the opportunity is required.

lnclusive If-Components. The effectiveness of inclusive, as compared to specific, formulations of the if-component was tested in a Car Race Study (Wieber, Odenthal, & Gollwitzer, 2009, Study 1). The participants' task was to drive as fast as possible on a computer-based car race simulation without damaging the car in potentially dangerous situations, such as on slippery racetracks, around competing cars, and in sharp curves. After completing two laps around the racetrack, participants worked on a so-called intention training, which served to manipulate their intentions. All participants formed the goal intention "I will complete the race track as fast and damage-free as possible!" Participants in the specific implementation intention condition additionally added the implementation intention "If I see a black and white curve road sign, then 1 will immediately adapt my speed!" Participants in the inclusive implementation intention condition added the implementation intention "If 1 enter a dangerous situation, then I will immediately adapt my speed!" After this intention manipulation, they drove two more laps around the racetrack. Although the inclusive implementation intention included various dangerous situations, it was predicted that specific if-component formulations would lead to an increased performance compared to an unspecific if-component, as the classification of a dangerous situation requires the effortful assessment of the actual situation and might not be completed swiftly enough to prevent car damage.

The results indeed supported the assumptions. Whereas the driving performance of those participants who used abstract formulations of the if-component did not differentiate from the mere goal intention

condition, participants with specific implementation intentions caused less damage to their cars without slowing down than those in the other two conditions. Thus, forming more inclusive if-components does not seem to represent a viable alternative to forming specific ones, at least when the swift recognition of the situation is crucial for successful action initiation.

Summary. When identifying an alternative opportunity to act is crucial, forming specific and exclusive if-components might not be ideal, as they cannot ensure the detection of all crucial opportunities. However, when representative situations can be identified that account for a large proportion of the situations appropriate to pursue an intended goal [e.g., sharp curves in the reported study), the benefits of forming specific implementation intentions should generally outweigh the costs of overlooking alternative opportunities. This should especially be true when one is prone to miss the critical opportunity, either because it is difficult to detect (e.g., it presents itself only shortly and thus requires immediate recognition) or because one is exhausted and therefore lacks focused attention.

How to Word the Then-Component of an Implementation Intention?

In addition to the heightened accessibility of the if-component, a second process underlies the implementation intention effect on goal attainment. Implementation intentions create a strong link between the if-component and the then-component (Gollwitzer, 1993; 1999). As a result, the initiation of the action specified in the then-component in response to the critical situation acquires features of automaticity. Responses are initiated immediately (Gollwitzer & Brandstätter, 1997), efficiently (Brandstätter, Lengfelder. & Gollwitzer, 2001), and without the need of a further conscious intent (Bayer, Achtziger, Gollwitzer, & Moskowitz, 2009).

How can this process best be utilized when wording the then-component of an implementation intention? Specifying concrete behaviors seems appropriate whenever a whole array of specific operationalizations is possible. Planning in advance which type of goal-directed behavior is to be executed prevents disruptive deliberation once the critical situation is encountered (with respect to choosing one behavior over another). For example, when one holds the goal of exercising regularly and decides in advance to go to the gym, then one inevitably prevents the deliberation of whether to go to the gym, run, or possibly question the plan of exercising once the situation arises. In this way,

implementation intentions help one to act in li ne with one's valued long-term goals, even when the necessary means require overcoming short-term costs like initial reluctance to engage in unpleasant behavior (i.e., when one runs only for the result ofbeing physically fit but does not like running per se).

To reduce disruptive deliberation during goal striving above and beyond the mere initiation of a behavior, simple behaviors should be included into the then-component that are easily carried out (without requiring reflective thought). Such simple behaviors can refer to single operations (e.g., pressing a keyboard button) or several operations that have been learned well (scripts like going to the gym, flossing teeth; see Gollwitzer & Sheeran, 2006). But in addition to simple behaviors, people's goal striving at tim es requires the initiation and enactment of complex actions, like applying abstract rules or enacting a sequence of actions that are taxing to automate (Hull, 1951). Does specifying complex behaviors in the then-component of an implementation intention still support goal attainment? Two recent studies examined this question.

Switching Task Strategies. In a Water Jar Study (Wieber, Odenthai, et al. , 2009, Study 2), participants had to allocate a predetermined amount of water from an initial jar (A) to a target jar (E) by using three jars (B, C, and D) with specified volumes (Luchins, 1942). Five trials required the application of one specific strategy (A - C + 2 x D or A - B + 2 x C) and five trials required the other. All participants learned about these strategies in the task instructions. Before the task began, participants were put in one of four intention conditions. In one condition, participants formed mere goal intentions "I want to find the right solution as fast as possible!" whereas participants in the remaining conditions added an implementation intention comprising the strategies explicated in the instructions in an if-then format. In the remaining three conditions, implementation intentions specified either one of the two pouring strategies in the then-component ("If I start working on a new task, then I will first try to pour water from jar A to j ar C!"; "If I start working on a new task, then I will first try to pour water from jar A to jar B!") or both strategies combined ("Ifr start working on a new task, then I will first try to pour water fromjar A to jar C or fromjar A to jar B!"). The results revealed that implementation intentions specifying both pouring strategies improved participants' performance more than those specifying one pouring strategy or those who merely formed goal intentions.

Action Sequences. A further aspect of complex behaviors relates to the enactment of action sequences. Do implementation intentions only

automate the initiation of the first action of a sequence or do they additionally automate the initiation of subsequent actions in the sequence (like scripts)? To test if the enactment of an action sequence addressed in the then-component of an implementation intention acquires features of automaticity, an Action Sequence Study was conducted (Wieber, Odenthal, et a1., 2009, Study 3). Participants worked on a computer-based lexical decision task that required pressing the left control key in response to nonwords and the right control key in response to words. As an exception, the word "jug" required pressing the "1" key (with the right hand), followed by the mouse button (with the left hand) and the right floor-based button (with their right foot). In addition, all participants were assigned goal intentions ("I want to perform as well as possible on the task' ") and either added implementation intentions or not. Half of the implementation intentions only spelled out the initial action response to the word "jug" ("If the word 'jug' shows up, then I will first press the 'I' keyl"), while the other half spelled out all three sequential action responses in the then-component ("If the word 'jug' shows up, then I will first press the '1' key, followed by the right mouse key, and the right floor key!"). As participants had to respond as quickly and correctly as possible, the immediacy of their reactions indicated the automaticity of the behavior. As expected, implementation intentions specifying the initial action response accelerated the initial action response time corn-pared to mere goal intentions, but not those of the second and third response (i. e., mouse and floor key press). Most importantly, participants who formed implementation intentions specifying all three behavioral responses in the then-component reacted faster to the complete action sequence than those who formed mere goal intentions.

Summary. In addition to simple behaviors, complex behaviors can also be fruitfully included in the then-component of implementation intentions. People should benefit from this possibility as it allows them to effectively tackle more complex problems like flexible switching between task strategies and the enactment of action sequences.

THE IMPORTANCE OF THE FORMAT OF IMPLEMENTATION INTENTIONS

So far, we have examined how to best specify the if-component and the then-component of implementation intentions. But in addition to the content, the format per se might also contribute to implementation intentions' effectiveness. Generally, the if-then format seems to represent an elementary component of human cognition. If-then conditionals are

integral parts of information processing frameworks that are designed to model higher-order cognition (e.g., mathematics, language, reasoning, memory, and problem solving) in psychology, computer science, language science, and philosophy. Examples include production system theories such as cognitive stimulus-response theories (ACT; Anderson, 1983; Anderson et a1., 2004), symbolic programming languages (e.g., Java, Perl, PHP), scientific speech theories (e.g., König & van der Auwera, 1988), and philosophical approaches (e.g., Stalnaker, 1968). To clarify the importance of the if-then format for the effectiveness of implementation intentions, we now address three emergent questions: (a) Is the if-then format of implementation intentions necessary?, (b) Is an if-then-why format even more effective?, and (c) Do if-then conditionals have to be directed at the future?

Is the If-Then Format Necessary for Strong Implementation Intention Effects?

If-Then versus When, Where, and How. The contribution of the if-then format was recently tested in a Fruit and Vegetable Promotion Intervention Study (Chapman, Arrnitage, & Norman, 2008). Participants were randornly assigned to a control condition, a "global" implementation intention condition (in which participants freely chose how to make their plan) or an if-then irnplementation intention (in which participants were additionally required to plan using the if-then format). One week later, participants fi1led out a second questionnaire indicating their fruit and vegetable intake during the previous week. As a key result, participants in the control condition did not manage to increase their fruit and vegetable intake, whereas those with global implementation intentions did, although only when their initial intake was low. However, with if-then implementation intentions, even participants with high initial fruit and vegetable intake were able to improve their goal attainment. Similarly, in a study by Oettingen, Hönig, and Gollwitzer, 2000 (Study 3), if-then implementation intentions were more effective than specified goal intentions explicating the when and where of an intended goal-directed behavior (i.e., doing regular math homework). In summary, then, implementation planning that uses an if-then format seems particularlyeffective.

Is an If-Then-Why Format Even More Effective?

One important prerequisite of implementation intention effects is a strong commitment to the respective goal intention (see also goal-

dependent automaticity, Gollwitzer & Schaal, 1998; Sheeran et al., 2005). Implementation intentions per se do not affect the strength of people's goal intentions (Webb & Sheeran, 2008, Study 1). Therefore, one might ask if the if-then format can be expanded to ensure sufficient motivation. One possible way to achieve this is to remind oneself of the desired long-term consequences of goal pursuit. This strategy may be especially helpful when the major problem encountered during goal striving is to overcome an initial reluctance to act on a goa1. For example, one may seriously asp ire to speak Italian as a foreign language to enjoy vacations in Italy but does not like learning vocabulary or grammar. How could one remind oneself of the positive consequences of a goal? One strategy suggested by Freitas, Gollwitzer, and Trope (2004) is to simply ask oneself why one intends to perform a certain goal-directed action. Thus, an if-then-why format might be a suitable way to increase people's motivation and thereby make implementation intentions particularly effective. Four studies tested this hypothesis.

If-Then-Why and Assigned Goals. In an Analytical Reasoning Study (Wieber, Gollwitzer, Gawrilow, Odenthal, & Oettingen, 2009, Study 1), participants worked on 20 Raven matrices (Raven, 1977, 2000), in which they had to select one of eight possible result patterns that logically completed a 3 x 3 matrix pattern. All participants frrst learned that double-checking was a useful strategy to improve one' s performance on the upcoming task. Participants then either formed a mere goal intention ("I will correctly solve as many trials as possible!") or added an implementation intention to it ("If I have a first idea for the solution to a trial, then I will double-check it!"). To vary motivation, participants either added a reason to their goal or implementation inten-tion ("because I want to achieve a good performance!") or not. The results revealed that implementation intentions without the motivation inter-vention as well as goal intentions with the motivation intervention were effective in improving participants' performance. However, the combi-nation of implementation intentions and the motivation intervention did not result in the expected improvement in participants' performance; they did not solve more matrices correctly than did participants in the goal intention group.

If-Then-Why and Self-Set Goals. To replicate these effects with self-set goals, a Dieting Behavior Study was conducted, in which participants formed self-set goal intentions for the highly valued goal oflosing weight (Wieber, Gollwitzer, et al., 2009, Study 2). As a baseline, participants' weight and body fat were measured in a first session, and they were required to document their eating habits for 2 weeks. In a

subsequent second session, participants were randomly assigned to one of four intention conditions. In the goal intention conditions, they either formed the mere goal intention "I want to lose weight" or additionally added their three foremost motivations for wanting to lose weight (e.g., "I want to lose weight because I want to stay healthy!"). In both implementation intention conditions, participants had to write down three critical situations (e.g., at a party, watching TV) that might jeopardize their goal, define suitable means of counteracting these critical situations, and merge them into three implementation intentions (i.e., in the if-then format). In the implementation intention plus why-component condition, they furthermore added their three foremost motivations for wanting to lose weight (e.g., "If I am sitting in front of the TV, then I will eat fruit because I want to become more attractive!"}, After four weeks, participants' body weight, body fat percentage, and body mass index (BMI) were again collected. Moreover, the average calorie and fat content of their weekly meals was computed based on their food diary. Results replicated the findings from the Analytical Reasoning Study. Whereas participants who formed goal intentions without motivational reasons did not manage to change their eating habits (no weight difference), participants who formed implementation intentions without motivational reasons lost on average more than two pounds. Whereas supporting goal intentions with motivational reasons produced an average weight loss of more than two pounds, the implementation intentions plus motivational reasons again did not achieve a significant weight loss.

Adding a why-component to the if-then plans did not result in improved performance in either study, but rather offset the previously observed positive effects for implementation intentions without the why-component. Conversely, adding a why-component to the goal intention improved participants' goal striving in both studies. These findings do not support the notion of additive effects of thinking of motivational reasons when forming implementation intentions. A plausible explanation is that adding the why-reasoning not only focuses people's attention on the beneficial long-term goals but also impacts their cognitive orientation (i.e., mindset) during goal striving. Mindsets are defined as cognitive orientations that accompany the different action phases proposed by the mindset theory of action phases (Gollwitzer, 1990). During goal setting, a deliberative mindset prevails that is characterized by an increased openness to new information and an impartial and realistic assessment of this information. This benefits the main task during this action phase, namely weighing the desirability (i.e., incentives) and feasibility (i.e., expectancies) of one's wishes in order to commit only to the realization of the most desirable and feasible ones (e.g., Gollwitzer &

Bayer, 1999; Gollwitzer & Kinney, 1989; Puca & Schmalt, 2001). Goal striving, in contrast, is accompanied by an implemental mindset that is characterized by closed-mindedness to new information. This again is functional because it helps to shield goal striving from interfering or distracting information (e.g., attention to competing goals, deliberating pros and cons; Puca & Schmalt, 2001; Taylor & Gollwitzer, 1995). Thus, within the pursuit of a single goal, goal intentions are best formed against the backdrop of deliberative mindsets, and implementation intentions are best formed against the backdrop of implemental mindsets. Asking "Why?" during implementation intention formation might impact one's motivation by reminding oneself of the positive consequences of a goal; however, it might also induce a switch from an implemental to a deliberative mindset (Freitas et a1., 2004). Wieber, Gollwitzer, et a1. (2009) therefore postulated a matching principle of intention formation and mindsets: goal intention formation should work best when people are in a deliberative mindset, whereas implementation intention formation should work best when people are in an implemental mindset. **In** other words, inducing an implemental mindset during goal intention formation and inducing a deliberative mindset during implementation intention formation should weaken goal setting and if-then planning, respectively, and thus impair subsequent goal attainment.

Do We Have to Assume a Matching Principle Between Mindsets and Intentions?

If-Then-Why and Self-Control. Two studies tested the matching principle by separately manipulating intention formation and mindset induction. In the Handgrip Self-Control Study (Wieber, Gollwitzer, et a1., 2009, Study 3), a well-established test of self-control was applied, namely the handgrip trainer task (Muraven, Tice, & Baumeister, 1998). The task requires clutching the handles of a handgrip closed as long possible, despite the increasing discomfort and taxing physical endurance (i.e., required exertion of self-control). All participants learned that the pain experienced is harmless and can be ignored. As a manipulation of participants' intentions, they either received no training (i.e., no intention) or a paper-based hand trainer task training including a goal intention ("I will press the handgrip as long as possible!") or a goal intention plus implementation intention ("If my muscles hurt, then I will ignore the pain!"). As a manipulation of participants' mindsets, they either received no mindset manipulation or one of two versions of an ostensibly unrelated paper-based study on "personal relationships." Participants either thought about reasons "why" it is important to establish and keep

personal friendships (deliberative mindset) or about ways "how" to establish and keep personal friendships (implemental mindset; for a similar manipulation, see Freitas et al., 2004). By asking why versus how questions four successive times in a sequence (e.g., asking why/ how the answer to the first why/how question is helpful), increasingly deliberate or implemental thoughts are produced step by step. Subsequently, they performed the handgrip task.

Results indicated that overall, mindsets alone did not impact performance, but intentions did. Implementation intentions lead to better self-control in comparison to goal intentions. Most importantly, this effect was qualified by mindsets. In line with the matching hypotheses, being in a deliberative mindset improved the performance of participants who formed a goal intention compared to those in an implemental mindset or no mindset. Being in an implemental mindset, on the other hand, improved the performance of participants who formed an implementation intention compared to those who were in a deliberative mindset or the control condition. In summary, this study provides initial evidence for the postulated matching principle of intention formation and mindset. As this study does not allow for the disentangling of motivational (i.e., ego depletion) and cognitive processes (i.e., suboptimal cognitive processing), another study was conducted.

If-Then-Why and Automaticity. The Dual Task Study (Wieber, Gollwitzer, et al., 2009, Study 4) sought to replicate the results of the Handgrip Self-Control Study in a more cognitively demanding speed-accuracy performance task. It was additionally intended to shed light on the processes underlying the effects of matching mindset-intention combinations with goal attainment. Derived from the theory of intentional action control (Gollwitzer, 1999) and the mindset theory of action phases (Gollwitzer, 1990), goal intention-deliberative mindset combinations were expected to improve goal attainment via resource-demanding deliberation processes; conversely, implementation intention-implemental mindset combinations were expected to improve goal attainment via automated processes. To test the automaticity of the performance, a dual-task paradigm was employed in accordance with Brandstätter et a1. (2001, Studies 3 and 4). Participants had to simultaneously work on a primary tracking task (enclosing a target circle that moved across the computer screen with a mouse-controlled second circle) and a secondary go/no-go task (pressing the left mouse button as quickly as possible in response to numbers [in particular number 3], but not to letters) that both relied on the same resources (i.e., visual attention and motor responses). As attentional capacities are limited, an improved

performance on one task is expected to carry features of automaticity only when the performance on the other task is not compromised.

To manipulate participants' intention, they formed the goal intention "I want to react to numbers as quickly as possible" and either added an implementation intention ("And if the number 3 appears, then I will press the left mouse button particularly fast") or a control intention ("I will particularly memorize the number 3"). Subsequently, participants' deliberative or implemental mindsets were induced using the task from the previous study (Wieber, Gollwitzer, et al., 2009, Study 3). Next, participants worked on the dual-task trials with high task complexity (cognitive load}, followed by trials with moderate task complexity (no cognitive load).

The results confirmed the hypotheses. When the primary task was easy and thus no automaticity was required for responding, participants in both matching mindset-intention combinations were able to improve performance on the secondary task (i.e., faster responses to critical cues on the go/no-go task) without suffering impaired performance on the primary task (tracking task). Those in the mismatching mindset-intention combinations were less able to improve their performance on the tasks. However, when the primary task was difficult and thus automaticity was required for responding, only those in the implementation intention-implemental mindset combination condition, and not those in the goal intention-deliberative mindset condition, were able to improve their performance on the secondary task without suffering impaired performance on the primary task. Those in the mismatching mindset-intention combinations were again less able to improve their performance on the tasks. These results suggest that the proposed matching principle cannot be completely explained by the depletion of self-regulatory resources, but that the cognitive orientation (mindset) explanation is also required.

Summary. Taken together, these studies provide evidence for the importance of the proposed matching principle for successful goal attainment (Wieber, Gollwitzer, et al., 2009, Studies 1-4) rather than the effectiveness of an if-then-why format. Compared to mismatching intention-mindset combinations, matching intention-mindset combinations improve goal attainment. Thereby, matching mindset-intention combinations impact performance either through effortful processes (goal intentions with deliberative mindsets) or automatie processes [implementation intentions with implemental mindsets). Moreover, mismatching mindset-intention combinations limit goal striving, no matter how the mismatching mindsets are induced (i.e., during the pursuit of the focal goal or of a nonfocal goal). As people commonly pursue multiple

goals, is it important to ensure that intentions and mindsets match during goal pursuit. Thus, the present findings suggest that instead of using an if-then-why format during planning, people should either combine tasks requiring concrete implemental actions or abstract deliberating. For example, sorting one's e-mail and organizing a conference trip in one work session should prevent cognitive processing mismatches, thereby resulting in enhanced performance.

Thinking About the Future Versus Thinking About the Past: Implementation Intentions and Upward Counterfactual Thoughts

Deliberating over whether and why to pursue a goal during the formation of an implementation intention undermines its effectiveness. But what if such considerations are completed prior to the formation of the plan, thus avoiding the problem of mismatching mindsets? **In** this case, motivation could be increased and the strength of subsequently formed implementation intentions enhanced. Such deliberation could be accomplished through upward counterfactual thinking. Upward counterfactuals are if-then statements indicating how a previous outcome could have been better. For example, a student might consider the thought "If only I had attended every lecture, then I would not have failed the exam!" Numerous studies have found that considering upward counterfactuals improves subsequent performance (Markman, McMullen, & Elizaga, 2008; Roese, 1994).

Several explanations for this effect have been postulated. Roese and colleagues (Epstude & Roese, 2008; Roese, 1994; Smallman & Roese, 2007) have suggested that counterfactual thoughts could affect performance by identifying useful strategies and supporting the formation of plans. For example, one could convert the counterfactual "If only I had attended every lecture, then I would not have failed the exam" into the implementation intention "Whenever there is a lecture, then I will attend." There is evidence from several studies that considering upward counterfactuals increases the accessibility of corresponding behavioral intentions (Smallman & Roese, 2007). However, the intentions (i.e., "I will do X") examined in these studies did not take the if-then format of an implementation intention. Thus, it is unclear whether counterfactual thinking is sufficient to support the spontaneous formation of specific if-then plans. Past work (Roese, 1994) examining whether individuals enact the behavioral strategy contained in the counterfactual has produced mixed results. Moreover, these studies were correlational in

nature, raising the possibility that the counterfactuals generated by participants merely reflected previously held behavioral intentions.

A second manner in which counterfactual thoughts might improve performance is by mobilizing effort (Epstude & Roese, 2008; Markman & McMullen, 2003). Upward counterfactual thinking involves evaluating the outcome relative to a higher standard. These comparisons are likely to cause disappointment with one's goal progress. Theories of effort mobilization (Brehm & Self, 1989; Carver & Scheier, 1999) suggest that such perceived goal discrepancies will increase effort and persistence. Consistent with this account, performance benefits of upward counterfactual thinking appear to be limited to situations in which the individual is dissatisfied with the outcome (Markman et a1., 2008). Conversely, upward counterfactual thoughts reduce persistence and effort when they serve to excuse failure (McCrea, 2008).

Myers and McCrea (2009) conducted several studies directly comparing the effects of upward counterfactuals and implementation intentions that shared a behavioral strategy. If upward counterfactuals improve performance by supporting the spontaneous generation of specific if-then plans, then forming an implementation intention should have no additional benefits. However, based on the notion that counterfactuals mobilize effort, Myers and McCrea (2009) predicted that these thoughts would increase persistence and performance, particularly when accompanied by more negative affect. Furthermore, these effects should be independent of the behavior specified in the thought. In contrast, implementation intentions should lead to enactment of the specified behavior, independent of affect. Thus, both types of thoughts were expected to additively improve goal attainment.

Assigned Counterfactuals and Implementation Intentions. In an initial study, participants were told they would be taking part in a study on decision making under time pressure. Participants were required to quickly select from a pair of pictures the one with the higher point value (adapted from Jaudas & Gollwitzer, 2004). Correct identifications were rewarded with the point value of the picture, minus a time penalty. Importantly, a picture of a water lily was of the highest point value, such that responding quickly on trials in which this picture appeared was a particularly effective strategy. Participants were provided with feedback after the first task and then assigned to one of two counterfactual conditions; those in the counterfactual group were asked to consider the thought "If I had pressed the corresponding key every time I saw the water lily, then I would have done better, " whereas those in the control condition were asked to consider the statement "I would like to know how my friends would do on the test." Participants were then randomly

assigned to one of two implementation intention conditions; those in the implementation intention group were asked to consider the plan "Every time I see the water lily, then I will immediately press the corresponding key," whereas those in the control condition proceeded to the next phase of the experiment. All participants completed a measure of mood and a second block of the task. Performance on this block relative to the initial block was examined. Participants in the counterfactual condition who also reported less positive affect responded faster on the critical (water lily) trials, compared to those in the control condition or who reported more positive affect. Furthermore, they made fewer errors on noncritical trials and improved their overall score more than did the latter groups. As expected, the beneficial effects of upward counterfactual thinking generalized to aspects of performance not mentioned by the thought and appeared dependent upon experiencing dissatisfaction with one's performance. Both of these findings are more consistent with increased effort mobilization rather than with the spontaneous formation of a plan. Indeed, implementation intentions were found to improve reaction times on the critical trials, suggesting that these plans had an additional (albeit specific) effect on performance. In other words, those who listed both the counterfactual thought and the implementation intention improved the most.

Self-Set Counterfactuals and Implementation Intentions. In a second study, effort mobilization in the form of task persistence was directly examined. Participants were given two word completion tasks. Two insolvable items were included in each task, such that the amount of time spent working on the task constituted a true measure of persistence. As in the previous study, participants were assigned to counterfactual and no counterfactual conditions and implementation intention and no implementation intention conditions prior to completing a second block of items. However, participants freely generated these statements, rather than being provided the statements by the experimenter. Consistent with the initial study, individuals persisted more in the counterfactual condition than in the control condition, but only when they reported experiencing more negative affect. Moreover, analyses classifying the statements generated by participants revealed that this effect was not limited to those counterfactuals concerning time spent on the task. Those assigned to form an implementation intention also persisted longer compared to those in a control condition, but this effect was not moderated by mood. Furthermore, classifying the implementation intentions generated by participants revealed that only those statements related to time spent on the task increased persistence.

In summary, implementation intentions and counterfactual thoughts ad additive effects on goal striving, with counterfactuals increasing effort mobilization and implementation intentions increasing the enactment of specified behaviors. In addition to explaining how counterfactual thoughts improve performance, these findings imply that implementation intentions can be made more powerful by first considering how a past performance could have been better. Because counterfactuals increase effort mobilization, subsequently formed implementation intentions become more effective, making it more likely that individuals will overcome the intention-behavior gap. It appears to be critical that counterfactuals are made prior to the formation of implementation intentions, thereby avoiding the problem of mismatching mindsets presented by the if-then-why phasing. Finally, these results once again demonstrate the unique qualities of the if-then format of implementation intentions. Although both counterfactuals and implementation intentions share a conditional phrasing, only implementation intentions commit one to act in a specified manner in a future situation. As a result, counterfactuals do not appear to be as effective in promoting the enactment of specific goal-directed behaviors.

Conclusion and Outlook

In the past, implementation intentions [if-then plans) have been observed to effectively reduce the gap between intentions and behavior. But how should one formulate one's implementation plans to maximize their effectiveness for goal attainment? In the present chapter, we first raised the question of how the components of implementation intentions should be worded. Regarding the if-component, including a specific situational cue in the if-component ensures that the critical cue does not escape one's attention. However, as this attention attraction effect compromises the attention given to alternative cues, people have to carefully choose what kind of situation al cue they want to specify in an implementation intention. Specifying more inclusive (abstract) situational cues in the if-component does not qualify as a solution, as such integrative specifications no longer ensure that swift attraction of attention occurs. Thus, the if-component of implementation intentions should be worded by using specific but "representative" good opportunities to act towards the goal. Regarding the then-component, specifying simple behaviors (such as pressing a response key) as well as complex behaviors (such as switching between different action strategies or enacting a sequence of behaviors) seems to be effective in promoting goal

attainment. Thus, people can also utilize implementation intentions to facilitate the initiation of complex behaviors.

The format of implementation intentions was subsequently examined. As the if-then format was more effective than merely specifying when, where, and how one intends to pursue a goal, people should apply the if-then format when forming implementation intentions. Conversely, an if-then-why format does not promote goal striving via implementation intentions. Instead, a matching principle between mindsets and intentions was extracted. This finding implies that people should not engage in too much deliberating during the formation or the enactment of an implementation intention, as an implemental, but not a deliberative, mindset supports goal striving with implementation intentions. Finally, applying the if-then format when thinking about past goal pursuits via upward counterfactual thoughts (i.e., conditional if-then statements indicating how a previous outcome could have been better) represents a powerful method to strengthen the motivational basis for subsequently formed implementation intentions

Which venues should future research address in order to expand knowledge on maximizing the effectiveness of implementation intention? A closer look should be given to the situation al context in which goal striving with implementation intentions takes place. People pursue their goals in a vast array of different situations, in which intrapersonal differences may be relevant to the maximizing of implementation intention effects. People may only experience problems during goal striving in some domains but not others. For example, a person may encounter problems exercising self-control in the domain of professional goals (e.g., writing an essay) but may have no problem exerting self-control within the domain of a health goals C e.g., resisting tempting chocolates). Thus, making people sensitive to the domains in which they experience difficulty with self-control should allow them to tailor their implementation intentions to the action control problems they most likely encounter.

Finally, future research should systematically develop procedures to ensure that the moderators of implementation intentions do not limit their effects on goal attainment. For instance, only when people are strongly committed to a goal intention can implementation intention effects be expected [e.g., Sheeran et al., 2005). To guarantee such strong goal commitment, people can either form upward counterfactuals or complement the use of implementation intentions with the mental contrasting technique (i.e., contrasting desired future states with the present negative reality to identify potential obstacles and ensure strong motivation; Stadler, Oettingen, & Gollwitzer, 2009). Interventions may also target a second prerequisite for strong implementation intention

effects, namely a strong commitment to the plan. A promising route to ensure strong commitment to the plan is to form implementation intentions collaboratively (Prestwich et a1., 2005). The collaborative discussion should increase the quality of the plans as more options are considered and inappropriate specifications of situations and behaviors can be prevented. Moreover, the public commitment of an implementation intention should increase people's commitment to the plan. Finally, low efficacy should also be considered as a limit of implementation intention effects. One way to strengthen people's self-efficacy beliefs is to form implementation intentions that include motivation al self-speech (e.g., to improve performance on an analytical reasoning test, "When I start a new problem, then I will tell myself: I can solve it!"; Bayer & Gollwitzer, 2007). In other words, people may use implementation intentions to favorably modulate the moderators of implementation intention effects.

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