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Metacognition in Action: The Importance of Implementation Intentions

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When people furnish their goal intentions ("I intend to attain the goal x!") with implementation intentions ("I will initiate the goal-directed response y when situation z arises!"), the initiation of goal-directed responses becomes automatized. As this type of automaticity stems from a single act of will, it is referred to as strategic automaticity. We report various studies demonstrating that strategic automaticity leads to immediate and efficient responding, which does not need a conscious intent. In addition, the situational cues specified in implementation intentions seem to be easily detected and readily attended to. Further research indicates that the strategic automaticity induced by implementation intentions also helps resist temptations and fight bad habits. Following Nelson's (1996; Nelson & Narens, 1994) model of metacognition, we suggest that goal intentions and, in particular, implementation intentions are important components of the metacognitive control of action geared toward its initiation, continuation, and termination.

Metacognition in Action

Following the ancient Chinese philosopher and general Sun Tsu (ca. 500 B.C./1996), there are three levels of thinking about action. The first and highest level is *strategy,* which is meant to define desired end states and set goals. The second and medium level is *operative planning,* where a person decides on when, where, and how one will engage in goal-directed behaviors. The third and lowest level is *tactics,* which is the execution of goal-directed behaviors. The decision about which tactics to take depends on the operative planning. Assuming that a person has made the right goal decision and engaged in appropriate operative planning, which in turn leads to effective tactics, Sun Tsu considered goal attainment guaranteed.

Whereas most approaches on metacognition address the question of metacognitive monitoring and control of memory and judgment (Bjork, 1994; Koriat, 1994; Metcalfe, 1993), in this article we focus on metacognition in action. More specifically, we compare two metacognitive tools of action control: (a) goal intentions that are located on the metalevel of strategy, and (b) implementation intentions that operate on the subordinate metalevel of planning. It is suggested that planning the when, where, and how of initiating goal-directed behaviors furthers goal attainment. The beneficial effects of such planning are expected to operate via automatic processes. When the person encounters the anticipated opportunity, the intended goal-directed action is initiated immediately, efficiently, and without conscious intent (Gollwitzer, 1993). Moreover, the opportunity and means specified in such plans are detected effectively, attended to spontaneously, and easily accessed in memory. All of these observations (see also Gollwitzer, 1996) suggest that action initiation is no longer consciously and effortfully controlled but has been placed under the direct control of the specified environmental cues. We therefore speak of *strategic automaticity* when a conscious act of will delegates the control of one's actions to anticipated inner or external events ("When I encounter *x,* I will perform behavior *y*!"). We call such acts of will *implementation intentions* to highlight that we are dealing with action control at the levels of operative planning and execution of tactics. We refer to decisions about goals (level of strategy) as *goal intentions* ("I want to achieve *z*!"). In line with Sun Tsu (ca. 500 B.C./1996), we believe that implementation intentions are formed in the service of goal intentions. Assuming that people have chosen reasonable goals and furnished them with appropriate implementation intentions, the chances of goal attainment are enhanced (Gollwitzer & Brandstätter, 1997).

In line with Nelson's (1996) model of metacognition that knows an object level and superimposed metalevels, we consider reflecting on the desirability and feasibility of one's wishes as a component of metacognitive monitoring of the preliminaries of actual behaving on the object level of tactics. Setting goals (goal intentions) and furnishing them with plans (implemen-

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tation intentions), on the other hand, are components of the metacognitive control imposed from the metalevel to the object level. In metacognitive terms, both goal intentions and implementation intentions are tools used at the metalevel to further wanted and prevent unwanted behaviors on the object level. Goal intentions produce action control triggered by monitoring that detects discrepancies between the goal state and the current state. Implementation intentions control wanted and unwanted actions by precueing automatic mechanisms. The related monitoring focuses on linking effective goal-directed behaviors to respective situations anticipated in the future. We assume that implementation intentions are particularly powerful metacognitive tools of action control.

Types of Automaticity

Automatic processes influence people's thought, affect, and behavior and thus play an important role in everyday life (Bargh, 1997). According to Bargh (1989, 1992), automatic processes come in different forms and sizes as they vary on the dimensions of efficiency, intentionality, controllability, and awareness. Of the many possible forms, Bargh focused only on the following three: preconscious automatic processes, postconscious automatic processes, and goal-dependent automaticity.

Preconscious automatic processes can be triggered without awareness of the critical stimulus. Once the process is started, it also runs to completion outside of awareness. Research on stereotype activation showed this process to produce higher accessibility of stereotypes in participants when primed with stereotype-relevant information (Banaji & Greenwald, 1994, 1995; Devine, 1989; Hamilton & Sherman, 1994; Pratto & Bargh, 1991).

Postconscious automaticity is seen as a residual effect of stimuli that were consciously processed. What stays outside of awareness here is not the critical stimuli themselves but their effects on the person's cognitive processes. For instance, Srull and Wyer (1979) demonstrated that the ambiguous behavior of a target person was rated more hostile when the construct *hostile* was present in a scrambled sentence task that preceded the impression formation task (see also Higgins, 1989; Higgins & Bargh, 1987; Wyer & Srull, 1986).

Finally, in goal-dependent automaticity, the person is in the process of pursuing a set goal. An example for goal-dependent automaticity is hitting the brakes when approaching a red light at an intersection. The stimulus "red traffic light" automatically leads to the reaction of hitting the brake—but only when a person has the goal of driving his or her car to a final destination. We can drive the car and simultaneously think of what we want to buy in the grocery store, daydream, and even have a discussion with another person. The driving behavior has become automatized by experience through repeated and consistent acting and can now operate autonomously. The process of automatization in such cases has also been referred to as *proceduralization* (Anderson, 1983; for a review, see Bargh, 1997).

The strategic automaticity we focus on in this article qualifies as a subcategory of goal-dependent automaticity. Implementation intentions are formed in the service of goal intentions. Their aftereffects—of automatically eliciting goal-directed behaviors once anticipated critical situations are encountered—can only be expected when strong superordinate goal intentions are still in place. Moreover, we expect the effects of implementation intentions to be stronger, the more the person feels committed to execute the plan specified in an implementation intention. The differences between strategic automaticity and the goal-dependent automaticity as defined earlier (Bargh, 1989, 1992) rest in the way they originate. The origination of goal-dependent automaticity is reminiscent of the acquisition of habits, as automatization comes from actual frequent and consistent pairing of situations and behaviors. Strategic automaticity, on the other hand, is created by forming implementation intentions on the spot by a single act of will. When forming implementation intentions, people do not actually behave but anticipate the future by linking anticipated good opportunities to act to effective goal-directed means and behaviors. Implementation intentions can be modified along the way and can be abolished once goal attainment has been achieved. Finally, the individual may decide to form implementation intentions or refrain from doing so at will. It is up to the individual whether or not he or she wants to resort to forming implementation intentions to promote goal pursuit. All this has led us to consider the automatic processes that stem from implementation intentions to be strategic automaticity.

Strategic Automaticity and Action Initiation

The Impact of Implementation Intentions on the Rate of Goal Attainment

If implementation intentions automatize action initiation, goal intentions that are furnished with implementation intentions should show a comparatively higher rate of goal completion. Gollwitzer and Brandstätter (1997) ran two studies exploring whether or not implementation intentions raise the completion rate of long-term projects (goal intentions). In the first study, college students were asked prior to Christmas break to each name two projects they intended to achieve during the vacation, one difficult to implement and the other

easy to implement. For both types of projects, participants indicated such goals as writing a seminar paper, settling an ongoing family conflict, or engaging in sports activities. When participants were asked whether they had formed intentions on when and where to get started (i.e., implementation intentions) about two thirds—again, for both types of goals—responded positively.

After Christmas vacation, the participants were contacted again and project completion was checked. For the projects that were difficult to implement, 2 out of 3 of the participants who had formed implementation intentions had carried them out. Participants without implementation intentions, however, had mostly failed to complete their projects. Only one fourth of those participants were successful. For the projects that were easy to implement, completion rate was very high (4 out of 5), regardless of whether participants had formed implementation intentions. Apparently, when action initiation is habitualized and thus easy to begin with, automatization does not produce an additional advantage; but automatization has a strong facilitating effect when action initiation is difficult (has not yet been automated). Participants had also been asked to indicate how they perceived certain qualities of the named projects (e.g., importance of project completion, likelihood of potential obstacles, perceived closeness to project completion). On the basis of these data, it could be confidently ruled out that the assessment of implementation intentions was a surrogate for goal-quality variables that might have produced the observed pattern of completion rates.

The findings of that study were corroborated in an analogous experiment in which the experimenters set participants a goal that was difficult to implement (Gollwitzer & Brandstätter, 1997, Study 2). In this experiment, all participants were asked, again prior to Christmas break, to complete the same type of project. More specifically, participants were requested to write a report on how they spent Christmas Eve. This report was to be written no later than 48 hr after the event and then sent to the experimenters, who were supposedly conducting a representative study on how people spend their holidays in modern times.

Half of the participants were randomly chosen and then instructed to form implementation intentions. They were handed a questionnaire that requested them to specify when and where they intended to write the report during the critical 48 hr. The other half of the participants were not requested to pick a specific time and place for implementing this project. When participants' reports arrived in the mail after Christmas, they were analyzed in terms of the dates when they were written. It turned out that three fourths of the implementation intention participants wrote the report in the requested time period, whereas only one third of the control participants managed to do so. It would be tempting to explain this finding in terms of obedience to the authority of the experimenter—however, the experimenters, being aware of this problem, granted participants absolute anonymity.

Difficult or unpleasant-to-implement projects like health-promoting and disease-preventing activities (e.g., starting to exercise regularly at the age of 50; changing an unhealthy diet that one has adhered to for years; walking for patients with arthritis, etc.) should also be substantially facilitated by forming implementation intentions. Indeed, women who had set themselves the goal of performing breast self-examinations (BSE) during the next month (Orbell, Hodgkins, & Sheeran, 1997) greatly benefited from forming implementation intentions. Participants in this study were university students or administrative staff who were first asked to indicate how strongly they intended to perform BSE during the next month. To create relevant implementation intentions, participants were asked to write down where they would perform BSE in the next month and at what time of day. Of the participants who had reported strong intentions to perform BSE during the next month, 100% did so if they had been induced to form additional implementation intentions. If no additional implementation intentions were formed, however, the strong goal intention alone only produced 53% goal completion.

How Do Implementation Intentions Facilitate Action Initiation?

Problems of the initiation of goal-directed behavior pertain to the following issues: First, when people are highly absorbed in an ongoing activity, wrapped up in demanding ruminations, gripped by an intense emotional experience, or simply tired, chances are high that they will not seize a good opportunity to act on their goals, simply because the opportunity fails to attract attention (e.g., a restaurant that offers low-cholesterol food for people with the goal of reducing their cholesterol level). The reason for this is that attention is focused on other things that have nothing to do with the question of how to achieve the intended goal. But even when people search for appropriate opportunities in a given situational context, they may not detect them simply because they are not obvious at first sight (e.g., when a club offers social activities, people fail to recognize the available sports opportunities). Finally, the initiation of goal-directed action often becomes a problem because people let slip opportunities that present themselves only for a short moment. What is needed here is an immediate initiation of appropriate goal-directed behaviors.

Gollwitzer (1993) theorized that implementation intentions that specify anticipated situational cues and link them to concrete goal-directed behaviors are ide-

ally suited to alleviate these problems. By forming implementation intentions, the mental representation of the anticipated situational cue becomes highly activated and thus easily accessible. This has attentional, perceptual, and behavioral consequences that should help overcome the problems listed.

First, regarding attentional consequences, it was observed in a dichotic listening task (Bargh, 1982; Johnston & Dark, 1986) that critical words describing the anticipated situational cues were highly disruptive to focused attention. Participants' performance of shadowing (i.e., efficient repeating of the words presented to the attended channel) was severely hampered when critical words were presented to the nonattended channel. Apparently, even when efforts were made to direct attention to the shadowing task, the critical words still managed to attract attention, as indicated by the weakened shadowing performance. In dichotic listening research, the critical situational cues are presented to participants in terms of verbal descriptions only. In real life, when a person enters a situational context that entails such critical cues not just as words, their potential to attract attention and thus to disrupt focused attention should be even stronger. This implies that opportunities to act as specified in implementation intentions will not easily escape people's attention, even when people focus on other things (e.g., worries, strong emotions, the conscious pursuit of competing goals) besides the respective goal pursuit.

Second, to assess the perceptual processes triggered by implementation intentions, an experiment by Steller (1992) employed the embedded figures test (Gottschaldt, 1926; Witkin, 1950). This test consists of complex geometrical figures (b-figures) that contain a smaller partial figure (a-figure). The a-figure is hidden within the b-figures according to the Gestalt principles and is thus difficult to detect. Still, following the idea that implementation intentions would lead to heightened accessibility and thus better detection of the a-figure, it was observed that participants showed an enhanced detection performance when they had formed implementation intentions that used the a-figure as the critical situation.

Third, the postulated behavioral readiness as a result of forming implementation intentions was demonstrated in a series of three experiments. In the first experiment (Gollwitzer & Brandstätter, 1997, Study 3), participants were induced to form implementation intentions that specified good opportunities for presenting counterarguments to a series of racist remarks made by a confederate. When participants were finally allowed to counterargue, implementation-intention participants initiated their counterarguments more immediately when these good opportunities arose than did mere goal-intention participants. In a second experiment (Brandstätter, 1992, Study 2) that involved a button-pressing task embedded as the secondary task in a dual-task paradigm, participants were induced to form the goal intention to press a button as fast as possible whenever numbers appeared on the screen, but not when letters were shown. Participants in the implementation-intention condition were asked to form the further intention to press the button particularly fast when the number 3 was presented. Implementation-intention participants showed a substantial increase in speed (the number 3 led to faster reactions than the other numbers) as compared to the control group, and this effect was independent of whether the simultaneously demanded primary task was easy or difficult to perform. Apparently, the immediacy of responding as induced by implementation intentions is effortless in the sense that it does not put much cognitive load on limited processing resources and thus persists even when the cognitive demand of the primary task in a pair of tasks is high. In a third experiment (Malzacher, 1992), it was observed that the goal-directed behavior specified in an implementation intention is triggered without any conscious intent once the critical situational context is encountered. Participants in a study employing a retaliation paradigm, modeled on Zillmann and Cantor (1976), formed the goal intention to respond to an insult by the experimenter in the form of a complaint spoken directly to the transgressor. Some participants also formed implementation intentions of the following form: "As soon as I see the experimenter again, I will tell her what an unfriendly person she is." In a subsequent, supposedly independent cognitive experiment, participants were asked to read a series of successively presented adjectives as quickly as possible from a screen. The adjectives were either positive words or negative words, suitable for describing people. Shortly (about 100 msec) before each adjective, either a neutral face or the face of the unfriendly experimenter was subliminally presented (presentation time was less than 10 msec).

Negative adjectives presented directly after the face of the unfriendly experimenter tended to be read faster than those presented directly after the neutral face, and positive adjectives were much more slowly read after the presentation of the unfriendly experimenter's face than after the neutral face. This data pattern was observed only for implementation-intention participants and failed to materialize for goal-intention participants. Apparently, the situational cues specified in an implementation intention directly elicit cognitive processes without conscious intent, in this case, the activation of relevant knowledge and the inhibition of irrelevant knowledge, which facilitate the initiation of the intended behavior. The mere formation of a goal intention is not sufficient to produce this effect.

In summary, it appears that implementation intentions lead to heightened activation of the mental representation of the specified situational cues. As a consequence, these cues are more easily detected and more

readily attended to. In addition, the reported findings on the behavioral effects induced by implementation intentions (i.e., immediacy, efficiency, and action initiation without conscious intent) suggest that implementation intentions create strong situation–behavior links that normally can be attained only through frequent and consistent situation–response pairings. As this latter procedure leads to the automatic, direct environmental control of behavior (Bargh, 1992, 1994), we argue that implementation intentions also achieve this effect, although in a strategic manner. In other words, implementation intentions are conscious mental acts that set up contingencies that will then lead to the automatic environmental control of behavior.

Does Behavioral Control Through Implementation Intentions Mimic Habits?

In the study on performing BSE (Orbell et al., 1997), additional observations suggested that implementation intentions led to automated or habitual action initiation. Whereas old habits were the best predictors of performing BSE for participants who did not form implementation intentions, the predictive power of old habits was nil as soon as participants had formed implementation intentions. Apparently, implementation intentions had created "new" habits. This interpretation is supported by the further observation that all implementation-intention participants performed BSE in the exact situation and at the exact time they had specified.

The neuropsychological literature reports that patients with a frontal lobe injury have problems with the conscious control of their actions (e.g., Shallice, 1982), whereas the control of habitual action is not impeded. Lengfelder (1995) explored the assumption that implementation intentions automatize action initiation by employing the dual-task paradigm described earlier (Brandstätter, 1992, Study 2) with a sample of frontal lobe patients. As expected, implementation intentions managed to speed up action initiation even with these patients. Most interesting, this effect of implementation intentions was particularly pronounced with patients who showed weak performances on the Tower of Hanoi problem—a classic measure of a person's aptitude for conscious action control. All of these findings support the argument that implementation intentions induce direct, automatic action control. Accordingly, implementation intentions are an effective self-regulatory tool, even and particularly for people who have insufficient conscious action control. Moreover, relying on implementation intentions as a self-regulatory tool seems to be crucial when a breakdown of the conscious control is anticipated (e.g., when people have to face strong emotional experiences).

Are the Effects of Implementation Intentions Independent of the Respective Goal Intentions?

As Orbell et al. (1997) and Gollwitzer and Brandstätter (1997) demonstrated, implementation intentions formed in the service of goal intentions have a substantial effect on effective goal pursuit over and above the superordinate goal intentions. However, the question remains whether implementation intentions are still effective when the goal intentions on which they are based are weak or have been either completed or abandoned. From a functional point of view, this should not be the case. As soon as a relevant goal no longer exists, implementation intentions should not evince their typical effects on action initiation. An experiment by Seehausen, Bayer, and Gollwitzer (1994) supported this view. When participants were told that the goal intention would no longer have to be implemented, the typical effects of the implementation intentions (in this study, the postulated heightened accessibility of the situational cues was measured by a recall test) did not vanish immediately but were completely gone after 48 hours. In addition, it was observed that varying the strength of participants' commitment to the implementation intentions had an effect. When participants were told that they were the kind of people who would benefit from rigidly adhering to their plans versus the kind of people who would benefit from staying flexible, the former participants showed strong implementation-intention effects, whereas the latter failed to do so.

In summary, feeling strongly about achieving the superordinate goal intention appears to be a prerequisite for the effects of implementation intentions. On the basis of such strong commitments, it is the forming and holding of highly mandated links between situational cues and goal-directed behaviors that produces strong implementation-intention effects.

Strategic Automaticity and the Inhibition of Unwanted Responses

Research on the effects of implementation intentions has focused so far on the problem of initiating goal-directed actions. However, the problem of getting started is just one of the many problems that need to be tackled to ensure successful goal attainment. Once a person has initiated goal-directed actions, the goal pursuit needs to be brought to a successful ending. People tend to give up in the face of difficulties, fail to ward off distractions, and have trouble resuming the pursuit of goals when disruptions occur. For instance, even though a person is highly involved with completing a chosen task, this goal can be thwarted by spontaneously attending to attractive distractions. Moreover, goal pursuits may conflict with other goals (e.g., a career goal can conflict

with private social goals) or bad habits (e.g., the goal of being fair to women may come into conflict with the habit of stereotyping women). In recent research, (Schaal, 1993; Schaal & Gollwitzer, 1997) we explored whether implementation intentions protect the person from tempting distractions and thus help the person to complete the task goal at hand. In addition, we analyzed the question of whether forming implementation intentions hinders the so-called automatic activation of stereotypes.

Resistance to Temptation as a Matter of Strategic Automaticity

Temptations in the form of attractive distractions while one works on a strenuous task can severely hamper task performance. Even though the goal intention of not letting oneself get distracted may raise resistance to these temptations, implementation intentions in the service of this goal should further promote goal attainment. Schaal (1993) conducted an experiment in which participants had to work on a boring but strenuous task under conditions of repeatedly being exposed to highly attractive distractions. The experimental paradigm was patterned after procedures used by Patterson and Mischel (1976) in their Mr. Clown-Box experiments, which analyzed the effects of children's plans on resistance to temptation. In Schaal's experiment, three groups of participants received different instructions on how to deal with the interspersed distractions. In the goal-intention group, participants only formed the intention of not letting themselves get distracted. In the two implementation-intention groups, participants furnished this goal intention with implementation intentions that specified how they wanted to respond when a distraction was experienced. The first implementation-intention group planned to work harder in the presence of distractions (task-facilitating plan), whereas the second implementation-intention group planned to simply ignore the distractions (temptation-inhibiting plan). It was expected that participants in both implementation-intention groups would be more successful in working on the unattractive and strenuous task than would goal-intention participants. Participants in the implementation-intention groups were expected to successfully control the spontaneous shifting of attention because this spontaneous shift is rivaled by automatized antagonistic responses.

More specifically, participants in this experiment were asked to work on arithmetic tasks selected from Düker's (1953) "Concentration Achievement Test" (*Konzentrations-Leistungs-Test,* KLT), which consists of a series of simple but complex arithmetic problems displayed in two rows of three numbers each, placed on top of each other. To solve this kind of problem, participants have to first add the upper row and then the lower row. Finally, the difference between the two sums has to be calculated and reported. The test consists of many such problems that have to be solved in a self-paced manner. Although the arithmetic problems in the KLT are simple, solving them takes much cognitive capacity and requires intensive concentration. Working on the KLT is very tedious, and participants report it to be unattractive and somewhat boring. In the Schaal (1993) experiment, the KLT was presented on a computer CRT that was mounted on a same-size video monitor on which the distractions were presented while participants solved the arithmetic problems.

The presented distractions were clips of award-winning commercials that showed attractive people and objects that were fun to watch; in addition, the commercials played exciting music and presented interesting texts that were fun to listen to. Six distraction periods lasting 75 sec each were interspersed at random intervals into the 15 min that participants had to work on the KLT.

Participants received different instructions on how to deal with the distractions. Whereas participants in the goal-intention group were asked to tell themselves, "I won't let myself get distracted," participants in the implementation-intention groups were in addition asked to form implementation intentions on how to achieve this goal. Participants of the task-facilitating, implementation-intention group were requested to specify the following in response to anticipated distractions: "As soon as I see moving pictures or hear some sound, I will increase my efforts on the arithmetic tasks." Participants for the temptation-inhibiting implementation-intention group were asked to tell themselves, "As soon as I see moving pictures or hear some sound, I will ignore them."

Both implementation-intention groups outperformed (on mean time needed per arithmetic problem) the participants of the goal-intention group—a finding that is in line with the goal-attainment-promoting effects of implementation intentions as reported earlier (Gollwitzer & Brandstätter, 1997; Orbell et al., 1997). One might argue that the beneficial effects of implementation intentions in the Schaal (1993) study are not based on the automatic initiation of responses that contradict giving in to a temptation, as our theorizing would suggest. Instead, implementation intentions might have simply strengthened participants' goal intentions to not let themselves get distracted. This is rather unlikely, however, for two reasons: First, both types of implementation intentions should have produced this effect to an equal degree. Second, in the studies reported previously (Gollwitzer & Brandstätter, 1997; Orbell et al., 1997), the formation of implementation intentions was never observed to enhance the strength of the respective goal intention.

Most interestingly, however, implementation intentions directed at temptation inhibition produced stronger performance enhancing effects than imple-

mentation intentions directed at task facilitation. This finding is in line with the research of Mischel and Patterson (1978), who observed that temptation-inhibiting plans helped children to resist the temptations of Mr. Clown-Box more effectively than task-facilitating plans. Apparently, children and adults fare better when they plan to ignore a temptation than when they plan to increase effort on the task at hand. But how do we explain the superiority of temptation-inhibiting implementation intentions? It seems possible that the boring tasks used in both the Schaal (1993) and the Patterson and Mischel (1976) studies did not lend themselves well to intensifying effort and concentration. There was nothing important or exciting about performing these tasks to begin with. So when the task-facilitating implementation intentions were focusing participants' attention and effort on these tasks, they could not benefit from this intensified concern. To check on this possibility, we recently performed two replication experiments.

Varying motivation to perform the task at hand. In a subsequent study (Schaal & Gollwitzer, 1997, Study 1), we manipulated the importance of the KLT and thus established a low and high task-motivation group. Experimental procedures and materials were exactly the same as in the study by Schaal (1993). The level of motivation was varied by telling one half of the participants that working on the KLT would serve the purpose of warming up for a subsequent, more important intellectual task and that the actual number of solved arithmetic problems was not of interest (low-motivation condition). The other half of the participants were told that the KLT would be a measure of an important cognitive skill and that participants would get feedback on their performance in comparison to other participants (high-motivation condition). Moreover, we added a control group that formed neither implementation intentions nor goal intentions to protect themselves from distractions.

When we looked at the performance scores (number of arithmetic problems completed in 15 min) of control participants, we discovered that our motivation manipulation was very successful. Low-motivation control participants completed only a little more than 50 problems, whereas high-motivation participants completed close to 90 problems. Looking only at the low-motivation participants, we observed a complete replication of the results of the Schaal (1993) study. Implementation-intention participants were superior to goal-intention participants, and this was particularly true when participants had formed temptation-inhibiting implementation intentions. Regular goal-intention participants also performed better than control participants but not as well as the implementation-intention participants.

With respect to high-motivation participants, we had expected that task-facilitating implementation intentions would favor task performance as much as temptation-inhibiting implementation intentions, hypothesizing that if task performance were made more important and involving, having one's mind turned toward the task at hand would lead to positive performance. However, task-facilitating implementation intentions led to weaker task performance than was observed in the goal-intention group. Only temptation-inhibiting implementation intentions increased task performance as compared to the goal-intention group. Moreover, when comparing the performance of high-motivation control participants to the performance of the three intention groups, only temptation-inhibiting implementation-intention participants did not show a reduction in performance; having formed goal intentions and task-facilitation implementation intentions on top of being highly motivated apparently reduced performance.

We take the pattern of data obtained in this study to mean that the inferior effects produced by task-facilitating implementation intentions as compared to temptation-inhibiting implementation intentions are caused by overmotivation (Baumeister, 1984; Heckhausen & Strang, 1988). Apparently, resisting a temptation (goal intention) does become easier when one uses the plan to intensively concentrate on the task at hand, but only when this very task is not involving to begin with (because it is too strenuous, boring, or unattractive for some other reason). The automatic increase in effort of performing the task as induced by the task-facilitating implementation intention is beneficial in such cases. However, it becomes dysfunctional when the individual is already highly involved with the task at hand. Any additional increase in effort leads to overmotivation and thus hampers task performance. Our overmotivation argument is supported by the fact that high-motivation participants in this study also suffered in their performance when they formed the goal intention of not letting themselves get distracted—because this intention should also increase one's effortful holding on to the task.

What is most interesting in this study is the fact that temptation-inhibiting implementation intentions further task performance, whether participants are high or low in task motivation. The strategic automaticity induced by this type of implementation intention seems to generally block diverting one's attention from the task at hand. Apparently, forming temptation-inhibiting implementation intentions is the more effective strategy to protect oneself from tempting distractions. Whereas the task-facilitating implementation intention protects only when noninvolving activities are to be pursued, the temptation-inhibiting implementation intention provides a protection that extends to involving activities as well.

These findings also make the point that implementation intentions produce a form of automaticity that is not readily escaped. One would think that task-facilitat-

ing-implementation-intention participants in the high-motivation condition would have noticed the ineffectiveness of their plans when working for 15 min on the task at hand. However, these participants could not easily disengage from their implementation intentions that in turn forced participants to increase their efforts on the task whenever tempting distractions were experienced.

Finally, the pattern of data of this study suggests that a person's willful attempt to escape tempting distractions is more effective the less he or she aims at the expenditure of effort. Task-facilitating implementation intentions that focused on effort exertion and energization of task activity were inferior to temptation-inhibiting implementation intentions that focused on simply ignoring the critical stimuli. Effective willing, therefore, seems more closely associated with "cold" skillful cognitive strategies than with the "hot" determined energization and mobilization of effort.

Varying the strength of the goal intention to not let oneself get distracted. In the last study reported, we manipulated participants' involvement with the task at hand by describing performing well as more or less important. In the present study (Schaal & Gollwitzer, 1997, Study 2), we varied the strength of the goal intention to not let oneself get distracted. We tried to achieve this by telling some participants that the interspersed distractions were easy to escape (weak goal-intention group), whereas other participants learned that escaping the distractions was quite challenging (strong goal-intention group). The rest of the procedure was the same as in the Schaal (1993) study.

Our manipulation of the goal intention to protect oneself from distractions was successful. Strong goal-intention participants performed better than did weak goal-intention participants. Assuming that the strength of a person's goal intention moderates the effects of the respective implementation intentions (see the study by Seehausen et al., 1994, reported previously), we expected that implementation intentions were more effective in the strong goal-intention condition than in the weak goal-intention condition. However, this hypothesis was strongly supported for temptation-inhibiting implementation intentions only. With respect to task-facilitating implementation intentions, we were again confronted with the phenomenon of overmotivation: Participants with task-facilitating implementation intentions did not show a heightened performance in the strong as compared to the weak goal-intention condition.

Even though in the weak goal-intention condition, planning to work harder on the task as soon as distractions arose led to better performance than that observed in the respective control group, furnishing a strong goal intention with such an implementation intention failed to produce a further performance increase. With temptation-inhibiting plans, on the other hand, we not only observed a beneficial effect in the weak goal-intention condition but we also observed an even stronger positive effect in the strong goal-intention condition. Apparently, as the temptation-inhibiting implementation intentions do not focus on energizing one's efforts on the task but on simply ignoring the tempting distractions, strong goal intentions to protect oneself from distractions did not hamper task performance but helped to increase it.

Summary. These three experiments on the effects of implementation intentions on resistance to temptation go beyond what has been learned about the effects of implementation intentions in research on the initiation of goal-directed behaviors (Gollwitzer, 1993, 1996). Previously, we had not differentiated between types of implementation intentions. These experiments suggest, however, that such differentiations are of vital importance when it comes to understanding the effects of implementation intentions on resistance to temptation. Accordingly, when a person faces the question of how to plan his or her resistance to temptation, he or she should deliberate the following prospects of success: Planning to respond to distractions by simply ignoring them produces the best results when task motivation is high and when one strongly intends not to get distracted; however, this type of planning is also effective when task motivation is low and when the intention to not let oneself get distracted is weak. Planning to respond to distractions with effort expenditure on the task at hand fails to affect task performance positively when task motivation is high and when one's intention to not let oneself get distracted is strong; it has positive effects only when task motivation is low or when there is only a weak goal intention to escape distractions. In other words, the first type of planning (temptation inhibition) works best when it is needed the most, whereas the second type (task facilitation) shows effects only when resistance to temptation is not a pressing issue to begin with. This insight does not speak against our general postulate that implementation intentions produce strategic automaticity with respect to the specified intended responses. Rather, it suggests that these automatic responses are functional or dysfunctional, depending on one's involvement with the task at hand and the strength of the goal intention. From a metacognitive perspective, one would like to know whether (and if yes, how) people's monitoring of the object level (the level of actual behavior) makes them discover which type of implementation intention is the most effective in a given situation and in addition, whether (and if yes, how) this discovery is ultimately translated into the appropriate formation of implementation intentions.

Strategic Automaticity and the Inhibition of Automatic Stereotype Activation

Stereotypes are cognitive structures representing beliefs about a select group of people (Hamilton & Sherman, 1994; Hamilton & Trolier, 1986). The activation and use of stereotypes is highly functional in the sense of parsimonious information processing about given people. On the other hand, stereotyping may be considered dysfunctional because it hinders individuated impression formation. The activation of stereotypes is considered automatic because of a long history of being activated over and over again in the presence of members of the respective group (Bargh, in press; Devine, 1989; Pratto & Bargh, 1991). Whereas stereotype activation is silent and passive and thus difficult to control, the use of stereotypes in impression formation can be controlled effectively by effortful correction processes (Bodenhausen & Macrae, in press; Devine, 1989; Fiske & Neuberg, 1990). Stereotype activation may be considered to be a bad habit by those who have the goal of judging others in a nonstereotypical manner. There should be a strong interest in controlling this unwanted response, and we wondered whether forming appropriate implementation intentions would protect a person from the so-called automatic activation of stereotypes.

Intentionally suppressing stereotypical beliefs. If one assumes that the presence of a member of a stereotyped group automatically activates the respective stereotypical beliefs, implementation intentions aimed at suppressing this activation would have to link antagonistic responses to the critical stimulus. For instance, when a picture of an older person is presented to experimental participants, they would have to form the implementation intention of suppressing stereotypical beliefs as soon as the picture was shown if they wanted to escape the automatic activation of stereotypical beliefs. According to the postulate of strategic automaticity, such preparatory mental acts of will should automatize the initiation of suppression responses given the presence of the critical stimulus and thus should effectively reduce the strength of the activation of stereotypical beliefs.

Priming procedures are a convenient tool for examining the accessibility of stereotypical beliefs in the presence of critical stimuli. One only has to present the critical stimulus (e.g., the face of an older person) as a prime to a respective stereotypical belief (e.g., the target word *stubborn*). When the Stimulus-Onset-Asynchrony (SOA) between prime and target is set lower than 300 msec, reading latencies of the target words can be assumed to be unaffected by effortful control processes and thus qualify as a reliable measure of the strength of automatic activation (Bargh, Chaiken, Govender, & Pratto, 1992; Fazio, Sanbonmatsu, Powell, & Kardes, 1986; see also Neely, 1977). To allow conscious, effortful controlling influences on reading latencies, SOAs have to be set above 600 msec.

An experiment by Gollwitzer, Schaal, Moskowitz, Wasel, and Hammelbeck (1997, Study 1) addressed the question of whether or not the automatic activation of stereotypes can be halted through implementation intentions. We analyzed the older person stereotype with its stereotypical beliefs of being conservative, inflexible, stubborn, experienced, even tempered, and wise. In a priming experiment that used SOAs of either 200 msec or 1,500 msec, pictures of older and younger men were used to prime attributes that belonged to older people (e.g., weak, wise) or the young men stereotype (e.g., athletic, egocentric). Participants were randomly assigned to either a no-treatment control group, a goal-intention group (participants were asked to tell themselves, "I want to judge old men in a fair and nonstereotypical manner"), or an implementation-intention group ("I want to judge old men in a fair and nonstereotypical manner. And whenever I see an old man, I tell myself: Don't stereotype!").

When primes and targets were paired with an SOA of 200 msec, the control groups reading latencies showed a pattern of data that suggested automatic stereotype activation. Consistent pairings (i.e., pictures of older men with respective stereotypical attributes and young men with respective stereotypical attributes) led to shorter reading latencies than inconsistent pairings (i.e., pictures of older men with young stereotypical attributes and young men with older stereotypical attributes). Implementation-intention participants managed to suppress this pattern; in addition, the pairing of older faces and respective stereotypical attributes led to significantly increased reading latencies as compared to control participants. This finding suggests that the strategic automaticity induced by implementation intentions succeeds in suppressing the automatic activation of stereotypical beliefs. However, the pattern of data produced by goal-intention participants called our interpretation into question. Goal-intention participants also escaped the automatic activation of stereotypes (they did not show the pattern produced by the control group) even though reading latencies for the critical pairings of older faces with older attributes were not as strongly delayed as observed in the implementation-intention group.

According to our hypothesis, only implementation intentions, but not goal intentions, produce strategic automaticity and thus allow one to escape automatic stereotype activation. How could goal intentions also successfully interfere in this study? The older person stereotype may not be strongly habitualized with German college students. Indeed, further studies on the older person stereotype failed to show its automatic activation with control participants. Moreover, the data

observed in the 1,500-msec SOA priming condition of this study also suggested that the older person stereotype was not very strong with German college students. Control participants' reading latencies no longer produced the significant data pattern indicative of the activation of the older person stereotype, implying that the activation observed in the 200-msec SOA condition was easily controlled by participants when they had time to do so.

In an attempt to explain the unexpected activation inhibiting effects of mere goal intentions in the 200-msec SOA condition of this study, one might want to argue that participants may not have closely adhered to the goal-intention instructions but may have in addition formed implementation intentions on their own. However, the reading latencies observed with goal-intention and implementation-intention participants in the 1,500-msec SOA condition suggested that participants did indeed follow instructions. Whereas goal-intention participants' reading latencies no longer showed the pattern indicative of stereotype activation, implementation-intention participants even produced significant reversals of this pattern.

Intentionally suppressing category activation. In a follow-up study, we switched to the gender stereotype because pilot work revealed that it is fairly easy to activate automatically in male German college students. In addition, we wondered whether the strategic automaticity created by implementation intentions does suppress the "automatic" activation of stereotypical beliefs more effectively if it already interferes at the time of category activation. Accordingly, we asked implementation-intention participants to plan to ignore the group membership of the presented targets and not just to refrain from stereotyping them, as was done in the previous study.

Three further modifications were implemented. First, to produce strong goal intentions we raised participants' motivation to judge the target in a fair and nonstereotypical manner (all participants were men). This was done by giving failure feedback on a faked stereotypicality test that preceded the priming task. Second, we allowed participants to form very specific implementation intentions. Only two female targets, INA and BEA, were presented and participants were led to believe that they would later meet INA and BEA to form a first impression. In the goal-intention condition, participants were asked to judge both women in a fair and nonstereotypical manner. In the implementation-intention condition, participants were asked to tell themselves in addition, "And whenever I see INA, I will ignore her gender!". Third, we assessed automatic stereotype activation via the latencies of Stroop responses. The target words (gender-stereotypical and gender-neutral attributes) were presented in four different colors that participants had to name as fast as possible. Because the target words were presented less than 300 msec after the primes (i.e., INA, BEA, and a control prime of the letters string *CCC*), delays in naming the color of target words can be interpreted as heightened activation of the content of these words.

The results strongly supported our strategic-automaticity notion. In the control group, the primes INA and BEA significantly delayed the color-naming responses of stereotypical target words in comparison to nonstereotypical words as well as to stereotypical and nonstereotypical target words that were primed by the letter string (*CCC*). In the goal-intention group, the pattern of data was exactly the same. Only in the implementation-intention group was there an indication of the suppression of automatic stereotype activation: When BEA was used as a prime, the color-naming responses paralleled those of the control group and the goal-intention group. However, when INA served as the prime, the delay in the color naming of stereotypical words vanished. Color-naming responses for stereotypical words were now as fast as color-naming responses for nonstereotypical words.

These findings suggest that implementation intentions can successfully suppress habitualized unwanted responses by automatically eliciting antagonistic responses. One must keep in mind, however, that in this study, implementation intentions defined the situational stimulus very specifically (i.e., focus was on the woman INA instead of on women in general). Moreover, the antagonistic behavior to be elicited was selected such that it intervened with the "automatic" activation of the unwanted responses at the earliest moment possible (i.e., at category activation). Finally, the participants' implementation intentions were based on a strong goal intention (i.e., participants had received failure feedback on a prior stereotypicality task).

Summary. There is some debate on whether or not the activation of stereotypes is possibly controllable by the individual. Some researchers (e.g., Blair & Banaji, 1996) suggest that "automatic" stereotype activation is rather easy to control; inducing contradicting expectations would already suffice. Others (e.g., Bargh, in press) argue that the control of stereotype activation may not be possible at all. The present studies suggest that goal intentions to respond nonstereotypically do not yet suffice when the activation of strong stereotypes is to be controlled. Only when added implementation intentions send antagonistic automatic responses into conflict with the habitual activation of stereotypes can the suppression of the latter process be expected.

Conclusion and Prospects

In a recent review of research on goals, Gollwitzer and Moskowitz (1996) concluded that modern goal

theories hold the view that whether people meet their goals depends on both how goal content is framed (e.g., specific vs. abstract, Locke & Latham, 1990; proximal vs. distal, Bandura & Schunk, 1981; or as performance goal vs. learning goal, Dweck, 1996) and how people regulate the respective goal-directed actions (e.g., through various action control strategies, Kuhl, 1984; effort mobilization, Wright & Brehm, 1989; compensation of failures and shortcomings, Wicklund & Gollwitzer, 1982; negotiating conflicts between goals, Cantor & Fleeson, 1994). In addition, modern goal theories assume that goals are selected and put into operation primarily through deliberate conscious choice and guidance. Bargh, Gollwitzer, Chai, and Barndollar (1997) criticized this view and proposed that goal pursuits may greatly benefit from automatic processes as well. They argued that the activation of goals can become automatized if a prior consciously set goal is repeatedly and consistently acted on in the same situational context. For instance, when a person repeatedly and consistently attempts to attain the goal of being an entertaining guest at dinner parties who successfully refrains from talking about his work, dinner parties will sooner or later activate this goal and the person will no longer bore others with his problems at work when invited to another person's house.

In this article, we also made the point that goal pursuits can greatly benefit from automatic processes, but the type of automaticity we are talking about is different. In the case of implementation intentions, automatic processes do not originate from laborious and effortful practice over time; rather, the person strategically decides to delegate control over his goal-directed behaviors to anticipated critical situational cues. With respect to the example chosen previously, a person who is prone to talk about his work to every pair of ears that is willing to listen can protect himself from doing so by furnishing the goal intention to be entertaining with respective implementation intentions (e.g., "As soon as I get bored at the dinner party, I will tell stories about my last vacation!"). We argued that this form of automatization of goal pursuit is less laborious, can be applied on the spot, and thus is a very flexible self-regulatory metacognitive tool. The person in our example no longer has to rigidly avoid dinner parties to prevent falling prey to his bad habit.

In modern times, most of our behaviors are no longer ruled by implicitly shared habits and goals that are followed by most people most of the time. Accordingly, people are frequently confronted with situations where they cannot rely on their habits and automatically activated goals. It is here where metacognitive control of action through the formation of implementation intentions is most valuable. In addition, modern times promote the setting of fuzzy and conflicting goals (Karoly, in press). Again, if one strategically automatizes the initiation of goal-directed behaviors, the action-initiation problems associated with fuzzy and conflicting goals can be ameliorated.

In this article, we presented a series of experiments suggesting that forming implementation intentions transfers the control of goal-directed behaviors to specified anticipated environmental stimuli. This deliberate, reflectively used self-regulatory tool makes use of the automatic control of action. As various experiments demonstrated, such strategic automaticity helps people to effectively meet their goals. This is true for the many problems of initiating goal-directed actions, the issue of protecting an ongoing activity from tempting distractions, and for the very difficult problem of controlling a strong bad habit. It turned out that implementation intentions need to be based on strong goal intentions and that certain types of implementation intentions work better than others.

We do not know yet whether people are at all knowledgeable about the effectiveness of implementation intentions. Nearly all of the studies we conducted were experimental, and participants were asked to form the implementation intentions we had assigned to them. In the only correlational study conducted (Gollwitzer & Brandstätter, 1997), two thirds of the participants reported having formed implementation intentions on their own, which at least suggests that forming implementation intentions is a rather popular self-regulatory tool. But do people know that some implementation intentions are even harmful to goal attainment and do they refrain from forming such implementation intentions? We doubt that metacognitive monitoring processes are the most effective way of acquiring this knowledge and therefore advocate that people should be instructed about the beneficial effects of certain implementation intentions (e.g., when people find it difficult to adhere to vital health goals or important professional or social goals). In any case, however, once people have decided to form implementation intentions on their own or simply follow the instructions of others to do so, the effects of implementation intentions should prevail regardless of whether people know about these effects, believe in them, or doubt them. Once implementation intentions have been formed, the specified situational cues will trigger the intended goal-directed behaviors in an automatic fashion.

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