CHAPTER

14 Goal Attainment

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Abstract

This chapter begins with a description of how the goal concept emerged in the history of the psychology of motivation to better understand the important role it plays in current research on motivation. The chapter then turns to the self-regulation of goal pursuit. The effects and underlying processes of two different self-regulation strategies will be discussed in detail: mental contrasting and forming implementation intentions. The chapter concludes with a report of the results of recent intervention studies that combine the self-regulation strategies of mental contrasting and forming implementation intentions to help people enhance goal attainment in the health, academic, and interpersonal domains.

Keywords: goals, goal contents and framing, mental contrasting, fantasies, obstacles, implementation intentions, self-regulation strategies, self-control, willpower, behavior change interventions

It is Friday afternoon. On Monday, you must give an important presentation. Even though you are highly motivated to do an excellent job (i.e., desirability and feasibility are high), you did not find the time to prepare during the week. So you set yourself a goal to use the weekend to develop an impressive presentation. But how do you attain this goal?

Goals Versus Motivation

The term *motivation* is commonly used to explain why a person in a given situation selects one response over another or makes a given response with great energization or frequency. Imagine a person looking for someone else in a crowd. She gets excited when she finds that person, and then she runs toward her. Each of these responses involves motivation, which can manifest itself cognitively (e.g., looking), affectively (e.g., excitement), and behaviorally (e.g., running). To the question of what drives motivation, the history of the psychology of motivation has offered ever more sophisticated answers.

Based on learning theory advanced by early animal psychologists (Hull, 1943; Spence, 1956), the strength of the tendency to make a response was at first considered a function of an organism's skills (or habit strength), its needs, and the incentive value of the desired outcome. For example, how fast an animal runs toward a box containing food depends on its habit strength, its need for food (expressed in hunger), and the quality and quantity of the food. With the advance of the cognitive revolution in psychology, these determinants of motivation, as well as the concept of motivation itself, became more elaborated. Tolman (1932) postulated various mental processes that "intermediate in the causal equation between environmental stimuli and . . . overt behavior" (p. 2). These intermediate processes entailed concepts of purpose (ends and means) as well as expectations (e.g., means expectations, end expectations, and means–end expectations). A few years later, Festinger (1942) and Atkinson (1957) drew on that work in their research on what motivates humans to select and

perform tasks of varying difficulty. They suggested that people weigh the incentive value of the desired outcome with the expectancy that it would actually occur.

Social cognitive learning theorists (e.g., Bandura, 1977) went a step further, factoring in whether one feels confident to successfully perform the necessary behavior required to arrive at a desired outcome (efficacy or control beliefs). These theorists also alluded to further relevant expectancies, such as whether the situation by itself would produce the desired outcome (Heckhausen, 1977; Mischel, 1973), whether performing a given behavior would indeed lead to the desired outcome (Bandura, 1977), whether achieving the desired outcome would be instrumental to accruing further positive consequences down the road (Vroom, 1964), whether the desired outcome could be attained (Oettingen, 1996), and whether the future in general would be bright (Abramson, Seligman, & Teasdale, 1978; Scheier & Carver, 1987).

Adding these various expectancy-related variables helped to explicate in more detail the *can* aspect (or feasibility aspect) of the motivation to make a certain response: Can the desired outcome be brought about? But the cognitive revolution also helped to explicate the *want* aspect (or desirability aspect) of the motivation to make a certain response: Do I really want the desired outcome? This desirability issue was originally captured by Hull (1943) and Spence (1956) as the concept of need and the concept of incentive. With respect to need, the cognitively inspired psychology of motivation ventured into the concept of motives (for a summary, see McClelland, 1985a), defined as the class of incentives that a person finds attractive (e.g., achievement, power, affiliation, intimacy). McClelland (1985b) discovered that depending on whether this preference for certain classes of incentives was measured implicitly (as assessed by the Thematic Apperception Test) versus explicitly (as assessed by attitude questionnaires), it predicts the execution of different types of motive-related responses: actions people spontaneously engage in versus decisions people make after thoughtful deliberation.

Researchers also found that whether an incentive is hoped for versus feared matters. For instance, a person with a strong achievement motive, longing for the pride associated with success, will choose a task of medium difficulty to pursue; this level of difficulty provides the most information about one's achievement potential. However, a person who abhors the shame associated with failure (Atkinson, 1958) will choose either a very easy or a very difficult task, which is an effective strategy to avoid shame (because very easy tasks are likely to be solved and failure on too-difficult tasks can easily be explained by external factors). Finally, researchers have differentiated among types of incentives as well (Heckhausen, 1977). For instance, in the realm of achievement, anticipation of positive self-evaluations (e.g., "I will do really well!"), positive evaluations by others (e.g., praise by the teacher or parents), higher order positive consequences (e.g., successful professional career), and consequences that go beyond achievement (e.g., having a good time with coworkers) can all motivate people to do well on given tasks.

Given this differentiation in thinking about the determinants of motivation (i.e., needs, incentives, and expectancies), one may wonder whether the concept of goals is at all needed. In our opinion, the concept of goals helps the explication of the readiness to make a certain response. Ajzen and Fishbein (1969) suggested that this readiness should be assessed in terms of a person's intention to make the response. Mischel (1973) went a step further and argued that such intentions can be conceived as self-imposed or assigned goals that imply standards that the person intends to meet (with respect to quality and quantity criteria). Doing so allows asking new questions, such as how people arrive at goal attainment.

Extensive research has shown (summary by Gollwitzer & Oettingen, 2012) that goal content and goal framing affect the likelihood of goal attainment. With respect to goal content, the perceived desirability and feasibility of the goal matter. Perceived desirability is high when the goal is in line with the person's needs (e.g., *needs* for autonomy, competence, and social integration; Ryan, Sheldon, Kasser, & Deci, 1996), wishes or fantasies (Oettingen & Mayer, 2002), possible selves (Oyserman, Bybee, & Terry, 2006), higher order goals (e.g., identity goals; Gollwitzer & Kirchhof, 1998), and attitudes (i.e., the expected value of achieving the goal at hand; Ajzen & Fishbein, 1980). But perceived feasibility also matters (Bandura, 1997). When people feel that they can perform the responses that produce the desired goal, they are said to have strong self-efficacy beliefs (Bandura, 1997; or control beliefs as referred to by Ajzen, 1991), which promotes high goal commitment and successful goal pursuit.

Relevant structural features of one's goals refer to many different aspects. First, goal striving is said to depend on whether the aspiration or standard that is specified in the goal is challenging and specific (Locke & Latham, 2002, 2006). Framing of the

orientation of goals in terms of *approach versus avoidance* affects their attainment as well. For instance, striving for the goal of making new friends versus striving for the goal of not being lonely produces quite different outcomes (Elliot, Gable, & Mapes, 2006). A further relevant framing variation pertains to forming promotion goals versus prevention goals (Higgins, 1997, 2006), because one may want to approach a desired end state either by promotion strategies (i.e., with eagerness) or by prevention strategies (i.e., with vigilance). Dweck (1996) and Molden and Dweck (2006) have suggested a framing distinction between *performance goals* and *learning goals*. Goals in the achievement domain, for example, may focus either on finding out how capable one is (performance goals) or on learning from the task at hand (learning goals). Finally, it makes a difference whether a person frames a given task goal in terms of its *identity relatedness*. For instance, the task of solving a certain arithmetic problem can be approached with the goal of solving it effectively or the goal of identifying oneself as a mathematician (Gollwitzer & Kirchhof, 1998; Wicklund & Gollwitzer, 1982).

Self-Regulation of Goal Attainment

In the present chapter, we will focus on research analyzing the question of what people can do to master the problems inherent in goal pursuit. The question of what kind of goals people set for themselves (content and structure) and what consequences that goal setting has down the road with respect to the likelihood of goal attainment has been discussed extensively in our prior chapter (Gollwitzer & Oettingen, 2012). Two powerful self-regulation strategies related to goal pursuit will be discussed: (a) mental contrasting of future and present reality and (b) forming implementation intentions regarding when, where, and how one wants to act on one's goal.

MENTAL CONTRASTING

The theory of fantasy realization specifies three modes of thinking about the future (Oettingen, 2000, 2012, 2014): mental contrasting, indulging, and dwelling. In mental contrasting, people first imagine the fulfilment of a wish or positive fantasy (e.g., giving a good presentation at a conference) and then reflect on the present reality that stands in the way of attaining the desired future (e.g., evaluation anxiety). Mental contrasting thus qualifies as a problem-solving strategy that makes people recognize that they have not yet fulfilled their wishes and that they must take action to achieve the desired futures. As a consequence, expectations of attaining a desired future become activated and determine a person's goal commitment and subsequent striving to attain the desired future. When perceived expectations of success are high, people will actively pursue (i.e., commit to and strive for) realizing the desired future; when expectations of success are low, people will refrain from doing so and thus will disengage and venture on to alternative wishes and desired futures. In this way, mental contrasting helps people discriminate between feasible and unfeasible goals.

The other two modes of thinking differentiated in the theory of fantasy realization are indulging (envisioning only the attainment of the wished-for future) and dwelling (reflecting only on the present negative reality). Neither of these mental strategies produces any discrepancy between future and reality, and thus the individual fails to recognize that action is needed to achieve the desired future. Therefore, expectations of success do not become activated, and goal pursuit does not reflect the perceived likelihood of reaching the desired future. Individuals who indulge and dwell show a medium level of goal pursuit even though the resource-efficient strategy to follow would be for no engagement in the case of low expectations of success and full engagement in the case of high expectations of success. For example, when it comes to the goal of giving a good presentation at a conference, both an indulging and a dwelling person will show moderate preparation, regardless of whether a successful performance is perceived as within one's reach or as barely possible.

A host of research supports these claims. In an early study (Oettingen, Pak, & Schnetter, 2001, Study 4), first-year students enrolled in a vocational school for computer programming indicated their expectations of excelling in mathematics. Next, they named positive aspects that they associated with excelling in mathematics (e.g., feelings of pride, increasing job prospects) and negative aspects of reality, that is, potential obstacles (e.g., being distracted by peers or feeling lazy). In the mental contrasting condition, participants had to elaborate in writing two aspects of the desired future and two aspects of present reality, in alternating order, beginning with the aspect of the desired future. Participants in the indulging condition were asked to elaborate four aspects of the desired future only; in the dwelling condition they instead elaborated four aspects of the present reality only. As a dependent variable, participants indicated how energized they felt with respect to excelling in math (e.g., how active, eventful, energetic).

Two weeks after the experiment, the participants' teachers reported how much effort each student had invested over the interim and provided each student with a grade for that period. As predicted, only in the mental contrasting condition did the students feel energized, exert effort, and earn grades based on their expectations of success. Those with high expectations of success felt the most energized, invested the most effort, and received the highest course grades; those with low expectations of success felt the least energized, invested the least effort, and received the lowest course grades. To the contrary, participants in both the indulging and the dwelling conditions felt moderately energized, exerted medium effort, and received medium grades independent of their expectations of success.

A variety of studies pertaining to different life domains such as academic and professional achievement, health, interpersonal relationships, and physical and mental well-being replicated this pattern of results. For instance, mental contrasting has been used as a highly effective strategy enabling students to learn a foreign language (Oettingen, Hönig, & Gollwitzer, 2000; A. Gollwitzer, Oettingen, Kirby, Duckworth, & Mayer, 2011), to study abroad (Oettingen et al., 2001), and to engage in vocational training (Oettingen, Mayer, Thorpe, Janetzke, & Lorenz, 2005). Mental contrasting also facilitates making better decisions. This was demonstrated by showing that mental contrasting helps finding integrative (win–win) solutions in negotiation tasks (Kirk, Oettingen, & Gollwitzer, 2011), solving insight problems in creativity tests (Oettingen, Marquardt, & Gollwitzer, 2012), and making behavioral decisions that reduce stress in health professionals' everyday life (Oettingen, Mayer, & Brinkmann, 2010). In the domain of health, mental contrasting has helped students take steps toward reducing or stopping smoking (Oettingen, Mayer, & Thorpe, 2010), stick to a healthy diet (Johannessen, Oettingen, & Mayer, 2012), increase physical exercise in overweight men of low socioeconomic status (Sheeran, Harris, Vaughan, Oettingen, & Gollwitzer, 2013), and better cope with the challenges of everyday life in patients with Type 2 diabetes (Adriaanse, de Ridder, & Voorneman, 2013). In the social realm, mental contrasting has been found to foster interpersonal relations and lead to effective reconciliation (Oettingen et al., 2001; Schrage, Schwörer, Krott, & Oettingen, 2017). It facilitated getting to know an attractive stranger and heightened tolerance and encouraged taking responsibility for members of an out-group (Oettingen et al., 2005). In addition, it promoted help-seeking in college students and help-giving in emergency care nurses (Oettingen, Stephens, Mayer, & Brinkmann, 2010).

In these studies, goal pursuit was assessed by cognitive (e.g., making plans), affective (e.g., feelings of frustration when anticipating failure), motivational (e.g., feelings of energization), and behavioral (e.g., amount of invested effort and achieved outcomes) indicators. These indicators were measured via self-report or observations, either directly after the experiment or weeks later. All these studies evidenced the same pattern of results: Given high expectations of success, participants in the mental contrasting group showed the strongest goal pursuit; given low expectations, mental contrasting participants showed the least goal pursuit. Participants who indulged in positive images about the future or dwelled on negative images of reality showed medium goal pursuit no matter whether expectations of success were high or low. It is important to note that the outcomes of mental contrasting do not occur as a result of changes in the level of expectations (feasibility) or incentive valence (desirability) but rather as a result of the mode of self-regulatory thought (i.e., mental contrasting, indulging, dwelling), with mental contrasting aligning strength of goal pursuit to expectations.

Furthermore, the effects of mental contrasting depend on the person perceiving the present reality as an obstacle, that is, as standing in the way of realizing the desired future. Thus, when mentally contrasting, people first elaborate the desired future and only then reflect the present reality; the reverse order (reverse contrasting) fails to connect future and reality in the sense of the reality standing in the way of realizing the desired future outcome (Oettingen et al., 2001, Study 3; A. Kappes & Oettingen, 2014).

The pattern of results, seen as a whole, shows that mental contrasting is a mode of thought that people can use to wisely regulate their goal pursuit. First, it helps people to vigorously pursue and attain feasible desired future outcomes (i.e., high expectations of success); however, equally important, mental contrasting also fosters disengagement from unfeasible desired future outcomes (i.e., low expectations of success). Thereby, mental contrasting allows people to orient themselves toward alternative, more promising endeavors and to actively search for new venues. That mental contrasting facilitates disengagement has also been shown in research on counterfactuals—*if only* reconstructions of negative life events. Such counterfactuals are functional in preparing people to act when opportunities to

restore the alternative past will potentially arise. If the counterfactual past is lost for good, however, because restorative opportunities are absent, letting go of the desired counterfactual past is the better solution, sheltering people from feelings of distress. In a series of studies, Krott and Oettingen (2018a) demonstrated that the self-regulation strategy of mental contrasting attenuated the negative emotions elicited by positive fantasies about a lost counterfactual past, specifically, disappointment, regret, and resentment. These findings held when participants were induced to focus on lost counterfactual pasts for which they were responsible, for which they blamed another person, or for which they deemed no one responsible.

Building on these findings, Krott and Oettingen (2018b) showed that mental contrasting not only helps people to cope with the emotional consequences of engaging in positive counterfactual thoughts. It also facilitates that people engaging in such thoughts start to exert effort and successfully perform in the here and now. Krott and Oettingen (2018b) showed this active engagement in the present with regard to the interpersonal domain (i.e., writing a high-quality get-well letter to a close friend, Study 1), the professional domain (i.e., writing a high-quality job application, Study 2), and the academic domain (i.e., successfully solving Raven matrices, Study 3). These results suggest that mental contrasting of counterfactual fantasies can help people to return to their present life (i.e., actively engaging and succeeding in the tasks at hand).

One may wonder, though, whether people differ in their spontaneous use of mental contrasting and whether there are special contextual conditions that facilitate or hinder people to spontaneously use mental contrasting. Research on these questions has revealed that people who are strong self-regulators in the academic domain or in everyday life in general do indeed engage in more spontaneous mental contrasting than people who are weak self-regulators. In other words, well-self-regulated people use mental contrasting (Sevincer, Mehl, & Oettingen, 2017). Moreover, it has been found that the state of ego depletion reduces people's readiness to engage in mental contrasting. However, this reduced readiness to engage in mental contrasting in ego-depleted individuals can be easily overcome by explicitly asking people to consider the desired future and the present reality standing in its way or by hinting to people that there might be some hurdles on the way to attaining the desired future (Sevincer, Schlier, & Oettingen, 2015).

Goal pursuit instilled by mental contrasting also equips people to successfully master negative feedback. A. Kappes, Oettingen, and Pak (2012) conducted three studies showing that mental contrasting facilitates the mastery of negative feedback in various ways. When expectations of success were high, mental contrasting promoted the processing of relevant negative feedback, protected participants' self-view of competence against negative feedback, and led to optimistic as well as effort-related (rather than ability-related) attributions in response to negative feedback. Thus, mental contrasting can be used as an effective strategy to strengthen goal pursuit in the sense that it prepares people to master upcoming negative feedback.

So far, we reported findings about mental contrasting of a positive desired future with a negative present reality. However, mental contrasting does not have to pertain to the attainment of a positive future; people can also fantasize about a negative future and contrast fantasies about a negative feared future with reflections on the positive present reality. Oettingen et al. (2005) observed in a group of xenophobic high school students that when negative fantasies (i.e., fears that social conflicts would arise from foreign youth moving into their neighborhood) are contrasted with reflections on a positive reality standing in the way of the feared future (i.e., youth having wonderful and exciting soccer matches with foreigners), mental contrasting produced expectancy-dependent goal pursuit as well (i.e., more tolerance and the goal of approaching the foreigners by investing time and effort in welcoming them into their neighborhood). Thus, mental contrasting can be used to create *approach* goals that make people successfully conquer a feared future.

Mental contrasting can also be used to create *avoidance* goals that make people successfully evade a feared future (Oettingen, Mayer, & Thorpe, 2010). In a study with chronic cigarette smokers, they found that setting oneself the goal of avoiding the feared consequences of smoking can be facilitated by mentally contrasting the feared future of negative health consequences with the current positive reality of still having a healthy body. In line with past research on mentally contrasting feared negative futures, Brodersen and Oettingen (2017) recently observed that participants who had to envision a negative future regarding a bacterial epidemic (Study 1) or an idiosyncratic negative event (e.g., not finding a job after graduating from college; Study 2) and then contrasting it with the present positive reality did show reduced state anxiety. These findings

suggest that mental contrasting of an envisioned negative future also helps people reduce the anxiety triggered by this imagination.

The underlying *mechanisms of mental contrasting effects* pertain to both cognitive and motivational processes. As for cognitive processes, mental contrasting modulates the strength of the associative links between future and reality and between reality and instrumental means. In a series of four studies employing a primed lexical decision task to measure strength of associative links between future and reality, A. Kappes and Oettingen (2014) observed that when expectations of successfully reaching a desired future were high, mental contrasting strengthened the associative links between the desired future and the reality; when expectations were low, mental contrasting weakened the future–reality associative links. These results were obtained no matter whether expectations were measured or manipulated. Importantly, the future–reality associative links in turn mediated mental contrasting effects on self-reported (e.g., feelings of responsibility) and other-rated goal pursuit (e.g., raters scored quality of performance on giving a talk and solving a creativity test). Finally, mental contrasting effects on future–reality associative links vanished when participants were informed that the goal was achieved, implying that future–reality associations wax and wane with the upholding versus accomplishment of the goal that was generated by mental contrasting.

Mental contrasting not only links future and reality but also connects present reality to relevant instrumental means (i.e., means instrumental to overcome or circumvent the present reality to attain the desired future). In two studies, A. Kappes, Singman, and Oettingen (2012) showed that mental contrasting paired with high expectations established strong associative links between present reality and instrumental behavior, whereas paired with low expectations of success, it weakened reality–behavior associative links. Importantly, the strength of the reality–behavior associative links mediated goal pursuit, as indicated by actual performance (e.g., performance of taking the stairs instead of the elevator to achieve the goal of becoming more physically fit). Mental contrasting their wishes with the present reality also makes people recategorize present reality by conceiving it in terms of obstacles; for instance, for a student with the wish to perform well on the next exam, a party the night before the exam is no longer perceived as a fun event but rather as an obstacle to a good test performance (A. Kappes, Wendt, Reinelt, & Oettingen, 2013). And finally, mental contrasting also spurs the planning of goal implementation, a known cognitive mediator between expectations of success and goal attainment (Oettingen et al., 2001, 2005).

The research on the mediating motivational processes of mental contrasting assessed the level of energization as a primary indicator. Oettingen et al. (2009) found that mentally contrasting a desired future with present reality leads to energization, which in turn heightens goal pursuit strong enough to lead to successful goal attainment. Mediating effects of energization on goal pursuit evinced in physiological indicators of energization (i.e., systolic blood pressure) as well as experiential indicators (self-report of feeling energized). A series of other experimental studies measuring systolic blood pressure and feelings of energization supported the described pattern of results (Sevincer, Busatta, & Oettingen, 2014).

Mental contrasting, because it is a problem-solving strategy involving imagery, should be associated with heightened astuteness in general. An experiment using continuous magnetoencephalography, a brain-imaging technique measuring magnetic fields produced by electrical activity in the brain (Achtziger, Fehr, Oettingen, Gollwitzer, & Rockstroh, 2009), attests to this idea. Mental contrasting compared to indulging or simply resting produced heightened brain activity in areas associated with working memory, episodic memory, intention maintenance, action preparation, and vivid visualization. That is, mental contrasting implies vividly imagining a desired future, anticipating hindrances to realizing this future, and making plans for how to overcome these barriers. The brain activity associated with indulging, in contrast, did not differ from resting.

Given this latter finding, one might think that indulging in the future could potentially also lead to strong goal pursuit—if only individuals managed to intensely engage in highly positive fantasies about the future. But research on engaging in positive versus negative fantasies about the future speaks against this argument. Early on, Oettingen and Wadden (1991) observed that obese women who spontaneously indulge in positive fantasies about their weight loss were less successful in achieving a lower body mass index (after 4 months and 2 years) than obese women whose spontaneously produced fantasies were more negative. Moreover, Oettingen and Mayer (2002) observed that people who indulge in positive fantasies (valence and frequency) show comparatively weaker goal pursuits (as assessed by their efforts and actual performance) in the areas of academic achievement

(i.e., achieving a good grade in a psychology class), professional achievement (i.e., finding a job after graduation), interpersonal relations (i.e., finding a romantic partner), and health (i.e., recovering from hip surgery). Importantly, it did not matter whether the spontaneously produced positive fantasies pertained to the desired outcome or to the ways of getting there. Additionally, goal pursuit in these studies was assessed 2 weeks or even 2 years after the assessment of the spontaneously produced positive future fantasies. H. B. Kappes, Oettingen, and Mayer (2012) observed the same pattern of results in vocational students of disadvantaged backgrounds. The more students positively fantasized early on about their educational success, the higher was their absence from school and the lower were their grades over the course of the program.

In a series of experimental studies, H. B. Kappes and Oettingen (2011) investigated the causal effects of positive future fantasies on energization. They hypothesized that low energy is one of the mechanisms by which positive future fantasies translate into poor achievement. Indeed, induced positive fantasies resulted in less energy (as measured by physiological and behavioral indicators) than fantasies that questioned the desired future, negative fantasies, or neutral fantasies. Additionally, energy measured right after the induction of the positive fantasies mediated accomplishment in everyday life a week later. Finally, positive fantasies yielded a larger decrease in energy when they pertained to a more rather than less pressing need (e.g., need achievement), further suggesting that it is the positivity of fantasies that quells energization. Altogether, the results indicate that one reason positive fantasies predict poor attainment is because they sap energy required to pursue the desired future. The negative relation between positive fantasies on goal attainment has also been observed at the societal level. Positive thinking about the future in newspaper reports and presidential addresses was found to predict economic downturn (Sevincer, Wagner, Kalvelage, & Oettingen, 2014). Finally, Oettingen, Mayer, and Portnow's (2016) finding that positive thinking in the form of fantasies about the future relates to decreased symptoms of depression when measured concurrently but predicts more depressive symptoms when measured longitudinally also suggests that positive thinking has problematic effects on the realization of one's goals; in line with this assumption, it turned out that the relation between positive thinking and increased long-term depression was partially mediated by low achievement.

At first sight, these findings seem to be in contrast to research observing facilitating effects of positive affect on performance in executive function tasks (e.g., Dreisbach & Goschke, 2004; Kazen & Kuhl, 2005). However, these performance-facilitating effects evince for individuals who perform tasks while being in a positive affective state. Note that in the studies reported by Oettingen and colleagues, it is not positive affect per se that is measured or manipulated, but the positivity of fantasies that depict the person already having attained the specified desired future. The mental experience of having already reached the desired outcome and of savoring the wished-for consequences reduces the energy required to reach the outcome in actuality. Only when such positive fantasies pertain to feasible futures and are mentally contrasted with the impeding reality will people muster the energy to excel (Oettingen et al., 2009).

IMPLEMENTATION INTENTIONS

Another powerful strategy to promote goal attainment is planning out one's goal striving in advance. Gollwitzer (1993, 1999, 2014) has proposed a distinction between goal intentions and implementation intentions. Goal intentions (goals) have the structure of "I intend to reach *Z*!" whereby *Z* may relate to a certain outcome or behavior to which the individual feels committed. Implementation intentions (plans) have the structure of "If situation *X* is encountered, then I will perform the goal-directed response *Y*!" Both goal and implementation intentions are set in an act of will: The former specifies the intention to meet a goal or standard; the latter refers to the intention to perform a plan. For instance, a possible implementation intention for the goal intention to eat healthy food could link a suitable situational context (e.g., one's order is taken at a restaurant) to an appropriate behavior (e.g., asking for a low-fat meal). Whereas goal intentions merely specify desired end states ("I want to achieve goal *X*!"), the if-component of an implementation intention specifies when and where one wants to act on this goal, and the then-component of the plan specifies how this will be done. Implementation intentions thus delegate control over the initiation of the intended goal-directed behavior to a specified opportunity by creating a strong link between a situational cue and a goal-directed response.

Evidence that forming if–then plans enhances rates of goal attainment has now been obtained in many studies on an array of different goals. An early meta-analysis (Gollwitzer & Sheeran, 2006)

involving over 8,000 participants in 94 independent studies revealed a medium to large effect size (d = 0.65) of implementation intentions on goal achievement in a variety of domains (e.g., interpersonal, environmental, health) on top of the effects of mere goal intentions. This size of the implementation intention effect is noteworthy, given that goal intentions by themselves already have a facilitating effect on behavior enactment (Webb & Sheeran, 2006). More recent meta-analyses focusing exclusively on goals of eating a healthy diet (Adriaanse, Vinkers, de Ridder, Hox, & de Wit, 2011), engaging in physical activity (Belanger-Gravel, Godin, & Amireault, 2013), and people's prospective memory performance (Chen et al., 2015) also demonstrate the beneficial effects of forming implementation intentions.

Research on the underlying mechanisms of implementation intention effects has discovered that implementation intentions facilitate goal attainment on the basis of psychological mechanisms that relate to the anticipated situation (specified in the if-component of the plan), the intended behavior (specified in the then-component of the plan), and the mental link forged between the if-component and the then-component of the plan. Because forming an implementation intention implies the selection of a critical future situation, the mental representation of this situation becomes highly activated and hence more accessible (Gollwitzer, 1999). This heightened accessibility of the if-component of the plan has been observed in several studies testing this hypothesis using different experimental task paradigms: for example, lexical decisions (Webb & Sheeran, 2004; Parks-Stamm, Gollwitzer, & Oettingen, 2007), dichotic listening, and cued recall (Achtziger, Bayer, & Gollwitzer, 2012, Studies 1 and 2).

Further studies indicate that forming implementation intentions not only heightens the activation (and thus the accessibility) of the mental presentation of the situational cues specified in the if-component, but also forges a strong associative link between the mental representation of the specified opportunity and the mental representation of the specified response (Webb & Sheeran, 2007, 2008). These associative links seem to be stable over time (Papies, Aarts, & de Vries, 2009), and they allow for priming the mental representation of the specified response (the plan's then-component) by subliminal presentation of the specified critical situational cue (if-component) (Webb & Sheeran, 2007). Moreover, mediation analyses suggest that both the cue accessibility and the strength of the cue–response link qualify as mediators of the impact of implementation intention formation on goal attainment (Aarts, Dijksterhuis, & Midden, 1999; Webb & Sheeran, 2007, 2008). Finally, making if–then plans seems to also affect the perceptual processing of the specified situational cues. Using a well-established chronometric method (i.e., the psychological refractory period paradigm) and combining it with the locus-of-slack logic, Janczyk, Dambacher, Bieleke, and Gollwitzer (2015) found that if–then plans facilitate early perceptual processing and not just attentional responding to the specified critical cues.

Gollwitzer (1999) suggests that the upshot of the strong associative (critical situation/goal-directed response) links created by forming implementation intentions is that—once the critical cue is encountered—the initiation of the goal-directed response specified in the then-component of the implementation intention exhibits features of automaticity, including immediacy, efficiency, uncontrollability, and redundancy of conscious intent. Evidence indicates that if–then planners act quickly (Gollwitzer & Brandstätter, 1997, Experiment 3), deal effectively with cognitive demands (i.e., speed up effects are still evident under high cognitive load; Brandstätter, Lengfelder, & Gollwitzer, 2001), do not need to consciously intend to act in the critical moment (i.e., implementation intention effects are observed even when the critical cue is presented subliminally; Bayer, Achtziger, Gollwitzer, & Moskowitz, 2009), and show uncontrolled attention to the specified cues (i.e., the situational cue specified in the if-component of an implementation intention still received attention when it was presented in a task that required ignoring it; Wieber & Sassenberg, 2006). In line with this latter finding, Schweiger Gallo, Pfau, and Gollwitzer (2012) observed that hypnotic instructions enriched with respective implementation intentions produced an increase in hypnotic responsiveness; importantly, this performance increase was accompanied by a felt involuntariness of responding.

The postulated and observed component processes underlying implementation intention effects (enhanced cue accessibility, strong cue–response links, automation of responding) mean that fashioning an if–then plan strategically automates goal striving: People intentionally make if–then plans that delegate control of goal-directed behavior to preselected situational cues with the explicit purpose of reaching their goals. This delegation hypothesis has been tested in a functional magnetic resonance imaging study reported by Gilbert, Gollwitzer,

Cohen, Oettingen, and Burgess (2009). In this study, participants had to perform a prospective memory task on the basis of either goal or implementation intention instructions. Acting on the basis of goal intentions was associated with brain activity in the lateral rostral prefrontal cortex, whereas acting on the basis of implementation intentions was associated with brain activity in the medial rostral prefrontal cortex. Brain activity in the latter area is known to be associated with bottom-up (stimulus) control of action, whereas brain activity in the former area is known to be related to top-down (goal) control of action.

Support for the delegation hypothesis also comes from studies assessing effort mobilization (i.e., effort-related cardiac activity) during task performance (Freydefont, Gollwitzer, & Oettingen, 2016) and from studies using critical samples—that is, individuals with poor self-regulatory abilities, such as people with schizophrenia and people with substance abuse disorders (Brandstätter et al., 2001, Studies 1 and 2), people with frontal lobe damage (Lengfelder & Gollwitzer, 2001), and children with attention-deficit/hyperactivity disorder (ADHD; Gawrilow & Gollwitzer, 2008, Paul et al., 2007). For instance, Brandstätter et al. (2001, Study 1) assigned hospitalized opiate addicts under withdrawal the goal to write a short curriculum vitae before the end of the day; half of the participants formed relevant implementation intentions (they specified when and where they would start to write what), and the other half (control group) formed irrelevant implementation intentions (when and where they would eat what for lunch). Eighty percent of the relevant implementation intention participants had written a short curriculum vitae at the end of the day, whereas none of the participants with the irrelevant implementation intention succeeded in doing so.

Implementation intentions have also been found to benefit children with ADHD who are known to have difficulties with tasks that require response inhibition (e.g., go/no-go tasks). For example, it was observed that the response inhibition performance in the presence of stop signals can be improved in children with ADHD by forming implementation intentions (Gawrilow & Gollwitzer, 2008, Studies 1 and 2). This improved response inhibition is reflected in electrocortical data as well (Paul et al., 2007). Typically, the P300 component evoked by no-go stimuli has greater amplitude than the P300 evoked by go stimuli. This difference is less pronounced in children with ADHD. Paul et al. (2007) found that if–then plans improved response inhibition and increased the P300 difference (no-go/go) in children with ADHD. Gawrilow, Gollwitzer, and Oettingen (2011a) observed that children with ADHD can also use implementation intentions to support executive functions other than inhibition (i.e., task shifting, working memory).

Additional process mechanisms to the stimulus perception and response initiation processes documented in the findings described earlier have been explored, for instance, whether furnishing goals with implementation intentions produces an increase in goal commitment or self-efficacy, which in turn causes heightened goal attainment, whether furnishing one's goals with implementation intentions increases experimenter demand, and whether implementation intentions have positive effects on goal attainment because they provide extra strategy knowledge. However, none of these alternative process-related hypotheses received empirical support (summary by Gollwitzer, 2014).

Research on the facilitating effects of forming implementation intentions on meeting the challenges of successful goal attainment has studied the following phenomena: getting started, staying on track, failing to call a halt to futile goal striving, and overextending oneself. Given that forming implementation intentions automates goal striving, people who form implementation intentions should find it easier to meet these challenges. Indeed, numerous studies suggest that problems of *getting started* on one's goals can be solved effectively by forming implementation intentions. For instance, Gollwitzer and Brandstätter (1997, Study 2) analyzed a goal intention (i.e., writing a report about how the participants spent Christmas Eve) that had to be performed at a time when people are commonly busy with other things (i.e., during the subsequent 2 days, which are family holidays in Europe). Still, research participants who had furnished their goal intention with an implementation intention that specified when, where, and how one wanted to get started on this project were about three times as likely to write the report than mere goal intention participants. Other studies found that implementation intentions even foster striving toward goals involving behaviors that are somewhat unpleasant to perform (e.g., to recycle, Holland, Aarts, & Langendam, 2006; and to engage in physical exercise, Milne, Orbell, & Sheeran, 2002). Moreover, Thürmer, Wieber and Gollwitzer (2015) observed that decision-making in groups does benefit from making if–then plans that specify to start by carefully reviewing all the relevant available

information when a decision must be made. Finally, implementation intentions were associated with goal attainment in domains where it is easy to forget to act (e.g., regular intake of vitamin pills, Sheeran & Orbell, 1999; attendance for cervical cancer screening, Sheeran & Orbell, 2000; the signing of worksheets by the elderly, Chasteen, Park, & Schwarz, 2001).

But many goals cannot be accomplished by a simple, discrete, one-shot action because they require that people keep striving over an extended period of time. Such *staying on track* may become very difficult when certain internal stimuli (e.g., being anxious, tired, overburdened) or external stimuli (e.g., temptations, distractions) interfere with ongoing goal pursuit. Implementation intentions can prevent the negative influence of interferences from outside the person (e.g., disruptions by attractive video shows; Gollwitzer & Schaal, 1998; Wieber, von Suchodoletz, Heikamp, Trommsdorff, & Gollwitzer, 2011). For this purpose, implementation intentions may take very different forms. For instance, if a person wants to avoid being unfriendly to a friend who is known to make outrageous requests, she can form implementation intentions such as, "And if my friend approaches me with an outrageous request, then I will not respond in an unfriendly manner!" The then-component of suppression-oriented implementation intentions does not have to be worded in terms of not showing the critical behavior; it may also specify an alternative antagonistic behavior ("…, then I will respond in a friendly manner!") or focus on ignoring the critical cue ("…, then I'll ignore it!"). Research suggests that the negation implementation intention ("…, then I will not respond in an unfriendly manner") is the least effective because it is associated with an ironic activation of the mental representation of the unwanted behavior (Adriaanse, van Oosten, de Ridder, de Wit, & Evers, 2011). Interestingly, implementation intentions can be used to curb the negative effects not only of interfering external events but also of interfering inner states. Achtziger, Gollwitzer, and Sheeran (2008), for instance, report two field experiments concerned with dieting (i.e., reduce snacking; Study 1) and athletic goals (i.e., win a competitive tennis match; Study 2) in which goals were shielded by implementation intentions geared toward controlling potentially interfering inner states (i.e., cravings for junk food in Study 1 and disruptive thoughts, feelings, and physiological states in Study 2). Parallel findings evinced in studies where the implementation intentions used were geared toward coping effectively with performance anxiety (i.e., motor performance, Stern, Cole, Gollwitzer, Oettingen, & Balcetis, 2013; test performance, Parks-Stamm, Gollwitzer, & Oettingen, 2010; interracial social interaction, Stern & West, 2014), the tendency toward self-handicapping (Thürmer, McCrea, & Gollwitzer, 2013), or the pain inflicted by persisting on a challenging task (Thürmer, Wieber, & Gollwitzer, 2017).

An alternative way of using implementation intentions to protect ongoing goal pursuit from derailment is to form implementation intentions geared toward stabilizing the ongoing goal pursuit (Bayer, Gollwitzer, & Achtziger, 2010). Using again the example of a person who is approached by her friend with an outrageous request, let us assume that the person who is the recipient of the request is tired or irritated and thus particularly likely to respond in an unfriendly manner. If this person has stipulated in advance in an implementation intention what she will converse about with her friend, the interaction may come off as planned, and being tired or irritated should fail to affect the person's behavior toward her friend. Bayer et al. (2010) tested this hypothesis in a series of experiments in which participants were asked to make plans (i.e., form implementation intentions) or not regarding their performance on an assigned task. Prior to beginning the task, participants' self-states were manipulated, so that the task at hand became more difficult (e.g., a state of self-definitional incompleteness prior to a task that required perspective taking; Gollwitzer & Wicklund, 1985; a good mood prior to a task that required evaluation of others nonstereotypically; Bless & Fiedler, 1995; and a state of ego depletion prior to solving difficult anagrams; Muraven, Tice, & Baumeister, 1998). The results suggested that the induced critical self-states negatively affected task performance only for those participants who had not planned out their working on the task at hand via implementation intentions (i.e., had only set themselves the goal to come up with a great performance).

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

chosen means or goal are reduced effectively, however, by the use of implementation intentions. These implementation intentions only have to specify receiving negative feedback as the critical cue in the if-component and switching to available alternative means or goals as the appropriate response in the then-component (Henderson, Gollwitzer, & Oettingen, 2007).

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

A new line of research on implementation intentions has been stimulated by Aristotle's concept of *akrasia* (lack of willpower), arguing that making if–then plans increases will power on the spot (Gollwitzer, 2014). The litmus test for any strategy to improve willpower is enhanced performance in a *delay of gratification* task. Accordingly, Gawrilow, Gollwitzer, and Oettingen (2011b) analyzed whether delay of gratification can be facilitated by forming implementation intentions, even in children with ADHD who are known to have particularly pronounced problems with delaying gratifications. A computer task was developed in line with the delay-of-gratification paradigms developed by Walter Mischel (1974) and Sonuga-Barke (2002)—waiting in the presence of a suboptimal cue to make money for a delayed optimal cue to make money led to a higher total amount of money earned. In two studies it was observed that the goal intention to do well on the task did not improve performance compared to a control group that received mere task instructions specifying the reward contingencies. However, when the goal intention was furnished with an implementation intention that linked a waiting response to the suboptimal cue, a significantly higher amount of money was earned.

There are further critical situations where willpower is needed. Three such conditions have been targeted so far: situations in which a person's knowledge and skills constrain performance such as taking academic tests, situations in which an opponent's behavior limits one's performance such as negotiation settings, and situations in which the wanted behavior (e.g., no littering) runs into conflict with habits favoring an antagonistic response (Gollwitzer, 2014).

Willpower is called for when working on *academic performance tests* (math tests, general intelligence tests) because a good performance is commonly determined not only by a person's knowledge, analytic capability, and cognitive skills but also by a person's motivation to do well as a consequence of perceived desirability and feasibility of successful test performance. To increase test scores on the spot by exerting willpower, a person may thus focus on holding up his or her motivation (e.g., by increasing his or her self-efficacy feelings). Accordingly, Bayer and Gollwitzer (2007, Study 2) tested whether it is possible to increase self-efficacy beliefs by forming implementation intentions. They asked college students to take the Raven Intelligence Test: One group of participants formed a mere goal intention to do well ("I will correctly solve as many test items as possible!"), whereas the implementation intention group added the following if–then plan: "And whenever I start a new test item, then I'll tell myself: I can solve it!" Participants in the implementation intention condition performed better than those in the mere goal intention to perform well condition; implementation intention participants also performed better than participants in a further condition where a self-efficacy strengthening goal intention had been formed ("I will tell myself: I can do these test items!").

Often our goals are constrained by others who are competing with us for positive outcomes or have competing goals for the use of the situation at hand. In such *competitive situations*, exerting willpower involves effectively protecting one's goal striving from the unwanted influences generated by the goals of others. In their negotiation research, Trötschel and Gollwitzer (2007) targeted the sharing of a common good and explored whether the self-regulation strategy of forming implementation intentions enables negotiators to find agreements even if they have to operate under the adverse conditions of a loss frame (i.e., participants see how many points they lose rather than win and thus they are reluctant to make concessions). When looking at the agreements achieved (i.e., level of joint outcomes), it was observed that pairs of loss-frame negotiators with a prosocial goal intention

managed to somewhat reduce the resistance to concession making arising from the loss-frame negotiation context, but that only negotiators who furnished their prosocial goal intentions with respective implementation intentions were successful in completely abolishing the negative impact of the loss-frame negotiation context. Negotiation research by Kirk, Gollwitzer, and Carnevale (2011) used a different task paradigm: the ultimatum game. The participants acted as receivers of a series of fair but also unfair offers. It is commonly observed that impulsive anger in response to unfair offers leads to rejections—and in turn to a financial cost to the receiver. Kirk et al., however, found that entering the ultimatum game with goals to make a personal profit managed to curb impulsive rejections by increasing the frequency of accepting unfair offers when these goals were furnished with respective implementation intentions.

The self-regulation of one's goal striving becomes particularly difficult when *habitual responses* conflict with initiating and executing the needed goal-directed responses instrumental to goal attainment (e.g., Wood & Neal, 2007). In such cases, showing willpower means asserting one's will to attain the chosen goal against unwanted habitual responses. By assuming that action control by implementation intentions is immediate and efficient and adopting a simple horse race model of action control (Gurney, Prescott, & Redgrave, 2001a, 2001b), people should be in a position to break habitualized responses by forming implementation intentions that spell out a response that is contrary to the habitualized response to the critical situation.

Research on the control of habitual responses by the use of implementation intentions has targeted cognitive, affective, and behavioral responses. With respect to *cognitive* responses, it has been shown that automatic cognitive biases such as stereotyping can be successfully controlled by forming implementation intentions. Extending earlier work by Gollwitzer and Schaal (1998), Stewart and Payne (2008) found that implementation intentions designed to counter automatic stereotypes (e.g., "When I see a Black face, I will then think 'safe'!") could indeed reduce automatic stereotyping. Research by Mendoza, Gollwitzer, and Amodio. (2010) using the so-called shooter task paradigm has added to these findings by showing that the behavioral expression of stereotypes can also be downregulated by forming implementation intentions.

Schweiger Gallo, Keil, McCulloch, Rockstroh, and Gollwitzer (2009, Study 3) analyzed whether it is possible to curb habitual *affective* responses by forming implementation intentions. They found that implementation intentions specifying an ignore response in the then-component helped control fear in response to pictures of spiders in participants with spider phobia—to the low level that was experienced by participants who did not report any spider phobia. The obtained electrocortical correlates (the authors had used dense-array electroencephalography) revealed that those participants who bolstered their goal intention to stay calm with an ignore-implementation intention showed significantly reduced early activity in the visual cortex in response to spider pictures, as reflected in a smaller P1 (assessed at 120 milliseconds after a spider picture was presented). This suggests that the ignore-implementation intention assigned to spider phobics lead to a strategic automation of the specified goal-directed response (in the present case, an ignore response) when the critical cue (in the present case, a spider picture) was encountered, so that—using the horse race metaphor—the planned response (i.e., ignore response) could outrun the habitual response (i.e., fear response).

Various studies have targeted the control of habitual behavioral responses. For instance, Cohen, Bayer, Jaudas, and Gollwitzer (2008, Study 2; see also Miles & Proctor, 2008) explored the suppression of habitual responses by implementation intentions using the Simon task. In this task paradigm, participants are asked to respond to a nonspatial aspect of a stimulus (i.e., whether a presented tone is high or low) by pressing a left or right key and to ignore the location of the stimulus (i.e., whether it is presented on one's left or right side). The difficulty of this task is in ignoring the spatial location (left or right) of the tone in one's classification response (i.e., pressing a left or right response key; Simon, 1990). The cost in reaction times is seen when the location of the tone (e.g., right) and required key press (e.g., left) are incongruent, because people habitually respond to stimuli presented at the right or left side with the corresponding hand. Cohen et al. (2008, Study 2) found that implementation intentions eliminated the Simon effect for the stimulus that was specified in the if-component of the implementation intention. Reaction times for this stimulus did not differ between the congruent and incongruent trials (i.e., they were fast throughout). In a recent study by Marquardt, Cohen, et al. (2017), stroke patients with a mild to moderate hand paresis were asked to perform the Simon task before and after they had formed respective if–then plans.

A significant Simon effect was observed in both the affected and the nonaffected arm for control trials, but there was no longer a significant Simon effect for the critical trials prepared by forming if–then plans. Apparently, making if–then plans effectively reduced the Simon effect for both the affected and the nonaffected arm. This finding opens a potential new route to improving stroke rehabilitation because if–then plans may qualify as a viable strategy to overcome the learned nonuse of the affected arm. Further studies on the control of habitual behavioral responses by implementation intentions analyzed abolishing concept and goal-priming effects on behavior (using different concept and goal-priming methods; Gollwitzer, Sheeran, Trötschel, & Webb, 2011) and breaking bad eating habits (using a lexical decision task presenting the unwanted food item as the critical word; Adriaanse, Gollwitzer, de Ridder, de Wit, & Kroese, 2011).

A further new line of implementation intention research explored whether if–then plans can also be used to benefit the control of social phenomena that run off automatically. For instance, Przybylinski and Andersen (2012) studied implementation intentions with respect to the social phenomenon commonly referred to as transference: Prior relationships readily play out in present ones, often without awareness and even when problematic for an individual. In other words, past relationships emerge in the present through the relatively automatic use of significant-other representations in judging and remembering others. In two experiments, the authors demonstrated that forming implementation intentions could successfully block transference effects.

In social projection, we assume that other people hold similar beliefs and attitudes to our own (e.g., "I like sauerkraut, so other people must like sauerkraut, too"). Although such projection can have its benefits, such as increased feelings of closeness (Robbins & Krueger, 2005), it can also have costs (e.g., when projecting that the majority of people smoke cigarettes hinders behavior change). Given the fact that social projection can have positive as well as negative consequences, A. Gollwitzer, Schwörer, Stern, Gollwitzer, and Bargh (2017) explored whether implementation intentions could be used for both intensifying and reducing social projection. They found that implementation intentions could successfully upregulate ("If I'm asked to estimate what percentage of people agree with me, then I will remember that other people are similar!") as well as downregulate ("If I'm asked to estimate what percentage of other people agree with me, then I will remember that other people are different!") social projection.

And finally, Wieber, Gollwitzer, and Sheeran (2014) demonstrated that mimicry effects on social interactions can also be controlled by forming implementation intentions, even though—as with transference and social projection—people are not usually aware of its influence on their judgments and behaviors. Although mimicry generally facilitates social interactions, sometimes mimicry effects can hamper the pursuit of focal goals (e.g., when we fall for the persuasive efforts of a salesperson mimicking our bodily and facial expressions). In one of the studies reported by Wieber, Gollwitzer, et al. (2014), participants formed the goal "I want to be thrifty with my money! I will save my money for important investments!" or an implementation intention regarding this goal, "I want to be thrifty with my money! And if I am tempted to buy something, then I will tell myself: I will save my money for important investments!" They were then mimicked by the experimenter, who tried to seduce them to spend the money they had earned for participating in the experiment on some leftover coffee vouchers and chocolate bars. Compared to a control group, implementation intentions reduced participants' giving in to the persuasive attempts of the experimenter to spend their money, whereas mere goal intentions to be thrifty failed to do so.

Still, one wonders whether forming implementation intentions can always block habitual responses. Using a horse race metaphor, the answer must be no. Whether the habitual response or the if–then guided response will win the race depends on the relative strength of the two behavioral orientations. If the habitual response is based on strong habits (Webb, Sheeran, & Luszczynska, 2009) and the if–then guided response is based on weak implementation intentions, then the habitual response should win over the if–then planned response; and the reverse should be true when weak habits are sent into a race with strong implementation intentions. This implies that controlling behavior that is based on strong habits requires the formation of strong implementation intentions. One way to create particularly strong links between situational cues (if-component) and goal-directed responses (then-component) is asking participants to use mental imagery when linking situational cues to goal-directed responses in their if–then plans (Knäuper, Roseman, Johnson, & Krantz, 2009); another way pertains to explicitly telling participants that they should plan out the when, where, and

how of goal pursuit by using an if–then format (Chapman, Armitage, & Norman, 2009).

What else empowers implementation intentions? For strong implementation intention effects to occur, people must be highly committed to the superordinate goal (e.g., de Nooijer, de Vet, Brug, & de Vries, 2006; Orbell, Hodgkins, & Sheeran, 1997; Sheeran, Webb, & Gollwitzer, 2005; Verplanken & Faes, 1999), which is facilitated when the goal is self-concordant (Koestner, Lekes, Powers, & Chicoine, 2002), the self-efficacy to reach the goal is high (Wieber, Odenthal, & Gollwitzer, 2010), one has no doubts that pursuing the goal is worthwhile (Wieber, Sezer, & Gollwitzer, 2014), and one feels energized to move forward (e.g., one is angry rather than sad; Maglio, Gollwitzer, & Oettingen, 2014). Not surprisingly, it was also found that the commitment to the formed implementation intention must be high to produce strong effects of if–then planning (e.g., Achtziger et al., 2012, Study 2).

The latter finding has raised the question of whether action control by implementation intentions shows costs in terms of a heightened degree of rigidity (Gollwitzer, Parks-Stamm, Jaudas, & Sheeran, 2008). Research on this question suggests, however, that goal striving guided by implementation intentions shows neither total rigidity nor total flexibility; instead, it is characterized by *flexible tenacity*. Indication of tenacity comes from recent research assessing physiological measures of effort increase (i.e., cardiac preejection periods; Freydefont et al., 2016). The authors observed that when task difficulty increased, only implementation intention participants continued to display shorter cardiac preejection periods (i.e., mobilized additional effort), whereas mere goal and control participants failed to do so. But there is an indication that this tenacity shows features of flexibility. Legrand, Bieleke, Gollwitzer, and Mignon (2017) compared action control by implementation intentions to action control by goal intentions under varying consequences of performing the goal-directed behavior, ranging from mildly aversive to considerably aversive. As it turned out, when the consequences of performing the goal-directed behavior became highly aversive (i.e., monetary loss), both goal and implementation intention participants were less likely to perform the goal-directed behavior, suggesting that implementation intention participants manage to flexibly disengage from a goal that no longer justifies the costs associated with its attainment.

There is a further question, however, when it comes to the issue of flexibility/rigidity of action control by implementation intentions: Do their effects generalize to similar situations by still triggering the specified action? Studies on promoting physical exercise (Epton & Armitage, 2017) and enhancing safe driving (Brewster et al., 2016) addressed this question and found that implementation intention effects do generalize to similar situations. With dissimilar situations, however, it is observed that implementation intention effects no longer evince (see also Masicampo & Baumeister, 2012; Parks-Stamm et al., 2007).

Finally, Bieleke, Legrand, Mignon, and Gollwitzer (2018) studied the flexibility/rigidity issue with regard to the question, What will happen when a response is required that differs from the planned one (i.e., the response specified in the then-component of the if–then plan)? In a series of experiments, it was found that behavior was impaired when a similar situation required a behavior different from the planned one, suggesting that participants could not withhold the planned response (resembling a habit capture error). Moreover, the results also showed an impaired performance of the planned behavior when participants encountered different situations. No such impairments occurred, however, in different situations that required different responding.

Recent research has addressed a challenging question that goes beyond the rigidity/flexibility issue: Are there any types of effective if–then plans when it comes to controlling one's impulses or habitual responses other than those based on the horse race model (i.e., if–then plans that specify an antagonistic response to the impulsive or habitual response)? Using various escalation of commitment task paradigms, Doerflinger, Martiny-Huenger, and Gollwitzer (2017) analyzed whether if–then plans that specify a *switch to reflective thinking* whenever impulsive responding is triggered can be used to halt it. They found that participants with implementation intentions to deliberate before making a decision of whether to continue a chosen course of action ("If the situation looks unfavorable, then I will deliberate thoroughly!") disengaged more effectively when facing negative feedback compared to participants without such implementation intentions. Using a different type of decision problem (i.e., whether to accept unfair offers in an ultimatum game), Bieleke, Gollwitzer, Oettingen, and Fischbacher (2017) sought to help individuals overcome impulsive rejections of unfair (albeit financially beneficial) offers by giving them a reflection-focused implementation intention ("If I start acting in a hasty way, then I will tell myself: Use your brain!"). Participants with this

reflection-focused plan took more time before making a decision and were also more likely to accept the unfair offers compared to control participants without such a plan.

Interventions

How can the research on goals be used to help people improve the attainment of their goals in everyday life? Knowledge about effective self-regulation strategies allows for creating interventions that teach people how to help themselves. One such intervention developed by Oettingen and her colleagues combines mental contrasting with forming implementation intentions into one metacognitive self-regulation strategy called mental contrasting with implementation intentions (MCII).

Mental contrasting and forming implementation intentions complement each other. Via identifying and imagining the desired future, mental contrasting clarifies in which direction one wants to act. Via identifying and imagining the obstacles of present reality, mental contrasting provides the implicit associative links between future, obstacles, and instrumental means as well as the energy to effectively overcome the obstacles and attain the desired future. However, when the obstacles are particularly hard to overcome (e.g., if they are habits, impulses, or strong emotions), forming implementation intentions will further benefit attaining the desired future.

In turn, to unfold their beneficial effects, implementation intentions require that strong goal commitments are in place, and mental contrasting creates such strong commitments. Implementation intentions are also found to show enhanced benefits when the specification of the if-component is personalized (Adriaanse, de Ridder, & de Wit, 2009), and mental contrasting guarantees the identification of personal critical obstacles that can then be used as the critical situation for specifying the if-component of an implementation intention.

In an intervention study with middle-aged women (Stadler, Oettingen, & Gollwitzer, 2009, 2010), participants were taught the cognitive principles and individual steps of the MCII self-regulation strategy. This intervention allowed participants to apply MCII to their idiosyncratic everyday wishes and concerns. Specifically, participants were taught to apply MCII by themselves to the wish of improving exercising and to the wish of healthy eating whenever possible. Hence, MCII is referred to as a *metacognitive* self-regulation strategy. Participants were free to choose whatever form of exercising they wished, and they were encouraged to anticipate exactly those obstacles that were personally most relevant and to link them to exactly those goal-directed responses that personally appeared to be most instrumental. As dependent measures, participants maintained daily behavioral diaries to keep track of the amount of time they exercised every day. Overall, teaching the MCII technique enhanced exercise more than the information-only control intervention; this effect showed up immediately after the interventions and remained stable throughout the entire period of the study (16 weeks after the intervention). More specifically, participants in the MCII group exercised nearly twice as much: an average of 1 hour more per week than participants in the information-only control group. Regarding healthy eating (i.e., eating more fruits and vegetables), MCII also produced the desired behavior change; these effects were observed after the extensive time period of 2 years (Stadler et al., 2010).

A more recent intervention study by Sailer et al. (2015) observed that MCII even helped patients with schizophrenia in autonomy-focused clinical hospital settings to translate their exercising intentions into action. In another study, Adriaanse et al. (2010) targeted the negative eating habit of unhealthy snacking in college students. Mental contrasting with implementation worked for students with both weak and strong such habits, and notably, it was more effective than mental contrasting or formulating implementation intentions alone. Moreover, MCII was observed to benefit chronic back pain patients in increasing their health behaviors (Christiansen, Oettingen, Dahme, & Klinger, 2010). Over a period of both 3 weeks and 3 months, patients increased their physical capacity compared to a standard treatment control group. Physical capacity was measured by objective (i.e., bicycle ergometer test and number of lifts achieved in 2 minutes) and subjective indicators (reported physical functioning). In more recent intervention studies, MCII helped to reduce red meat consumption (Loy, Wieber, Gollwitzer, & Oettingen, 2016) and increased physical exercise and weight reduction in stroke patients over the period of 1 year (Marquardt, Oettingen, Gollwitzer, Sheeran, & Liepert, 2017).

In the academic domain, MCII supported medical residents in studying for their exams and helped them manage their time (Saddawi-Konefka et al., 2017). The same effects in time management and performance were observed in working mothers from low-income backgrounds instructed in MCII, who achieved success in vocational education

(Oettingen, Kappes, Guttenberg, & Gollwitzer, 2015). Other studies have shown that using MCII increased the quality and quantity of homework as judged by the parents of children at risk for ADHD (Gawrilow, Morgenroth, Schultz, Oettingen, & Gollwitzer, 2013) and that it helped high school students work on practice tasks over summer vacation for an upcoming standardized test (Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011). Attendance and course grades improved in middle school children from low-income backgrounds instructed in using MCII (Duckworth, Kirby, Gollwitzer, & Oettingen, 2013). When applied to the domain of interpersonal relationships, MCII increased commitment to the relationship and decreased insecurity-related behaviors (Houssais, Oettingen, & Mayer, 2013); it also helped couples talk about sensitive topics (Oettingen & Cachia, 2016).

To test the additive value of combining mental contrasting with implementation intentions, as opposed to using the strategies by themselves, Kirk, Oettingen, and Gollwitzer (2013) conducted an experiment using an integrative bargaining task (i.e., negotiating the sale of a car) to measure success. Students taught how to use MCII generated more integrative win–win solutions than those who used mental contrasting or if–then plans alone. Students in the MCII condition also demonstrated more perspective taking and cooperation. In the study on snacking behavior conducted by Adriaanse et al. (2010) reported above, MCII better enabled students to eliminate bad snacking habits compared to mental contrasting or implementation intentions alone. By creating insights into their wishes, outcomes, and obstacles, mental contrasting prepared people to generate more personally relevant if–then plans.

Researchers have started to conduct MCII interventions online. Kizilcec and Cohen (2017) found in two recent studies that MCII delivered as an 8-minute online intervention to a total of 17,983 people who had enrolled in massive open online courses increased completion rates by 32% and 15%, respectively. Interestingly, these effects were observed in participants of individualistic but not of collectivistic cultures and only when the obstacle was related to an everyday obligation but not to uncontrollable obstacles such as lack of time or practical barriers. In participants from individualistic cultures who also had generated controllable obstacles (everyday obligation), MCII improved the course completion rate by 78%.

These findings highlight the most important takeaways for using MCII to fulfill one's wishes and attain one's goals: that the person must wholeheartedly embrace the wish and that the obstacle to overcome should be identified within one's control and thus be surmountable (Oettingen, 2014). Fulfilling an individualistic wish (course completion) in a collectivistic culture may present formidable obstacles and even lead to disengagement from individualistic wishes rather than engagement.

Once people have been taught how to use MCII, they can deploy it in everyday life in four simple steps, taking just a moment of calm and uninterrupted time. They can apply it on their own, without guidance from others, making it a self-sustainable, practical strategy to help people take control of their lives. Mental contrasting with implementations has been disseminated under the acronym WOOP, which stands for *wish, outcome, obstacle, plan* (for the dissemination of MCII or WOOP, see www.woopmylife.org and the WOOP app).

Conclusion and Outlook

The research on goals presented in this chapter paints a picture of an agentic individual who can apply proper self-regulatory strategies to attain their goals. Mental contrasting and implementation intentions per se and in combination qualify as such strategies. They allow people to pursue realizing their idiosyncratic wishes and timber their own development according to principles of what is desirable and feasible. When applied in metacognitive form, mental contrasting and implementation intentions and especially their combined usage (MCII) liberate people from being bound to erroneous goal engagement and bad habits.

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