# Part I

## CONCEPTS AND PROCESSES OF SELF-REGULATION

# 1 Self-Regulation: Principles and Tools

Gabriele Oettingen and Peter M. Gollwitzer

## Author Note

Gabriele Oettingen, Psychology Department, New York University and Department of Psychology, University of Hamburg, Germany; Peter M. Gollwitzer, Psychology Department, New York University and Department of Psychology, University of Konstanz, Germany.

Correspondence concerning this chapter should be addressed to Gabriele Oettingen, Psychology Department, New York University, 6 Washington Pl., New York, NY 10003, USA, E-mail: gabriele.oettingen@nyu.edu

## Abstract

Motivation has been traditionally defined as energy (e.g., running speed) and direction (e.g., toward food), and the determinants of motivation as need (e.g., for food), expectation (e.g., cognitive map of the maze), and incentive value (e.g., quality of the food). When motivation toward attaining a desired future meets resistance or conflict, self-regulation becomes relevant. The use of effective self-regulation tools can support individuals in dealing with such resistance or conflict (e.g., obstacles, difficulties, temptations). We discuss various self-regulation tools and then focus on the effects and mechanisms of two of them: mental contrasting and forming implementation intentions. Recent interventions attest to the effectiveness of combining these two strategies: Mental contrasting with implementation intentions (MCII) is a time- and cost-effective tool that allows adolescents to master their everyday life and long-term development in a self-reliant way.

The other day a friend told us about the difficulties his adolescent son experiences with schoolwork. Our friend was puzzled: His son was well aware that studying was important and feasible, and he strongly intended to study. But then the father found the son doing everything else except studying. So the father simply felt at a loss, and so did the son. We argue

that even when people are highly motivated and strongly intend to change their behavior, they still need self-regulation tools when resistances such as difficulties or distractions arise. We describe such tools, their effects and mechanisms, as well as interventions that allow adolescents to easily acquire and effectively use them in an autonomous way.

## Motivation versus Self-Regulation

The terms *motivation* and *self-regulation* call for clear definitions of both. In our definition of motivation we follow Hull (1943) who referred to motivation in terms of intensity and direction. The intensity is defined by the energization or arousal of an organism (Duffy, 1934; see also Oettingen et al., 2009), whereas the direction is defined by whether the behavior aims at approaching or avoiding a certain outcome (Atkinson, 1957; McClelland, 1985). Intensity and direction in turn are determined by need (e.g., for food), expectation (e.g., cognitive map of the maze), and incentive value (e.g., quality of the food; Tolman, 1932).

Gollwitzer (1990, 2012) classified the determinants of motivation into desirability and feasibility. Desirability is the expected value of a desired future (i.e., the subjective attractiveness of reaching it), while feasibility pertains to perceived expectations of attaining it. Expectations are beliefs or judgments of the likelihood of future events that are based on past performance and experience (e.g., Ajzen, 1991; Atkinson, 1957; Bandura, 1977; Mischel, 1973; Oettingen & Mayer, 2002). They might pertain to (a) performing a certain behavior (self-efficacy expectations), (b) producing a desired outcome (outcome expectations), or (c) reaching the desired outcome (general expectations).

In the 20th century, psychological research on behavior change primarily focused on the concept of motivation. Although theoretical approaches and concepts changed over time, incentive value and expectations were and still are considered to be the two core determinants of behavior change, with most motivational theories centering on questions of how the two variables influence behavior. In this vein, behavior change interventions such as motivational interviewing (Miller & Rollnick, 2002; see also Prochaska, DiClemente, & Norcross, 1992) or incremental theory training (Blackwell, Trzesniewski, & Dweck, 2007) utilize strategies geared at modifying incentive value and expectations. The strategies render behavior change more important or strengthen people's expectations of successfully achieving behavior change (see also, Eccles, Fredricks, & Baay, this volume; Wigfield, Tonks, Klauda, & Wenzel, 2009).

Only recently has research on self-regulation gained more attention. In line with William James (1890), we understand self-regulation as helping people deal with resistance and conflict, such as with obstacles and temptations standing in the way of attaining desired future outcomes. Thus self-regulation tools are strategies that target resistance and conflict to help translate high incentive value and expectations of success into appropriate behaviors. In contrast to motivational strategies, self-regulation strategies do not aim at making future outcomes more desirable or feasible, but rather at assuring that they become behaviorally relevant.

After providing an overview of the history and recent research on self-regulation, the present chapter introduces three self-regulation tools: mental contrasting, implementation intentions, and the combination of mental contrasting with implementation intentions (MCII). Mental contrasting is a self-regulation tool that allows people to consider possible resistance and conflict when trying to reach a desired future. Mental contrasting means mentally juxtaposing the desired future (e.g., excelling in the impending exam on Tuesday) with a critical obstacle of reality (e.g., invitation to a party on Saturday). After mental contrasting, but not after relevant control exercises, expectations of success are activated (not changed) and determine behavior (e.g., studying for the exam). As a self-regulation tool, it helps effectively pursue feasible desired futures (summary by Oettingen, 2012).

In a second step, we discuss forming implementation intentions as an additional self-regulation strategy. Implementation intentions are *if...*, *then...* plans that link a critical situation to an action that is instrumental in reaching a desired future (e.g., if my friend calls to join her at the party, then I will tell her that I have to study). These plans allow people to respond to a critical situation in a fast and effortless way and without any further conscious intent (summary by Gollwitzer, 2014).

In a third step, we introduce the combination of both strategies. MCII is a self-regulation tool that enables individuals to hold both the desired future and the obstacles of reality in the mind, and it then provides people with explicit plans for how to deal with these obstacles. MCII has been found to be more powerful in changing behavior than mental contrasting and implementation intentions by themselves, and it is cost- and time-effective to learn and apply (summaries by Oettingen & Gollwitzer, 2010; Oettingen, 2012).

## Self-Regulation: Overview

Self-regulation is required when people face resistance or conflict to attaining their desired future (Gollwitzer & Oettingen, 2011; James, 1890;

Oettingen, 2012). Investigating self-regulation, some researchers focus on nonconscious processes (e.g., implicit goal shielding), whereas others target conscious strategies (e.g., distancing); still others focus on conscious strategies that trigger nonconscious processes, which in turn help overcome resistance and conflict (e.g., mental contrasting, forming implementation intentions).

## Nonconscious Self-Regulation

*Nonconscious Goals.* Most approaches to self-regulation have assumed an agentic, conscious individual who makes decisions and behaves in a goal-directed way (Bandura, 2006; Vohs & Baumeister, 2011). However, self-regulation of goal-directed behavior may also occur nonconsiously; that is, it may operate outside of awareness. Research on priming attests to these nonconscious processes; priming is the activation of relevant mental representations outside of awareness (Bargh & Chartrand, 1999). Primes can evoke concepts, procedures, or, importantly, goals (for reviews, see Bargh, Gollwitzer, & Oettingen, 2010; Dijksterhuis & Aarts, 2010).

When goals are primed, mental representations of goals (e.g., to be assertive) are activated and people act to fulfil these goals without knowing it (Oettingen, Grant, Smith, Skinner, & Gollwitzer, 2006). Primes can be presented subliminally or supraliminally (e.g., in the form of words, objects, scents), and the evoked goals may, for example, be to form a good impression or to achieve well, but also to cooperate or to help. Importantly, nonconscious goal pursuit has been shown to produce similar behavioral effects as conscious goal pursuit; goal-primed individuals show resumption after interruption and persistence in the face of difficulties (Bargh, Gollwitzer, Chai, Barndollar, & Trötschel, 2001). Once a nonconscious goal is satisfied, its influence on goal pursuit disappears (e.g., Kawada, Oettingen, Gollwitzer, & Bargh, 2004).

There is an important difference between conscious and nonconscious goal pursuit: Unlike individuals pursuing conscious goals, those pursuing nonconscious goals are puzzled why they did what they did once they become aware of their behavior. Their inability to explain their behavior creates negative affect (i.e., the behavior cannot be readily attributed to the respective goal; Oettingen et al., 2006). When such an explanatory vacuum occurs, people readily jump to any available plausible explanation to reduce their negative affect (Parks-Stamm, Oettingen, & Gollwitzer, 2010).

*Goal Shielding.* To attain a goal demands shielding the goal from distractions. Goal shielding is more pronounced when goal commitment is high

(Shah, Friedman, & Kruglanski, 2002). Emotions play a different role in goal shielding depending on whether the goal is distal or proximal. If the goal is distal, positive emotions signal strong goal commitment and thus heighten goal shielding; if the goal is proximal, positive emotions signal goal attainment and thus decrease goal shielding (Louro, Pieters, & Zeelenberg, 2007).

*Goal Hierarchies.* Superordinate goals may consist of various subgoals (Fishbach, Shah, & Kruglanski, 2004). If a superordinate goal is activated, initial success with a subgoal implies strong commitment to the superordinate goal, while initial failure implies weak commitment. In contrast, if the superordinate goal is not activated, initial success on the subgoal implies goal attainment, whereas initial failure implies that the goal is still incomplete (Fishbach, Dhar, & Zhang, 2006).

## Conscious Self-Regulation

Walter Mischel, a pioneer in the research on conscious self-regulation, focused on strategies enabling delay of gratification and resistance to temptation (Mischel, 1974; Mischel & Patterson, 1978). In his studies, he effectively established the prerequisites for investigating self-regulation: high incentive value (e.g., marshmallows as rewards for preschool children) and high expectations of success (e.g., trust that the experimenter would respond to a given behavior with the promised rewards).

*Delay of Gratification.* In his studies on delay of gratification, Mischel first observed and then experimentally manipulated which self-regulation strategies children deployed to wait for a preferred reward (e.g., two marshmallows) instead of consuming a less preferred reward immediately (e.g., one marshmallow; Mischel, 1974; Mischel & Ebbesen, 1970). The children who more successfully waited for the delayed reward employed strategies to distract themselves such as humming, role playing, staring at the ceiling, or even falling asleep. These observations led to a series of experiments testing whether children who had to minimize arousal (e.g., imagine the marshmallow as a cloud) were more successful in delaying the bigger rewards. Effective self-regulation entailed cognitively transforming the rewards so that the immediate urge to consume them was minimized.

Mischel followed his preschool participants until they became adolescents and adults. The results of the preschool studies predicted self-regulation outcomes in adolescence (Mischel, Shoda, & Peake, 1988): Those children who had been able to wait longer at age four or five became

adolescents whose parents rated them as more academically or socially competent, verbally fluent, rational, attentive, organized, and able to master disappointments and stressors. Even into adulthood (beyond 40 years old), those participants who originally were able to wait longer showed more self-control skills on a go/no-go task when asked to suppress a response to a happy face (but not to a neutral or fearful face). When the neural activity of some of the adult participants was assessed, the original patterns of delay of gratification were associated with reliable biases in frontostriatal circuitries, known to integrate motivational and cognitive processes (Casey et al., 2011).

*Resistance to Temptations.* In their Mr. Clown Box studies, Mischel and Patterson (1978) told preschool children that they had to work on a boring task (putting pegs in a pegboard) to earn permission to play with fun toys. Before starting the pegboard task, children were informed that while working on the task, they would be tempted to do something fun: Mr. Clown Box (a robot) would tempt them to play with him. But in order to play with the fun toys later they would have to keep working on the boring pegboard task. There were four planning conditions (task-facilitating plan vs. temptation-inhibiting plan vs. combination of both plans vs. no plan). In the task-facilitating condition, children had to form the plan: "When Mr. Clown Box says to look at him and play with him, then you can just look at the pegboard and say, 'I'm going to look at my work.'" In the temptation-inhibiting condition, they were provided with the plan: "When Mr. Clown Box says to look at him and play with him, then you can just *not* look at him and say, 'I'm not going to look at Mr. Clown Box.'" In the combined condition, children had to combine the task-facilitating and temptation-inhibiting plans, while in the control condition, children were not asked to form any plan. The temptation-inhibiting plans were more effective than the task-facilitating plans, the combined plans, or no plans. That is, making a plan specifically targeted at looking away from Mr. Clown Box rather than focusing on the boring task was the most effective self-regulation strategy. To be effective, the plans did not need to be rehearsed (repeated several times by using inner speech).

Addressing nonconscious self-regulation, we have discussed the phenomenon of nonconscious goal pursuit as well as the role that goal shielding and goal hierarchies play in goal pursuit. We then focused on strategies that help people distance themselves and minimize their arousal in the service of delaying gratification and resisting temptation. We will now turn to conscious strategies that trigger nonconscious processes to overcome resistance

and conflict: mental contrasting, forming implementation intentions, and the combination of the two (MCII).

## Mental Contrasting with Implementation Intentions (MCII)

### Mental Contrasting

Fantasy Realization Theory (FRT; review by Oettingen, 2012) identifies mental contrasting as a self-regulation tool that instigates and sustains behavior change. Specifically, mental contrasting of future and reality energizes people when chances of success are perceived as high and de-energizes them when chances of success are perceived as low (Oettingen, 2000; Oettingen, Pak, & Schnetter, 2001).

When mentally contrasting, people imagine a desired future (e.g., settling a conflict with a friend) and then immediately identify and imagine the critical obstacle of reality that stands in the way of attaining this future (e.g., feeling insulted). Mental contrasting activates people's expectations of attaining the desired future; they pursue (commit to and strive for) the desired future when chances look good, and let go when prospects are bleak (Oettingen et al., 2001). In sum, mental contrasting leads people to discriminate in their pursuits between high and low expectations, thereby allowing individuals to conserve energy and resources.

,Apart from mental contrasting, FRT has identified three further modes of thought: mentally elaborating the desired future without considering the reality (indulging), imagining the reality without the desired future (dwelling), and reversing the order of elaboration so that the reality is mentally elaborated before the future (reverse contrasting). Contrary to mental contrasting, when people indulge, they do not juxtapose the reality to the desired future, and when they dwell, they have not mentally experienced a desired future. Thus, these one-sided elaborations fail to clarify that obstacles are in the way of the desired future (indulging) or they fail to clarify the direction in which to act (dwelling).

Reverse contrasting, finally, implies elaborating first the present reality and then the desired future; this order prevents the reality from being perceived as impeding the desired future (Kappes, Wendt, Reinelt, & Oettingen, 2013; Oettingen et al., 2001). Accordingly, reverse contrasting leaves goal pursuit unchanged, just like indulging and dwelling (e.g., Sevincer & Oettingen, 2013). To sum up, indulging, dwelling, and reverse contrasting do not instigate prudent (expectancy-based) goal pursuit and behavior change.

Let us return to our friend and his adolescent son. When mental contrasting, the son would imagine excelling on the exam and elaborate the feelings

of happiness. Immediately afterward, he would try to identify his critical obstacle. What is it that gets in the way of excelling on the exam? Feeling peer pressure to party? Browsing the internet? Watching all the latest TV shows? Of the many obstacles that come to mind, what is his most critical obstacle? Fear of failure? Feeling too shy to ask for help? Whatever the obstacle might be, finding and mentally elaborating it will energize the high school student, and he will put in the necessary effort to overcome it.

*Effects of Mental Contrasting.* Mental contrasting is effective in different life domains, settings, and samples (summary by Oettingen, 2012). For example, an experimental study investigated adolescents in a vocational school for computer programming, where excelling in mathematics was highly desirable for the students (Oettingen et al., 2001, Study 4). Participants had to first identify positive outcomes they associated with improving in mathematics (e.g., increased job prospects, feeling of relief) and then find obstacles in their present reality that might impede their improvement (e.g., procrastination, partying). In the mental contrasting condition, participants had to imagine and write about two aspects of the desired future and two aspects of present reality, in alternating order, starting with a positive future outcome. In the indulging and dwelling conditions, participants had to mentally elaborate either four positive future outcomes or four reality aspects. Two weeks later, when asking the teachers how well participants did in class, those in the mental-contrasting condition had exerted effort and earned grades according to their expectations of success: Those with high expectations were the most energized, showed the most effort, and earned the highest grades, while those with low expectations showed the reverse pattern of results. Students in the indulging and dwelling conditions scored in between regardless of whether their expectations of success were high or low.

Experimental studies replicated these findings in a variety of domains: studying abroad (Oettingen et al., 2001), acquiring a foreign language (Oettingen, Hönig, & Gollwitzer, 2000), meeting a potential romantic partner, completing one's doctoral degree and raising a child (Oettingen, 2000), reducing cigarette consumption (Oettingen, Mayer, & Thorpe, 2010), and solving interpersonal problems (e.g., getting along with one's roommate; Oettingen et al., 2001). Cognitive (e.g., making plans), affective (e.g., feeling responsible), motivational (e.g., anticipating disappointment in case of failure), and behavioral indicators of goal attainment (e.g., investing effort, time, money) were measured subjectively and objectively (e.g., content analysis, observations), right after the experiment or weeks and months later.

Across experiments, mental contrasting helped conserve resources: Participants invested much when the attainment of the future was likely and little when it was unlikely.

As a self-regulation (vs. motivational) strategy, mental contrasting does not change expectations of success, but activates them and translates them into respective goal pursuit. In two experiments, Oettingen, Marquardt, and Gollwitzer (2012) investigated whether mental contrasting transforms expectations into heightened effort and performance even if they are induced in situ via positive feedback. Using a creativity task to provide bogus feedback to student participants, they observed that mental contrasting increased creative performance after positive feedback rather than after moderate feedback. By manipulating expectations through bogus feedback, the Oettingen et al. (2012) studies account for third-variable explanations of mental-contrasting effects on expectancy-dependent goal pursuit. They also suggest that mental contrasting will help translate positive situational feedback into heightened performance.

*Processes of Mental Contrasting.* Mental contrasting affects behavior through changing cognitive and motivational processes as well as through changing responses to negative feedback. In terms of cognitive processes, mental contrasting modulates the mental associations between future and reality and between reality and the means to overcome or circumvent the reality. In addition, it shifts the meaning of reality so that it can be interpreted as an obstacle. In terms of motivational processes, mental contrasting changes feelings and physiological indicators of energy. And finally, mental contrasting changes the way people respond to negative feedback; negative feedback is processed as useful information without impairing an individual's self-confidence.

MENTAL ASSOCIATIONS. Mental contrasting works by affecting the mental associations of future and reality (Kappes & Oettingen, 2014). It strengthens the association between future and reality when expectations are high, while it weakens this association when expectations are low. The future-reality associations in turn mediate the link between expectations and subjective as well as other-rated goal pursuit. Interestingly, mental contrasting's effects on future-reality associations vanished after feedback that the desired future had been attained; they were no longer needed.

Similar mental associations emerge between reality and the behavior instrumental to overcoming the present reality toward the desired future. Mental contrasting paired with high expectations of success leads to strong associations; paired with low expectations, it leads to weak associations.

Again, no such effects are observed in the control groups (e.g., reverse contrasting, content control). The strength of the mental associations mediated mental-contrasting effects on goal pursuit (e.g., commitment, persistence, and observed performance).

OBSTACLE IDENTIFICATION. FRT assumes that mental contrasting affects goal pursuit by redefining reality as an obstacle to attaining a particular future outcome. To study this process, Kappes et al. (2013) assessed explicit evaluation of reality (Study 1), implicit categorization of reality as an obstacle (Study 2), and detection of an obstacle (Study 3). They observed that mental contrasting (versus relevant control groups) heightened the interpretation of reality as an obstacle when expectations of success were high but lowered it when expectations of success were low. And again, the meaning of reality as an obstacle mediated mental-contrasting effects on goal pursuit. These results imply that mental contrasting affects goal pursuit by changing the meaning of a person's reality.

ENERGIZATION. Identifying the present reality as an obstacle is not enough to reach the desired future; one also needs the energy to deal with the obstacle. Mental contrasting increases energy for people with high expectations while decreasing it for people with low expectations, whether measured by self-report (e.g., "How energized do you feel?") or via systolic blood pressure (SBP; Oettingen et al., 2009). By lowering energy, mental contrasting allows people with low expectations of success to turn to alternative, more promising projects. Importantly, energization mediates the relation between expectations and goal pursuit (e.g., commitment, actual performance; Oettingen et al., 2009; Sevincer, Busatta, & Oettingen, 2014).

DEALING WITH NEGATIVE FEEDBACK. Feedback may originate from a parent, a peer, or a teacher, or from people one encounters during daily life. Negative feedback, more than positive feedback, provides useful information for attaining one's goal effectively. However, often negative feedback is poorly processed and hardly remembered (Sedikides & Green, 2009). It may be interpreted as threatening and may lower people's confidence (Nease, Mudgett, & Quiñones, 1999). Mental contrasting allows people to respond effectively to such negative feedback (Kappes, Oettingen, & Pak, 2012). When expectations of success are high, mental contrasting promotes the processing of negative feedback, and in turn leads participants to form plans to best solve the given task. It also preserves one's confidence in the face of very strong (normative) negative feedback, and it facilitates optimistic attributions of such feedback. Altogether, these findings imply that mental contrasting can be used to help adolescents reap the benefits of negative

feedback. As mental contrasting is an easy-to-apply, time- and cost-effective strategy, it may be a helpful tool to master one of the most difficult tasks in an adolescent's life: learning from criticism and carrying on in spite of it.

***Mental Contrasting as a Meta-Cognitive Intervention.*** The observed benefits of mental contrasting on pursuing goals and processing critical feedback raises the question of whether it can be used as a meta-cognitive strategy that involves thinking about one's own thinking (Flavell, 1979). If so, adolescents could apply mental contrasting to select and effectively pursue their own personal wishes, and parents and educators could adopt the strategy to improve their relationships with them.

A series of intervention studies speaks to whether mental contrasting can be taught and effectively used as a meta-cognitive strategy. In one study, middle-level managers working in hospitals were taught how to apply mental contrasting versus indulging regarding solving everyday life problems. In comparison to those who indulged in a desired future, those who mentally contrasted the desired future with obstacles of reality were subsequently more successful in setting priorities and managing their time (Oettingen, Mayer, & Brinkmann, 2010). Mental contrasting was also useful for finding integrative solutions in a bargaining game (Kirk, Oettingen, & Gollwitzer, 2011). Pairs of participants were asked to effectively negotiate with each other over buying/selling a car. For each pair, there was a buyer and a seller, and buyer and seller were asked to maximize their gains, which was facilitated by coming up with integrative solutions (e.g., regarding color of the car, price, audio system). Pairs in the mental-contrasting condition reached the highest combined gains compared to those in the relevant control conditions (indulging, dwelling, and no treatment control). The agreements in the mental-contrasting condition were also more equitable to both partners than those in the other three conditions.

Mental contrasting leads to selective goal pursuit: People with high expectations engage fully, whereas people with low expectations disengage from futile endeavors, thus saving energy, time, and other resources for more promising projects. Sometimes, however, interventions aim for full engagement of all participants (e.g., doing homework). In these cases, participants must have high expectations when they mentally contrast. As discussed earlier in the chapter, one way to guarantee high expectations is to instill high expectations in situ by applying positive performance feedback (Oettingen et al., 2012). Another way is to provide participants with a novel task so no preexisting experiences will interfere with the assumption of success

(A. Gollwitzer, Oettingen, Kirby, Duckworth, & Mayer, 2011). And third, participants may generate a personal wish or concern of their own that is challenging yet feasible (Oettingen, 2012).

Applying the second of the three possibilities, A. Gollwitzer et al. (2011) showed in two studies that mental contrasting facilitated language acquisition in elementary school children and middle school adolescents. Second and third graders in Germany and fifth graders in the United States were asked to learn a vocabulary in a foreign language (English for the German children) or to learn to say "thank you" in ten different languages (adolescents in the United States). Using mental contrasting to learn the foreign language words facilitated the acquisition of new vocabulary more than indulging.

An intervention study aimed at heightening physical activity applied the third option mentioned earlier. Members of a fishing club in northern England completed a postal questionnaire in which a mental-contrasting procedure geared at improved physical activity was either embedded or not (Sheeran, Harris, Vaughan, Oettingen, & Gollwitzer, 2013). When participants were called by phone one month and seven months post baseline, those who received the mental-contrasting questionnaires (vs. the control) reported to be more physically active. Longitudinal, explanatory, and intention-to-treat analyses each indicated that mental contrasting was effective in enhancing rates of physical activity at both points in time. In another intervention study, students interested in losing weight listed specific weight-related wishes. They then mentally contrasted or indulged in fulfilling these wishes (Johannessen, Oettingen, & Mayer, 2012); no treatment was given to a third group. Compared to participants in the indulging or no treatment conditions, those in the mental-contrasting condition reported having consumed fewer high-calorie and more low-calorie foods. Importantly, the effects transferred into the exercise domain: Mental contrasting of the diet wishes also helped students increase their physical activity compared to participants in the other two conditions.

*Summary.* Mental contrasting is a self-regulation strategy that facilitates both engagement with and disengagement from desired futures – depending on a person's expectations of successfully attaining the envisioned future. It changes behavior by affecting nonconscious cognition (e.g., mental associations, interpretation of reality), energization (e.g., feelings, systolic blood pressure), and dealing with negative feedback constructively (e.g., processing of relevant information, protection of subjective competence). Thus, mental contrasting is a conscious strategy that produces changes in implicit

cognition and energization that mediate behavior change (e.g., effort, successful performance). A person who uses mental contrasting engages in promising goals and disengages from futile ones, thereby conserving resources for improving everyday life and long-term development. Mental contrasting can be easily taught and used as a meta-cognitive strategy in various life domains, such as excelling in academics, preserving health, managing time, resolving conflict, and negotiating with others.

### Implementation Intentions

Even when people are fully engaged in reaching a desired future, they may still need additional help in attaining their goals. Explicitly planning out in advance how to master particular challenges on the way to reaching the desired future turns out to be very helpful. Specifically, Gollwitzer (1993, 1999) suggested forming implementation intentions (i.e., if-then plans) that specify, "If critical situation X is encountered, then I will perform the goal-directed response Y!" Returning to the example at the beginning of the chapter, the son of our friend might form the following implementation intention to attain the goal of being more attentive in class: "If someone starts talking to me, then I'll say: 'Let's talk after class!'" Forming implementation intentions raises the rate of goal attainment. A meta-analysis based on close to a hundred studies pertaining to attainment of goals in various life domains showed a medium to large effect size ($d = .61$; e.g., achievement, health, environmental, egalitarian, prosocial, and consumer goals; Gollwitzer & Sheeran, 2006).

*Processes of Implementation Intentions.* Implementation intentions facilitate goal attainment based on mechanisms relating to the anticipated situation (the if-part) and the mental link created between the if-part and the then-part of the plan. For instance, in a dichotic listening task paradigm, Achtziger, Bayer, and Gollwitzer (2012) observed that words describing the anticipated situation presented to the non-attended ear disrupted the focused attention (i.e., performance in repeating the words presented simultaneously to the attended ear decreased in implementation-intention participants). The heightened accessibility of the anticipated critical situation (see also Parks-Stamm, Gollwitzer, & Oettingen, 2007) partially mediated the effects of implementation intentions on goal attainment (Aarts, Dijksterhuis, & Midden, 1999). Further studies showed that forming implementation intentions also links the specified cue to the respective goal-directed response (Webb & Sheeran, 2007, 2008). These associative links (mental associations) are quite stable over time (Papies, Aarts, & de Vries, 2009),

and mediation analyses suggest that both the accessibility of the cue and the strength of the cue-response link mediate the impact of implementation-intention formation on goal attainment (Webb & Sheeran, 2007, 2008).

Gollwitzer (1999) argues that the strong associative links (critical situation with goal-directed response) generated by forming implementation intentions facilitate the initiation of goal-directed responses by automating action initiation; it becomes immediate, efficient, and no longer needs a conscious intent. That is, if-then planners act fast (e.g., Gollwitzer & Brandstätter, 1997, Experiment 3), deal with cognitive demands effectively (e.g., speed-up effects are observed even under high cognitive load; Brandstätter, Lengfelder, & Gollwitzer, 2001), and implementation-intention effects are observed even when the critical cue is presented subliminally (Bayer, Achtziger, Gollwitzer, & Moskowitz, 2009).

The mechanisms underlying implementation-intention effects (enhanced cue accessibility, strong cue–response links, automated responses) allow if-then planners to effectively detect and seize opportunities to move toward desired futures. Making if-then plans thus strategically automates goal striving; people intentionally make if-then plans that in turn delegate control of goal-directed behavior to preselected situational cues (Gollwitzer, 2014). This delegation hypothesis has also been supported by studies that assessed brain activity using EEG (e.g., Gallo, Keil, McCulloch, Rockstroh, & Gollwitzer, 2009, Study 3) and fMRI (e.g., Gilbert, Gollwitzer, Cohen, Oettingen, & Burgess, 2009).

*Overcoming Typical Problems of Goal Striving.* Implementation intentions help meet the four major challenges of goal striving: getting started, staying on track, disengaging from futile goals and faulty methods, and avoiding resource depletion (summaries by Gollwitzer & Oettingen, 2011; Gollwitzer, 2014). With respect to the first problem, implementation intentions helped individuals get started with goal striving in terms of remembering to act (e.g., adolescents better remembered to take contraceptive pills and prospectively acquired condoms; Martin, Sheeran, Slade, Wright, & Dibble, 2009). Moreover, regular dental care can be facilitated when adolescents form respective implementation intentions (e.g., heightened compliance with wearing intraoral elastics; Veeroo, Cunningham, Newton, & Rayess, 2014; regular tooth brushing in Iranian adolescents; Hajiagha & Saffari, 2012), and Chinese adolescents are more effective in translating their exercise goals into action when they make plans specifying when and where to engage in physical exercise (Cao, Schüz, Xie, & Lippke, 2013).

With respect to the second problem, implementation intentions can be used to effectively protect ongoing goal striving from a wide range of disruptions, both internal (e.g., general anxiety; Varley, Webb, & Sheeran, 2011; performance anxiety; Stern, Cole, Gollwitzer, Oettingen, & Balcetis, 2013) and external (e.g., sleep procrastination; Loft and Cameron, 2013; distracting video clips; Gollwitzer & Schaal, 1998; Wieber, von Suchodoletz, Heikamp, Trommsdorff, & Gollwitzer, 2011; offering cigarettes to adolescents trying to prevent smoking; Conner & Higgins, 2010). These implementation intentions can come in various formats. For example, if an adolescent wants to persist in studying even though her peers start playing games, she can form suppression-oriented plans, such as "And if my friends ask me to join them, then I will not get distracted!" The then-component of such suppression-oriented plans may alternatively specify a replacement behavior (". . ., then I will say, please let me focus on my work!") or it may focus on ignoring the critical cue (". . ., then I'll ignore their request!"). When one wants to control bad eating habits (Adriaanse, Van Oosten, De Ridder, De Wit, & Evers, 2011), implementation intentions to negate the distraction are less effective than the latter two (i.e., replacing and ignoring it).

Implementation intentions protect ongoing goal striving not only by directly targeting the disruption but also by stabilizing the order of steps to be taken; such plans effectively block the disruptive effects created by inappropriate moods or ego-depletion (e.g., Bayer, Gollwitzer, & Achtziger, 2010). In line with these findings, Webb et al. (2012), conducting studies on risk-taking behavior, observed that implementation intentions reduce the detrimental effects of unpleasant mood and arousal whether the plans aimed at controlling the negative mood/heightened arousal or directly targeted the risk-taking behavior.

When goals or means are no longer feasible and/or desirable, goal striving should be adjusted or disengaged from. Implementation intentions can be used to solve this problem by specifying negative feedback as a critical situation and linking this situation to switching to an alternative goal or means (Henderson, Gollwitzer, & Oettingen, 2007). Finally, implementation intentions can also prevent overextending oneself because they induce automated goal striving that does not require deliberate effort. Therefore, the person does not become depleted (Muraven & Baumeister, 2000). Indeed, in studies using different ego-depletion paradigms (e.g., Webb & Sheeran, 2003), participants who used implementation intentions to self-regulate in a first task did not show reduced self-regulatory capacity in a subsequent task.

*Critical Tests of Implementation-Intention Effects.* Goal striving is sometimes extraordinarily hard. For example, goal striving is hard (1) when a person's knowledge and skills constrain performance, (2) when a competitor limits one's performance, and (3) when the desired behavior (e.g., not snacking) conflicts with habits favoring antagonistic responses. In all three situations, implementation intentions are beneficial. First, when knowledge and skills constrain performance, simple implementation intentions (i.e., if-then instructions to be confident) were found to enhance adolescents' performance on the Raven intelligence test (Bayer & Gollwitzer, 2007).

Second, when an opponent limits performance, a study with tennis players in competitive tennis tournaments showed that implementation intentions helped cope effectively with critical situations during the game (Achtziger, Gollwitzer, & Sheeran, 2008). Similar results emerged when pairs of negotiators used implementation intentions (e.g., when a common resource had to be distributed; Trötschel & Gollwitzer, 2007; or anger had to be regulated when unfair offers were received in an ultimatum game; Kirk, Gollwitzer, & Carnevale, 2011).

Third, the self-regulation of goal striving becomes particularly difficult when habits conflict with appropriate goal-directed responses (e.g., Wood & Neal, 2007). In studies on snacking behavior, if-then plans that spelled out a response contrary to the habitual response of snacking have been found to be effective in Dutch college students (Adriaanse et al., 2011) and Iranian adolescent girls (Karimi-Shahanjarini, Rashidian, Omidvar, & Majdzadeh, 2013). Other habitual responses are automatic cognitive biases, such as stereotyping; these can get in the way of the goal to be fair. Implementation intentions designed to counter automatic stereotypes (e.g., "When I see a black face, I will then think 'safe'") reduced automatic stereotyping (Stewart & Payne, 2008) and its behavioral expression (Mendoza, Gollwitzer, & Amodio, 2010).

Forming implementation intentions can also control primed behavioral responses (Gollwitzer, Sheeran, Trötschel, & Webb, 2011). Doing research on binge drinking in adolescents, Rivis and Sheeran (2013) found that priming the binge drinker stereotype (i.e., binge drinkers are outgoing, fun-loving, cheerful, and friendly) increased the frequency of binge drinking assessed over the period of one month in 16-year-old high school students; however, this effect was no longer evident when the students were induced to form implementation intentions to take an outside observer's perspective whenever the urge to binge occurred.

Armitage, Rowe, Arden, and Harris (2014) recently proposed to form an alternative type of implementation intention to counter habitual (or primed) unwanted responses. Rather than specifying an antagonistic response that could outrun the habitual (or primed) response, the authors had adolescent alcohol drinkers who wanted to reduce their alcohol consumption form implementation intentions to engage in self-affirmation (then-component) whenever health-related anxiety was experienced (if-component). When the researchers provided a health risk message designed to reduce alcohol consumption, participants processed the information without much defensiveness and in turn significantly reduced their drinking.

*Summary.* Forming implementation intentions is a self-regulation tool that links goal-directed responses to critical situational cues. As a consequence, when the critical situation is encountered, the specified response is executed immediately, effortlessly, and without conscious intent. That is, if-then planners can strategically delegate their response to critical situational cues. Importantly, individuals who have low executive control resources (ECR) will also benefit from forming implementation intentions (Hall, Zehr, Ng, & Zanna, 2012). In line with these findings, implementation intentions help children with attention deficit hyperactivity disorder (ADHD) by improving both their inhibitory functions (e.g., Gawrilow & Gollwitzer, 2008; Gawrilow, Gollwitzer, & Oettingen, 2011a) as well as their ability to delay gratification (Gawrilow, Gollwitzer, & Oettingen, 2011b).

## MCII as a Meta-Cognitive Intervention

Mental contrasting and implementation intentions have been combined to form a meta-cognitive strategy called MCII (Oettingen, 2012). The two self-regulation tools support each other. Mental contrasting of feasible wishes creates nonconscious associations between reality and instrumental means. Explicitly forming implementation intentions strengthens this association even further. Implementation intentions in turn benefit from mental contrasting. Mental contrasting creates energization and goal commitment, which are prerequisites for implementation intentions to achieve their effects (Sheeran, Webb, & Gollwitzer, 2005). In addition, mental contrasting helps identify personal obstacles and the appropriate means to attain the desired future; the obstacle can then be used as the if-component and the instrumental means as the then-component of an implementation intention. In sum, *if-then* plans in MCII may be framed as: If . . . [obstacle], then I will . . . [response] to overcome or circumvent the obstacle.

*MCII Is More Effective Than MC and II.* MCII is more effective than mental contrasting or forming implementation intentions alone. Using the integrative bargaining paradigm described earlier in the chapter, Kirk, Oettingen, and Gollwitzer (2013) asked the negotiating pairs to either engage in MCII, to only mentally contrast, or to only form implementation intentions. Those who were taught MCII achieved the best integrative performance (i.e., the highest combined gain) followed by participants who either engaged in mental contrasting or implementation intentions alone. Importantly, participants formed more cooperative and integrative plans when they had engaged in MC beforehand than when the plans were made without being prepared by mental contrasting.

MCII also was more effective in breaking bad habits (i.e., unhealthy snacking) than mental contrasting or forming implementation intentions alone (Adriaanse, Oettingen, Gollwitzer et al., 2010). Student participants in the MCII condition consumed fewer unhealthy snacks than participants in a control condition who thought about and listed healthy snack options, and they were more effective in breaking bad snacking habits than participants in both the mental-contrasting condition and the implementation-intention condition. Mental contrasting also helped participants clarify their personal obstacles standing in the way of breaking their snacking habit (e.g., mindless eating; feeling stressed out) that then could be effectively used as cues in the implementation intentions (e.g., if I catch myself eating mindlessly, then I will drink a glass of water). In line with these findings, when Adriaanse, de Ridder, and de Wit (2009) compared implementation intentions that were personalized vs. kept general (i.e., pertained to participants' personal problems vs. a general problem), the personalized plans were more effective.

In an intervention study, high school students scheduled to take the fall Preliminary SAT were given the MCII exercise before the summer, while students in the control group had to write an essay on an influential person or event in their life (Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011). Participants in both groups received Barron's 12th edition of *How to prepare for the PSAT workbook*. As part of the MCII exercise, participants wrote down two positive outcomes they associated with completing all of the practice tests in the workbook (e.g., feeling "relieved," "calm," "well prepared") and two obstacles of present reality (e.g., being "tired," being in "vacation mode," "wanting to hang out with friends") that could interfere with this task. Thereafter, they rewrote the first positive outcome, imagined it "as vividly as possible," and wrote their thoughts and images down. They did the same for the first obstacle, the second positive outcome, and the second obstacle.

Students then generated a solution to deal with each obstacle. Specifically, they completed two if-then plans (i.e., implementation intentions) in the following way: 'If [obstacle], then I will [action].' The workbooks were collected in October right after students had taken their PSAT. MCII helped in preparing for the PSAT: Students in the MCII condition completed 60% more questions in their workbooks than did control-participants.

MCII also helped resolve school-related concerns in young adolescents at risk and not at risk for ADHD (Gawrilow, Morgenroth, Schultz, Oettingen, & Gollwitzer, 2013). Those who applied MCII to their most pressing school-related concerns (e.g., trying to be more attentive in French class) benefited more from MCII than from a mere learning style intervention; the benefits of MCII were particularly pronounced for children at risk for ADHD. When parents rated how their children managed their school-related tasks (e.g., homework done, vocabulary learned, desk tidied) over the period of two weeks, the more ADHD symptoms the children showed before the intervention, the more they benefited from the MCII intervention.

In economically disadvantaged young adolescents (Duckworth, Kirby, A. Gollwitzer, & Oettingen, 2013), MCII helped improve attendance, conduct, and grade point average (GPA). From official report cards of the first and second quarters, attendance, conduct, and GPA were recorded. At the start of the third quarter, children were randomly assigned to either complete the MCII or a positive-thinking control exercise regarding their most important school-related wishes and concerns. Trained interventionists instructed children in groups of 4 to 5 for one hour. At the end of the third quarter, attendance, conduct, and GPA were recorded again. Children taught how to apply MCII (vs. control) improved their school attendance, conduct, and GPA.

An important developmental task in adolescents is the regulation of romantic relationships. In romantic relationships, MCII reduced anxiety as expressed in insecurity-based behaviors (e.g., checking the partner's e-mails to assure oneself of the partner's loyalty; Houssais, Oettingen, & Mayer, 2013). Students in the MCII condition reported fewer insecurity-based behaviors than those in two control conditions (reverse contrasting and no-treatment). At the same time, participants in the MCII condition felt more committed to their partner.

*Summary.* MCII is a self-regulation tool that is more effective in changing people's behavior than either mental contrasting or implementation intentions alone. MCII is cost- and time-effective to learn and apply, and it benefits adolescents facing complex everyday obstacles such as ADHD or

socioeconomic disadvantages. Instructions on how to apply MCII can be found at http://www.woopmylife.org and in Oettingen (2014).

## Self-Regulation: Individual Differences

In this chapter we have focused on describing the scope of self-regulation strategies and understanding the processes of mental contrasting and implementation intentions as well as their combination. But there are also personality perspectives on self-regulation. These, for example, pertain to the conscientiousness factor of the Big Five personality model, which encompasses dependability, punctuality, and orderliness (McCrae & Costa, 1987). Alternatively, Duckworth (2009) distinguishes between the personal attributes of grit and self-control. Grit is the tendency to maintain interest and effort regarding long-term goals; it is measured by statements like "I am a hard worker," and "I finish whatever I begin." Self-control is the regulation of behavioral, emotional, and attentional impulses in the face of temptations or diversions; it is measured by statements like "My mind wandered when I should have been listening," and "I talked back to my teacher or parent when I was upset" (Duckworth & Carlson, 2013). Grit and self-control predict successful performance over and above measures of IQ, SAT, or other standardized achievement scores or physical fitness scores. For example, high levels of grit and self-control predicted surviving the first summer of training at West Point and reaching the final rounds of the National Spelling Bee, retention in the U.S. Special Forces as well as graduation from Chicago public high schools. Self-control predicts changes in report card grades over time better than do measures of intelligence (Duckworth, Quinn, & Tsukayama, 2012).

## Conclusion

One central task for adolescents is to build a future that is safe and beneficial for themselves and for others, and that can be the basis for their long-term development. A first step to help adolescents with this task is to provide them with energy and direction by strengthening both the incentive value of responsible actions (desirability), as well as their expectations of success (feasibility). But beyond high desirability and feasibility, when facing resistance and conflict (e.g., obstacles, temptations), adolescents will benefit from self-regulation tools guaranteeing that they actually follow through (e.g., graduating from high school, caring for others, taking responsibility in

the community). The self-regulation tools of mental contrasting and form-
ing implementation intentions, and the combination of the two (MCII), can
support adolescents in attaining their desired futures by overcoming obsta-
cles and setbacks. Children and adolescents from different backgrounds and
cultures can easily learn how to apply MCII as a metacognitive strategy that
benefits their everyday life and long-term development.

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