# Future Thought and the Self-Regulation of Energization

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## 21.1 Future Thought and Cardiovascular Response

It is a widely held belief of the American popular culture and a credo of the self-help literature that thinking positively about attaining desired future events will help people realize those events, for example, by energizing them to invest the necessary effort to pursue the events (Ehrenreich 2009). In this chapter, we present evidence suggesting that thinking positively about realizing desired futures, if it comes in the form of positive fantasies, may actually be detrimental for effort exertion as it leads to a decreased bodily mobilization of energy. This decreased physiological energization is reflected in a dampened response of the cardiovascular system, which supplies the body with energy in form of oxygen and nutrients. According to fantasy realization theory (FRT; Oettingen 2000, 2012), however, positive future fantasies can be used to wisely self-regulate effort expenditure for pursuing desired futures if they are mental contrasted with the present reality. Indeed, we will present research suggesting that mental contrasting a desired future with present reality can be used as a self-regulation strategy leading to increased or decreased energization, depending on people's expectations of realizing the desired future. Such selective effort mobilization assures that people mobilize enough resources when realizing a desired future is possible and save their resources when realizing the future is impossible. Moreover, recent studies suggest that the energy mobilized by mental contrasting the desired future of solving a given task may even be used to fuel effort in a task unrelated to the desired future targeted by mental contrasting. We will discuss these findings in relation to other models of physiological self-regulation, such as motivational intensity theory (Brehm and Self 1989; Gendolla et al. 2013), the biopsychosocial model of arousal (Blascovich and Tomaka 1996), and excitation transfer theory (Zillmann 1983). Finally, we will line out implications for designing interventions geared at improving peoples' self-regulation of effort.

### 21.1.1 Positive Fantasies About the Future

Positive fantasies about the future are free thoughts and images about desired future events that appear in people's stream of consciousness (Oettingen and Mayer 2002). The depicted events are independent of people's experiences in their reality. A person who is very shy may, for example, envision herself giving a barnstorming speech in front of an absorbed audience or

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walking straight up to her crush to ask for a date. Positive fantasies need to be distinguished from other forms of thinking positively about the future such as beliefs or judgments about whether the desired future events will actually occur (i.e., expectations of success), or as William James noted: "Everyone knows the difference between imagining a thing and believing in its existence" (James 1890, p. 283). In contrast to positive fantasies, people's expectations (i.e., their estimated likelihood of whether the desired future events will be realized) are grounded on their past performance history. Past successes (e.g., having given an excellent presentation) strengthen people's expectations about their future performance; past failures (e.g., having flunked a test) weaken their expectations (Bandura 1997). Precisely because people estimate their expectations on the basis of their past performance, people's estimated expectations provide a valid basis for their future performance. In line with this contention, research consistently showed that positive (vs. negative) expectations predict successful performance (reviews by Bandura 1997; Heckhausen 1991; Seligman 1991).

Because positive fantasies are independent of peoples' past performance, their predictive value for future performance is less obvious. Indeed, Oettingen and Mayer (2002) hypothesized that positive fantasies may actually be detrimental for successful performance, because they may lead people to mentally enjoy the desired events in the here and now (e.g., vividly imagining oneself being awarded one's degree at the graduation ceremony). Doing so may prevent people from mobilizing the effort to actually make the events come true. To test their predictions, in one study, Oettingen and Mayer (study 1) measured fantasies about transition into work life among university graduate students: Students were asked how frequently during their everyday life they had experienced positive and negative, respectively, thoughts, images, or fantasies about graduating from university and getting a job. To obtain an estimate of the extent to which students experienced positive rather than negative fantasies, the researchers subtracted reported frequency of negative fantasies from that of positive fantasies. The researchers also measured students' expectations about transition into work life by asking them how likely they thought it was that they would find an adequate job in their field. Two years later, students were contacted again. In line with earlier findings, students with positive rather than negative expectations had received more job offers and earned higher salaries. As Oettingen and Mayer predicted however, the reverse pattern emerged with respect to positive fantasies: Students who frequently experienced positive rather than negative fantasies had received fewer job offers and earned lower salaries.

Moreover, positive fantasies about attaining the desired events also predicted lower success in starting a romantic relationship in students with a crush on a peer and lower academic success in students anticipating an exam (Oettingen and Mayer, studies 2 and 3). They also predicted slower recovery in patients who had undergone hip replacement surgery (Oettingen and Mayer, study 4), and poorer weight loss in obese patients (Oettingen and Wadden 1991). The pattern emerged for short-term and long-term pursuits, subjective and objective indicators of successful performance, different measures of fantasy (self-reported and semi-projective), and samples of different age groups and cultures (Germany and the USA). As mentioned above, Oettingen and Mayer suspected that positive fantasies are detrimental to performance because they lead people to mentally consume the desired events in their present reality and doing so should keep them from investing the necessary effort to actually pursue the events. If this assumption were true, then the impeding effect of fantasies on effort should prevent the body from mobilizing the necessary resources for effort expenditure and this process should be reflected in a physiological response.

### 21.1.2 Measuring Energization by Physiological Indicators

Traditionally, energization plays a key role in allowing people to pursue and realize desired events (Brehm and Self 1989; Klinger 1975).

Hull (1943) described variations in behavior as a function of two variables: direction and intensity. Direction specifies whether people approach a certain positive outcome or avoid a negative one (Atkinson 1957; Elliot 2006; McClelland 1985), and intensity refers to the force or vigor with which they do so. According to Hull's drive theory (Hull 1943), the intensity of behavior is determined by the current need state of the organism (e.g., the hours the organism is deprived of food). Unsatisfied needs activate a drive, which in turn energizes behavior. In this vein, energization has also been described as excitation, arousal, or activation (Cannon 1915; Duffy 1934). To fuel the intensity of behavior (e.g., to initiate a fight or flight response, to maintain physical exercise, or to initiate need-satisfying behavior), the organism needs to mobilize energy. In addition to bodily need states (e.g., hunger, thirst; Hull 1943), energization can be caused, for example, by drugs, threatening or novel stimuli, stimuli that prime an action mindset (words such as "action," "go"; Gendolla and Silvestrini 2010), performing difficult tasks, as well as simply thinking about upcoming challenges (e.g., when people anticipate that they will perform difficult arithmetic tasks; Contrada et al. 1984):

The mobilization of energy or bodily resources is associated with the sympathetic branch of the autonomous nervous system (ANS; Brownley et al. 2000). According to Obrist (1981), the most direct indicator of energy mobilization for effort expenditure is beta-adrenergic sympathetic discharge to the heart. Beta-adrenergic discharge directly heightens the force with which the heart contracts (i.e., myocardial contractility). A stronger myocardial contractility in turn increases the volume of blood pumped with a heartbeat (i.e., stroke volume). Stroke volume (SV) and heart rate (HR—the number of heartbeats per time unit) determine cardiac output—the total amount of blood transported through the vessels to supply the body with resources such as oxygen and nutrients per unit of time.

Because cardiac output directly potentiates systolic blood pressure (SBP—the maximum pressure exerted by the blood against the vessel walls) SBP can be used as a noninvasive proxy of energy mobilization (Wright 1996; Wright and Kirby 2001). It should be noted though that in addition to cardiac output, SBP is influenced by total peripheral resistance (TPR)—the resistance of all peripheral vasculature or diameter of the blood vessels. Peripheral resistance is unsystematically linked to sympathetic discharge, that is, sympathetic discharge may constrict some vessels and dilate others. However, even though sympathetic discharge *unsystematically* increases or decreases peripheral resistance, because it *systematically* increases cardiac output and cardiac output directly potentiates SBP, SBP is a reliable proxy for energy mobilization (Wright 1996). Indeed, a multitude of studies has successfully used SBP as an indicator of energy mobilization for effort expenditure (Wright and Kirby 2001).

Other noninvasive cardiovascular measures, such as diastolic blood pressure (DBP, the minimum pressure of the blood against the vessel walls) and HR, are less reliably linked to energization because they are also strongly influenced by other factors (e.g., DBP is, for example, mainly influenced by peripheral resistance and HR is influenced by parasympathetic activity). Therefore, to investigate whether positive fantasies lead to a decreased energy mobilization, Kappes and Oettingen (2011) experimentally induced positive fantasies and thereafter assessed participants' energization by changes in their SBP.

## 21.2 Positive Fantasies About the Future Dampen Energization

To test their hypothesis that positive future fantasies lead to a reduced energy mobilization that is manifested in a dampened cardiovascular response (measured by SBP), Kappes and Oettingen (2011) conducted two experiments. In two additional experiments, they assessed self-reported feelings of energization.

In the first study, female participants were led to positively fantasize about looking admirable in high-heeled shoes. High-heeled shoes are typically perceived as a fashion item that is associated with elegance and attractiveness (Kaiser 1996). Participants were either told to imagine being

glamorous and admired for wearing high-heels (e.g., imagining how men would turn their heads when they would walk by; positive fantasy condition) or they were told to question whether they would actually look so glamorous and attractive in high heels (e.g., imagining how difficult it is to walk in high heels and how easily they might stumble; questioning fantasy condition). SBP was measured before and after participants fantasized about wearing high heels. As predicted, whereas participants' SBP remained stable in the questioning fantasy condition, it decreased in the positive fantasy condition.

In another study, Kappes and Oettingen (study 4) explored a context variable that may influence the link between positive fantasies and energization: whether the fantasies pertained to a currently pressing need. The researchers suspected that because satisfaction of a current need decreases energy expenditure (Atkinson and Birch 1970), fantasies that are directed at satisfying a currently pressing need would be particularly de-energizing. Participants were undergraduates at New York University. As this university is highly competitive, the researchers assumed that its students generally would have a high need for achievement. To satisfy that need for achievement, in half of the student participants a more pressing need was induced (Atkinson and Birch 1970; Blankenship 1987), the need for water. This was done by asking all participants to consume no food or liquid for at least 4 h prior to the experiment and, moreover, giving them salty crackers to eat at the start of the experiment as part of a bogus taste test. Half of the participants were then offered as much water as they wanted. For these participants the need for water was satisfied and thus the need for achievement could surface again. As predicted, for those participants, who after drinking water were again high in need for achievement, induced fantasies about an achievement-related concern (excelling in an important exam) led to lowered SBP. In contrast, in participants who were still thirsty and thus high in need for water, induced fantasies about satisfying their thirst (drinking an ice-cold glass of water) led to lowered SBP. In short, the effect of positive fantasy on de-energization depended on participants' need state. Positive fantasies decreased energy the most when they pertained to a currently pressing need.

The finding that positive fantasies lead to decreased energy mobilization was replicated in two additional studies where energization was assessed via self-reported feelings (e.g., "how active do you feel right now?"): Participants who were induced positive fantasies about winning an essay contest reported feeling less energized than those who were induced negative fantasies (study 2). In addition, participants who were asked to generate positive fantasies about successfully managing their projects and obligations in the upcoming week reported feeling less energized than those who generated neutral fantasies (study 3). Of importance, the lowered energization in participants from the positive fantasy condition actually resulted in lower success in accomplishing their projects and obligations in the upcoming week.

Across all four studies, the researchers ruled out several alternative explanations for the de-energizing effect of positive fantasies, like for example, the possibility that positive fantasies are easier to generate and/or less irritating than questioning, negative, or neutral fantasies. Including the neutral condition also allowed concluding that whereas positive fantasies decreased energization, negative fantasies increased energization. In sum, the research suggests that positive fantasies lead people to prematurely consume the desired events in their mind and thus conceal the need to mobilize resources for actually making the desired future come true. Accordingly, mentally fantasizing about having realized a desired future led to a demobilization of bodily resources that was manifested in a dampened cardiovascular response. The decreased energization led to low accomplishment and success in realizing the desired future.

## 21.3 Mental Contrasting Future and Reality

As outlined above, positive fantasies about the future are detrimental for energization and successful performance. However, in everyday life, people frequently fantasize and daydream about desired events (Klinger 1990; Singer and Antrobus 1972). If fantasies are ubiquitous but can hamper effort and performance, the question arises as to what can be done to make those fantasies fruitful for successfully pursuing desired futures. FRT (Oettingen 2000, 2012) explores the effect of fantasies on realizing desired futures from a self-regulatory perspective. The theory specifies that positive fantasies can be used to wisely regulate one's pursuit of desired futures if they are mental contrasted with the present reality. When people use the self-regulation strategy of mental contrasting, they first imagine having attained an important desired future (e.g., starting a romantic relationship) and immediately thereafter they imagine the present reality that stands in the way of realizing the desired future (e.g., being shy). Imagining the desired future followed by the present reality should make people recognize that they have not attained the desired future yet and need to overcome the present reality to do so. As a consequence, expectations of attaining the desired future (and overcoming the reality) become activated which then translate into performance. When expectations of successfully reaching the desired future are high, mental contrasting people engage in pursuing the desired future (i.e., they show high determination, effort, and persistence). Conversely, when expectations are low, they disengage from pursuing the desired future (i.e., they show low or no determination, effort, and persistence). Mental contrasting thus causes selective pursuit of desired futures. Selective pursuit of desired futures is adaptive because it saves resources that are inherently limited (e.g., time, energy, and attention; energy conservation principle, Brehm and Self 1989; Silvestrini and Gendolla 2013; Wright 1996): People invest their resources only for endeavors they can realize but refrain from wasting resources for endeavors they cannot realize.

FRT describes three other modes of thought that people use when thinking about desired future events (i.e., personal wishes and concerns): indulging, dwelling, and reverse contrasting. These modes of thought lead to indiscriminate pursuit of desired futures that is not based on expectations. Indulging (i.e., imagining the future only) and dwelling (i.e., imagining the reality only) fail to induce a perception of the reality as standing in the way of the desired future because people unilaterally reflect on the future or the reality. As a consequence, expectations do not become activated and do not translate into goal-directed effort and performance. Mentally elaborating reality before the future (i.e., reverse contrasting) also fails to induce a perception of reality as standing in the way of the future because the future is not a reference point for the reality, and thus the reality cannot be perceived as an obstacle (Oettingen et al. 2001). Therefore, just as after indulging and dwelling, expectations do not become activated and cannot translate into effort and performance.

A series of studies exploring mental contrasting effects on implicit cognition confirmed that mental contrasting (but not the other modes of thought) changed the meaning of participants' subjective reality: These studies suggest that when expectations were high (vs. low), mental contrasting strengthened (vs. weakened) the mental link between the desired future and the present reality as well as between the desired future and the instrumental means to overcome the reality (Kappes et al. 2012). Moreover, when expectations were high (vs. low), mental contrasting but not reverse contrasting led participants to identify idiosyncratic aspects of their reality as obstacles to reaching the desired future Kappes et al. 2013). In sum, when expectations were high, mental contrasting led people to recognize the present reality as an obstacle toward realizing their desired future, when expectations were low, mental contrasting led people to dismiss the reality as an obstacle. The other modes of thought (indulging, dwelling, and reverse contrasting) did not influence how participants understood the meaning of their reality.

The pattern that mental contrasting (vs. indulging, dwelling, and reverse contrasting) leads to selective (i.e., expectancy-based) pursuits of desired futures has been replicated in a multitude of studies. In these studies, effort and performance were assessed by cognitive (e.g., making plans), affective (e.g., anticipated disappointment in case of failure), motivational (e.g., determination), and behavioral indicators (e.g., action initiation). The pattern emerged whether these indicators were measured by self-report or observations, directly after the experiment or weeks later, whether mental contrasting was experimentally induced or unobtrusively observed, and whether expectations were measured or manipulated (Kappes et al. 2012; Johannessen et al. 2012; Oettingen 2000; Oettingen et al. 2001, 2005, 2009, 2010b, c, 2012; Sevincer and Oettingen 2013). As described above, positive fantasies about a desired future exerted their effect on poor performance through reduced energy mobilization. Accordingly, Oettingen and colleagues suspected that the effect of mental contrasting the desired future with reality on selective effort and performance would be mediated by expectancy-dependent energy mobilization, assessed by cardiovascular response (SBP).

### 21.3.1 Mental Contrasting Instigates Expectancy-Dependent Energization

To test the hypothesis that mental contrasting would trigger expectancy-dependent energization which would fuel subsequent effort and performance, Oettingen et al. (2009) conducted two experiments modeled after previous experimental studies that induced mental contrasting. In study 1, participants completed a computer-based questionnaire. First, they were asked to name their currently most important interpersonal wish (they named e.g., "to keep up a friendship"). The researchers then measured participants' expectations of successfully realizing their interpersonal wish ("How likely do you think it is that the named concern will have a happy ending?"). Moreover, because people's energization to realize a wish may also be influenced by the incentive value of the wish (Gendolla et al. 2012; Wright 1996), we assessed participants' incentive value of realizing their wish ("How important is it to you that the named concern will have a happy ending?"). Thereafter, participants listed four aspects of the desired future of realizing their wish (e.g., "having someone to talk to") and four aspects of the present reality that stands in the way of realizing the wish (e.g., "friend lives far away").

Thereafter, participants were led to either mental contrast or indulge about their interpersonal wish. Participants in the mental contrasting condition mentally elaborated and wrote about two aspects of the desired future they had listed and two aspects of the present reality in alternating order beginning with a future aspect; those in the indulging condition in contrast elaborated on and wrote about each of the four listed aspects of the desired future. SBP was assessed twice while participants elaborated the aspects: The first time while participants elaborated the first aspect (T1) and the second time while they elaborated the third aspect (T2). The researchers assessed SBP at the first and third aspects because these aspects were future aspects in both conditions and therefore could be directly compared. The dependent variable was change in SBP during the mental exercise from T1 to T2. Analogous to SBP, participants' DBP and HR were recorded. However, because DBP and HR are less consistently linked to energization than SBP, the researchers did not have as specific hypothesis for DBP and HR. Finally, participants' commitment toward realizing the desired future was measured by self-report (e.g., "How disappointed would you feel if your concern did not come to a happy ending?"). Because strongly committed people show disappointment and frustration when failing to realize the desired events, the degree of disappointment people feel when anticipating failure in wish fulfillment is a reliable indicator for commitment (Oettingen et al. 2001; Wicklund and Gollwitzer 1982).

As predicted, in the mental contrasting condition participants showed expectancy-dependent change in SBP from T1 to T2. When expectations

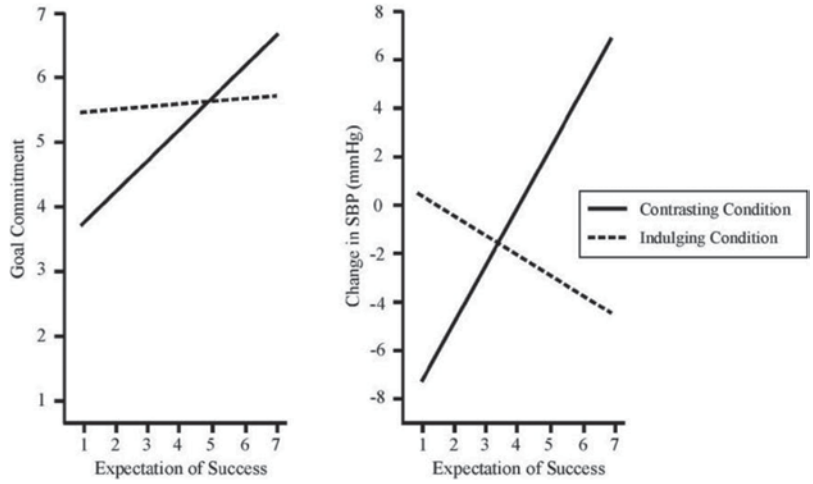


**Fig. 21.1** Regression lines depict the link between expectations and goal commitment (*left*), and expectation and change in SBP in mmHG (*right*) as a function of mental contrasting and indulging. (From: "Mental contrasting and goal commitment: The mediating role of energization," by Oettingen et al. [2009], copyright © 2009 by the Society for Personality and Social Psychology. Reprinted by Permission of SAGE Publications)

were high their SBP increased, when expectations were low it decreased. This pattern indicates that participants who were induced to mental contrast *mobilized* bodily resources when they estimated that they could successfully realize their wish but *demobilized* resources when they estimated that they could not realize their wish. In contrast, indulging participants' SBP did not change (Fig. 21.1). An analogous pattern emerged for self-reported commitment: When expectations were high, mental contrasting participants reported feeling strongly committed to realizing their wish, when expectations were low, they reported feeling only weakly committed. Indulging participants reported feeling moderately committed independent of expectations. Of importance, in mental contrasting participants the effect of expectations on commitment was mediated by change in SBP (Fig. 21.2). DBP and HR were not related to participants' expectations or commitment in neither mental contrasting nor indulging participants.

In study 2, the researchers conceptually replicated the above pattern. They measured energization by asking participants to self-report their feelings of energization. In addition, they observed participants' quality of performance toward realizing their wish. Specifically, they asked economics students to deliver a speech in front of a camera supposedly to help a human resource department develop a measure of professional skills. After students either mental contrasted or indulged about delivering a good speech, they were asked to indicate their subjective feelings of energization by self-report (e.g., "How full of energy do you feel with respect to the upcoming talk?"). As dependent variable, participants' quality of performance in giving the speech


**Fig. 21.2** Change in SBP as a mediator for the relation between expectations and goal commitment in mental contrasting participants. [From: "Mental contrasting and goal commitment: The mediating role of energization", by Oettingen et al. 2009], copyright © 2009 by the Society for Personality and Social Psychology. Reprinted by Permission of SAGE Publications)

was assessed by their subjective self-evaluation and other-rated quality of performance. Mental contrasting participants showed expectancy-dependent energization which predicted their self-evaluated and other observed quality of performance in the talk; indulging participants showed expectancy-independent energization and quality of performance.

In sum, mental contrasting (vs. indulging) a specific wish instigated expectancy-dependent (vs. expectancy-independent) energization (assessed by change in SBP and self-report) which fuelled subsequent performance with regard to realizing that particular wish (measured by commitment and quality of performance). Because energization can be understood as a nonspecific arousal state (Duffy 1934), Oettingen and colleagues suspected that energization triggered by mental contrasting a specific desired future such as solving a given task could even be used to fuel goal-directed behavior with regard to performing a task unrelated to the primary task.

### 21.3.2 Energization Transfer by Mental Contrasting

As mentioned above, energization can be defined as "the extent to which the organism as a whole is activated or aroused" (Duffy 1934, p. 194). In line with this definition, Hull (1943, 1952) conceptualized energization as an unspecific activation or arousal state that indiscriminately fuels behavior: According to Hull's drive theory (Hull 1943, 1952), behavior was spurred by drive, and drive was conceptualized as an undifferentiated, universal energizer that was fuelled by the sum of all current bodily deficits/needs (hunger, thirst, pain, etc.). The nonspecific drive energized behavior, but did not determine its direction. Rather, direction was determined by habit. Habit in turn was influenced by whether the organism had learned that a particular behavior would reduce the drive in a specified situation. Thus, in Hull's conception there was no one-to-one linkage between drive and an associated behavior. The unspecific drive could energize any behavior. Hull termed this principle *irrelevant drive*. In other words, a nonspecific drive state can spur energization that facilitates behavior not primarily directed at reducing the particular bodily deficit that initially brought forth the drive. Drawing on Hull's ideas, Zillmann contented that an irrelevant drive should function analogously to physical energization in that it "indiscriminately 'energizes' and thus facilitates enacted behavior" (Zillmann 1971, p. 422).

Following up on Hull's and Zillmann's conception of energization as an unspecific motor force for behavior, Sevincer and colleagues proposed that mental contrasting a specific desired future such as solving a given task may elicit a general energization state which may then fuel effort in a task unrelated to solving the primary task. To test this proposition, the researchers conducted a series of studies: A first study (Sevincer et al. 2013) tested whether energization effects elicited by mental contrasting persist over time, because to fuel effort in an unrelated task, physiological energization effects should persist after the mental exercise. In two additional studies the researchers then tested the idea that energization (SBP) elicited by mental contrasting about successfully solving a given task (e.g., writing an outstanding essay) may fuel physical and mental effort in an unrelated task (Sevincer et al. 2014 study 1 and 2). All three studies were based on previous research that investigated the effects of mental contrasting on SBP. That is, participants first specified a wish that they would like to realize or a task they would like to solve. After indicating their expectations and the incentive value of realizing the wish, they were induced either to mental contrast or to engage in a control mental elaboration. Energization was assessed by changes in participants' SBP from baseline to after the manipulation.

The first study (Sevincer et al. 2013) investigated whether energization elicited by mental contrasting persists over time. Participants first named their currently most important interpersonal wish (they named e.g., "resolving an argument"), and indicated their expectations as well as the incentive value of realizing it. Then they either mental contrasted or they indulged about fulfilling their wish. After the mental exercise,

participants engaged in two filler tasks. First, they worked on a word-search puzzle for 7 min and second, they worked on a subtask of the WILDE-Intelligence-Test (WIT-2; Kersting et al. 2008) for 13 min. The SPB measurements were taken while participants worked on each filler task. The researchers replicated the results of the previous studies (Oettingen et al. 2009); that is, mental contrasting (vs. indulging) triggered expectancy-dependent energization as assessed by changes in SBP from before to after mental contrasting versus indulging. However, going beyond the previous work, the study showed that participants maintained the expectancy-dependent energization until about 20 min after the mental exercise while they worked on the filler tasks.

Another study (Sevincer et al. 2014, study 1) tested whether energization triggered by mental contrasting one task translated into physical effort in an unrelated task. Participants were undergraduate students who wished to attend graduate school. All participants were presented with the same task: writing an excellent graduate admission essay. They indicated their expectations of writing an excellent essay and the incentive value. Thereafter, participants either mental contrasted about successfully solving their task or they engaged in control elaborations (i.e., indulging in the desired future or elaborating an irrelevant event). To assess physical effort, the researchers measured for how long participants could squeeze a handgrip (Muraven et al. 1998). Performance on this task is a measure of physical stamina, which strongly depends on the mobilization of effort and energy (Hutchinson et al. 2008; Krombholz 1985). As predicted, in the mental contrasting condition, participants' change in SBP and performance on the handgrip task depended on their expectations of writing an excellent admission essay. Mediation analysis showed that the effect of mental contrasting on handgrip performance was mediated by change in SBP from before (baseline) to after the mental exercise. Thus, mental contrasting a given task (i.e., writing an excellent essay) instigated expectancy-dependent change in SBP which translated into physical effort in a task unrelated to the primary task (i.e., squeezing a handgrip).

This pattern was successfully replicated in another study (Sevincer et al. 2014, study 2) with mental effort as the dependent variable. Participants either mental contrasted, indulged, dwelled, or reverse contrasted about excelling in an intelligence test. After the mental exercise, they were presented with an unrelated task: writing a get-well letter to a friend. Their invested effort in writing the letter was assessed by self-report. Mental contrasting but not the three other mental elaborations (indulging, dwelling, and reverse contrasting) instigated expectancy-dependent change in SBP which fuelled effort in the unrelated task: Writing the letter.

In sum, the research presented so far suggests that positive fantasies can be made fruitful for energy mobilization if they are mental contrasted with the present reality. Such mental contrasting of future with reality leads to physiological energization (assessed by SBP) that is in line with a person's expectation of realizing the desired future. The elicited energization in turn fuels subsequent behavior instrumental for wish fulfillment. Of importance, because energization can be understood as a general activation or arousal state, the elicited energization state was observed to even fuel performance in solving a subsequent task that was unrelated to the initial desired future. How these results relate to models of physiological energization will be discussed next. We will consider motivational intensity theory (Brehm and Self 1989; Wright 1996), the biopsychosocial model of arousal regulation (Blascovich and Tomaka 1996), and excitation transfer theory (Zillmann 1983).

## 21.4 Models of Physiological Energization

### 21.4.1 Motivational Intensity Theory

Motivational intensity theory (Brehm and Self 1989) specifies the variables that predict the motivational intensity (i.e., the invested effort) with which people will engage in a given task. According to the theory, the effort that people invest in a task is directly proportional to the demand of

the task (or task difficulty). Thus, the more difficult the task is the more effort people will invest, as long as success is possible and justified. However, the maximum amount of effort that people exert (i.e., the potential motivation) is limited by the amount of effort that people are willing to invest with regard to the importance of success (i.e., the incentive, attractiveness or desirability of completing the task). Consequently, when the amount of effort needed to complete the task exceeds the amount of effort that people are willing to invest, people cease their effort investment. In short, people's effort investment is guided by an energy conservation principle in which the energy that people mobilize is limited by the task demand and the importance of successfully completing the task. A multitude of studies confirmed this pattern with assessing energy mobilization by cardiovascular indicators (e.g., SBP, preejection period; Richter 2013; Richter and Gendolla 2009; for summaries, see Gendolla et al. 2012; Wright 1996; Wright and Kirby 2001).

The finding that mental contrasting produces expectancy-dependent energy mobilization (assessed by SBP) is in line with motivational intensity theory by suggesting that mental contrasting elicits energization according to the energy conservation principle. That is, people mobilize energy when attaining a specific desired future (e.g., completing a certain task) is perceived as important and achievable (i.e., when incentive and expectations are high) but cease energy mobilization when attaining the desired future becomes unattractive or unachievable (i.e., when incentive value or expectations are low, Oettingen et al. 2009).

FRT and motivational intensity theory differ, however, in that whereas motivational intensity theory states that the demand of a task (or task difficulty) directly increases energy mobilization, FRT does not make predictions about how task demand affects energy mobilization. Rather, FRT specifies how people's expectations about being able to complete a task affect energy mobilization depending on people's mode of thought (mental contrasting, indulging, dwelling, reverse contrasting). Although task demand and people's expectations of completing a task are often (inversely) related—the more difficult a task the lower people's expectations of successfully completing it—the two concepts are not the same. Whereas task demand refers to the resources needed to successfully complete the task, expectations refer to people's estimated likelihood of successfully completing the task.

A number of studies on motivational intensity theory investigated the impact of outcome expectations (completing task Y will lead to outcome X) on energization. In this research, outcome expectations were operationalized as whether participants expected that successfully completing a task (an easy vs. difficult memory task) will lead to a desired outcome (participants had either a low or a high chance of winning a price if they succeed on the task; Wright and Gregorich 1989; see also Wright et al. 1992). When outcome expectations were low, participants evinced low energization, irrespective of task difficulty; when outcome expectations were high, participants' energization depended on task difficulty—the more difficult the task, the higher the participants' energization. These findings are interpreted as that people's outcome expectations determine the maximum amount of energy that people mobilize (i.e., their potential motivation, Gendolla et al. 2012).

Of importance, FRT (summary by Oettingen 2012) extends these findings in that it posits that mental processes (i.e., the four different modes of thought as specified by FRT) also need to be taken into consideration when predicting energy mobilization. Specifically, whereas mental contrasting leads to energy mobilization in accordance with the energy-conservation principle, indulging, dwelling, and reverse contrasting lead to energy mobilization that violates this principle: As people mobilize energy irrespective of their expectations of success, they fail to invest the energy that is required to successfully reach achievable desired future and to successfully let go from reaching unachievable desired futures. Consequently, they waste their energy in half-hearted pursuits of a host of desired futures.

### 21.4.2 Biopsychosocial Model of Arousal

The finding that mental contrasting instigates expectancy-dependent energy mobilization that is manifested in a cardiovascular response also relates to the biopsychosocial model of arousal (Blascovich and Tomaka 1996). The model posits that people's physiological reactions with regard to a stressor (an upcoming task like a mental arithmetic task) differ depending on whether people appraise the task as a challenge or as a threat. When people expect that they are able to cope with the task (i.e., they appraise their resources to exceed the task demand) they evince a challenge response. In contrast, when they expect that they are not able to cope with the task (i.e., they appraise the task demand to exceed their resources) they evince a threat response.

According to Mendes et al. (2008), the challenge response is associated with an activation state that is characterized by increased cardiac output, myocardial contractility, and HR, and decreased peripheral resistance. The threat response, in contrast, is associated with an inhibition state that is characterized by little or no increase in cardiac output, and increased myocardial contractility, HR, as well as peripheral resistance. However, our primary measure of energization, SBP, is not considered as a key concept in the model (Blascovich et al. 2003; see also Wright and Kirby 2003).

The claim that appraisal of resources exceeding task demand (challenge) leads to an activation state, while appraisal of task demand exceeding resources (threat) leads to an inhibition state is generally in line with FRT, positing that when people expect that they can (vs. cannot) successfully realize a desired future (e.g., mastering an upcoming task), mental contrasting leads to the mobilization (vs. demobilization) of energy. However, FRT goes beyond the challenge and threat model in that it specifies the mental processes (i.e., cognitive strategies or modes of thought: mental contrasting, indulging, dwelling, reverse contrasting) that influence whether people's expectations about mastering an upcoming event will translate into energy mobilization and goal-directed behavior.

### 21.4.3 Excitation-Transfer Theory

The finding that energization triggered by mental contrasting of solving a given task triggers energization that fuels effort in an unrelated task relates to excitation-transfer theory (Zillman 1971). Excitation-transfer theory posits that emotional activation or arousal triggered by one stimulus may enhance people's responses to another stimulus. Zillmann called this nonspecific activation or arousal state "residual excitation." To test their hypotheses, Zillmann and colleagues (summaries by Byrant and Miron 2003; Zillmann 1983) either presented participants with an arousing stimulus (e.g., engaging in physical exercise, watching an erotic movie) or with a nonarousing stimulus (e.g., engaging in an agility task, watching a neutral movie). Thereafter, the researchers assessed participants' activation state by a number of cardiovascular indicators (SBP, DBP, HR). Before the cardiovascular response, elicited by the first stimulus, decayed, participants were exposed to a second stimulus unrelated to the first stimulus (e.g., a funny cartoon, a provocation). Participants who had been exposed to an arousing first stimulus evinced a more intense response to the second stimulus (i.e., they judged the cartoons to be funnier; reacted more aggressively to the provocation) than those who had been exposed to a nonarousing stimulus, but only when they did not attribute their arousal to the first stimulus or experience. Our findings are in line with Zillmann's results by suggesting that motivational energization (or activation/arousal) triggered in one situation may transfer to a subsequent situation. They go beyond Zillmann's results in that the transferred energization may be used to fuel goal-directed behavior with regard to an unrelated task in the subsequent situation. Future research may combine the two approaches (excitation transfer theory and energization transfer by mental contrasting) by investigating whether energization triggered by mental contrasting pervades to fuel performance in

an unrelated task if it is attributed to the mental contrasting procedure.

## 21.5 Implications for Interventions

The research presented in this chapter has implications for designing interventions using mental contrasting to regulate people's energy mobilization and in turn their everyday pursuits. A number of intervention studies already support the effectiveness of mental contrasting as a metacognitive strategy to improve people's success in fulfilling their wishes (Oettingen 2012; Oettingen et al. 2010a). Teaching mental contrasting (vs. indulging) resulted, for instance, in more effective time management and easier decision making in health-care professionals (Oettingen et al. 2010a, b, c), better academic achievement in disadvantaged school children (Gollwitzer et al. 2011), and improved health behavior in dieting students (Johannessen et al. 2012).

The finding that mental contrasting instigates expectancy-dependent mobilization of energy is directly relevant for interventions that use mental contrasting. Succesfully realizing one's desired future requires the mobilization of energy. Energy, however, is a limited resource and people are motivated to conserve their energy (energy conservation principle; Brehm and Self 1989; Richter 2013; Gendolla et al. 2012; Silvestrini and Gendolla 2013). Thus, interventions using mental contrasting may guide people to wisely spend their limited energy in their everyday life. People will conserve energy by investing it only for projects they can realize and withdraw it from projects they cannot realize.

Of particular importance for designing interventions is the observation that mental contrasting a specific desired future such as successfully solving a particular task spurs expectancy-dependent energization that fuels effort for a task unrelated to the primary task. This finding suggests that persons may be taught mental contrasting regarding a desired future for which they have high expectations that then will energize effortful performance to realize a future that was not targeted by mental contrasting. For example, a person who has high expectations of winning a sport match may mental contrast the desired future of winning the match which in turn will mobilize the energy to prepare for an upcoming exam or clean up her apartment. A person may even use mental contrasting strategically: She might mental contrast a desired future that is well in reach (e.g., solving a challenging math problem) for obtaining the energy to complete an unrelated unpleasant activity (e.g., rote learning foreign language vocabulary). In the same vein, one may develop educational interventions that strategically induce mental contrasting a desired future for which a student has high expectations to benefit performance for activities for which the student has low expectations. For example, in an academic context, a student may be induced mental contrasting about excelling in her major where she has high expectations (e.g., excelling in biology) to mobilize the effort to prepare for a test in which she has low expectations (e.g., improving in history). Finally, some contexts may call for relaxation rather than energization. For example, when a person is overexcited or is performing a progressive muscle relaxation task, mental contrasting a desired future for which the person has low rather than high expectations may help her to downregulate her energization level.

## 21.6 Summary

Contrary to lay belief and the credo of the self-help literature, positive thinking about the future is detrimental for realizing desired futures if it comes in the form of positive future fantasies. Indeed, positive future fantasies lead to reduced energy mobilization, assessed by cardiovascular response (SBP). Reduced energy mobilization in turn predicts low success in realizing the future fantasized about. However, positive future fantasies can be made fruitful for the self-regulation of one's everyday and long-term pursuits if they are mental contrasted with the present reality. Such mental contrasting leads to energy mobilization and subsequent pursuits that are in line with people's expectations of realizing the desired future. When expectations are high, people mobilize the

necessary resources to realize the desired events; when expectations are low, they conserve their resources for more promising pursuits. Of importance, the energy mobilized by mental contrasting a desired future may even be used to modulate performance in tasks unrelated to the desired future that was elaborated in mental contrasting. These findings open the door to develop interventions directed at helping people to wisely regulate their energy mobilization for realizing important wishes and solving pressing concerns.

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