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# Mental Contrasting and Goal Commitment: The Mediating Role of Energization

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*Mentally contrasting a desired future with present reality is a self-regulation strategy that leads to goal commitment in line with a person's expectations of success. One possible mediator variable of these effects is level of energization. In Study 1, energization assessed by physiological measures was found to mediate the effect of mental contrasting on goal commitment. In Study 2, feelings of energization, as assessed by self-report, mediated the effect of mental contrasting on goal commitment as gauged by performance on an acute stress paradigm (giving a talk in front of a camera). Results imply that when expectations of success are high, mental contrasting provides the level of energy needed to commit to realizing desired futures.*

**Keywords:** *self-regulation; fantasies; mental contrasting; expectations; energization*

It is commonly assumed that happily fantasizing about success in realizing a dear wish or blissfully daydreaming about solving an upcoming challenge will be enough to bolster energy and commitment to actually fulfill the wish and master the challenge (Peale, 2007). Yet, people who nourish such positive fantasies and daydreams will often fail to evince enough energy to exert the necessary effort and persistence. Consider the case of an undergraduate student who blissfully dreams about entering graduate school but fails to put in the necessary hours to prepare for the Graduate Record Examinations (GREs). Contrasting the happy visions about acceptance in graduate school with reflections on going astray with partying will help the student understand that he or she has

not yet been accepted to the desired program. It is the recognition that lacking study time because of excessive partying is an obstacle to wish fulfillment that will make the student generate the energy to fully commit to the goal of making his or her dreams come true.

Theories of motivation (e.g., Atkinson, 1957; Bandura, 1997; Gollwitzer, 1990) suggest that people prefer to commit to goals that are desirable and feasible. A goal is desirable if attaining it is judged to be attractive, and a goal is feasible if attaining it is judged to be likely (i.e., incentive and expectation; Bandura, 1997; Heckhausen, 1977; Klinger, 1975). Goal commitment, to the contrary, refers to one's attachment or determination to reach a goal (Locke, Latham, & Erez, 1988) and is a prerequisite for successful goal striving, especially when goals are difficult to achieve (summary by Klein, Wesson, Hollenbeck, & Alge, 1999).

Although much research has examined the effects of desirability and feasibility on goal commitment, the

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processes by which desirability and feasibility translate into goal commitments also need consideration; otherwise, one cannot understand why high desirability and feasibility judgments do not guarantee the emergence of strong goal commitments (summary by Oettingen & Gollwitzer, 2001). Using a self-regulation approach, fantasy realization theory (Oettingen, 2000; Oettingen, Pak, & Schnetter, 2001) suggests that mentally contrasting a desired future with impeding reality is an effective strategy to produce commitment to a feasible goal. Specifically, when expectations of success are high, mental contrasting enables strong goal commitments; when expectations of success are low, mental contrasting produces weak or no goal commitments. Thus, mental contrasting produces expectancy-dependent goal commitments (Oettingen et al., 2001).

One outstanding question in mental contrasting research revolves around the mechanisms by which mental contrasting translates perceived feasibility into goal commitment. As energization is an important variable fostering goal commitment (Locke & Latham, 1990), the present research introduces energization spurred by mental contrasting as a critical motivational mediator for the effects of mental contrasting on goal commitment. Specifically, we argue that when feasibility (expectations of success) is high, mental contrasting mobilizes energy that then strengthens goal commitment. We test this idea in two studies assessing energization via physiological indicators (Study 1) and experiential indicators (Study 2). Thus, the present research extends previous work on mental contrasting showing that energization plays a key mediating role in mental contrasting by producing goal commitments that are in line with high or low expectations.

### *Mentally Contrasting Future and Reality*

When people use the self-regulation strategy of mental contrasting (Oettingen et al., 2001), they imagine a desired future (e.g., improving academic or professional performance) and immediately thereafter reflect on the current situation that stands in the way of reaching this desired future (e.g., obstacles and temptations such as having little time or being distracted). The conjoint elaboration of the future and reality makes both simultaneously accessible and links them together in the sense that the reality impedes realization of the desired future (i.e., obstacle). When feasibility is high, people strongly commit to attaining the goal; when feasibility is low, they form a weak goal commitment or none at all.

Consistent with Newell and Simon's (1972) theory of problem solving, for those who engage in the strategy of mental contrasting, the subjective problem space (defined as the internal subjective representation of the

problem at hand) matches the objective problem space (defined as the objective task demands posed by the environment) encompassing both the mental representation of the desired future and the impediments obstructing its attainment. As a result, this strategy enables one to recognize that measures need to be taken to overcome the status quo to achieve the desired future. Therefore, the perceived feasibility of attaining the desired future should determine the person's goal commitment.

However, when the subjective problem space only entails part of the objective problem space, as is the case for those who either solely indulge in the positive future or solely dwell on the negative status quo, one fails to recognize that measures need to be taken to overcome the status quo to achieve the desired future. As a consequence, expectations are not consulted and goal commitment fails to align with expectations. Instead, goal commitment is determined by prior commitment to attaining the desired future. Thus, it is only the self-regulation strategy of mental contrasting that succeeds in raising commitment when expectations of success are high and in lowering commitment when expectations of success are low.

A series of experimental studies measuring various indicators of goal commitment supports these hypotheses. Participants either mentally elaborated both the desired future and present reality (mental contrasting condition), only the desired future (indulging condition), or only the present reality (dwelling condition). In one experiment, adolescent students had to mentally contrast the positive future of excelling in mathematics (e.g., participants imagined feelings of pride, increasing their job prospects) with obstacles impeding such a desired future (e.g., participants reflected on being distracted by peers, feeling lazy). Two weeks after the experiment, students in the mental contrasting condition who had initially felt they could achieve the desired change (i.e., excel in math) received better course grades and teachers rated them as exerting more effort than those in the indulging and dwelling conditions (Oettingen et al., 2001, Study 4). The same pattern of results emerged in school children who started to learn a foreign language (Oettingen, Hönig, & Gollwitzer, 2000, Study 1), in students wanting to solve an interpersonal problem (Oettingen et al., 2001, Studies 1 and 3), and in students wanting to get to know an attractive stranger (Oettingen, 2000, Study 1). In these studies commitment was measured via self-report or observations, as well as directly after the experiment or weeks later. However, the question of which mechanisms are responsible for the effect of mental contrasting on commitments remains and is examined in the two studies presented here.

### *Forming Goal Commitment via Expectancy-Dependent Energization*

*Assessing goal commitments.* Researchers have measured goal commitment in various ways using various indicators. For example, they have directly asked participants to indicate the extent of their commitment (e.g., “I am strongly committed to pursuing this goal”; Hollenbeck, Klein, O’Leary, & Wright, 1989). However, this approach assumes that people have insight into their own commitment, when in fact they often do not (Brunstein & Gollwitzer, 1996; Klinger, 1975). To circumvent this problem researchers assess goal commitment indirectly by asking participants for affective, cognitive, or behavioral indicators of actual goal striving (summaries by Klein et al., 1999; Oettingen & Gollwitzer, 2001). For example, participants rate their interest or enthusiasm in reaching the goal (affective/motivational indicator), report the frequency of thinking about goal attainment (cognitive indicator), and indicate the extent to which they have acted toward goal attainment (behavioral indicator). As strongly committed people show frustration when experiencing failure, previous studies have also used the degree of disappointment and hardship participants feel when anticipating failure in goal attainment as a reliable indicator for goal commitment (Oettingen et al., 2001; Wicklund & Gollwitzer, 1982). As commitment represents the extent to which a person feels compelled to act in the service of attaining a goal, behavioral indicators of goal striving are considered to be particularly valid measures of commitment (Locke et al., 1988).

*Forming goal commitments.* Although plenty of research examines the beneficial consequences of goal commitment for goal attainment, it is much less clear how goal commitment emerges. The model of action phases (Heckhausen & Gollwitzer, 1987) posits a temporal perspective regarding the formation of goal commitments. Only after people proceed from a precommitment state to being committed will they show the typical features of goal commitment such as enthusiasm, preoccupation with the concern, goal-directed action, resumption of goal-directed behavior, and anticipated disappointment. Similarly, Klinger (1975) postulates a definite onset of a *current concern*, which he defines as a state where an organism is especially responsive to respective incentive-related cues. Independent of the differential use of terminology, however, the literature has not specified the processes that trigger the definite onset of commitment (Heckhausen & Gollwitzer, 1987) or current concern (Klinger, 1975).

The present research focuses precisely on this specification. We argue that mental contrasting provides

the energy to traverse from a precommitment to a commitment state (a precurrent concern to a current concern). Specifically, we postulate that mental contrasting will produce expectancy-dependent energization. That is, when expectations of success are high, mental contrasting will energize people so that they will consent to realizing their desired future.

*Energization.* Energization is a variable with a long tradition in motivation psychology. For example, Hull (1943) described variations in behavior as a function of two independent variables, direction and intensity. Whereas direction specifies whether an organism approaches or avoids a cue (Atkinson, 1957; Elliot, 2006; McClelland, 1985), intensity has been described as energization, excitation, arousal, or activation. The concept of energization arose from Cannon’s (1915) concept of energy mobilization and is defined as “the extent to which the organism as a whole is activated or aroused” (Duffy, 1934, p. 194). Traditionally, energy mobilization has been assessed by indicators of autonomic function (Duffy, 1934; Wright, Murray, Storey, & Williams, 1997) and more recently by self-report measures. Self-report studies have specified different qualities of energization, such as feelings of energy and vigor versus feelings of tension and arousal (Thayer, 1978). Feelings of energy have also been referred to as activity incitement (Brunstein & Gollwitzer, 1996) or invigoration (Klinger, 1975).

*Mental contrasting provides the energy to commit.* Causes of energization can be manifold: Physical exercise, drugs, and motivation have traditionally been cited as causes of energy mobilization. Present or anticipated incentives have also been shown to lead to energy mobilization. In the absence of resisting notions (e.g., obstacles), “the mere perception of the object and the fleeting notion of the act seem of themselves to bring the latter about” (James, 1890, p. 422). Thus, the mere idea of the desired future outcome is enough to produce energization in the service of goal attainment (i.e., *ideo-motor action*; James, 1890).

However, if there are obstacles hindering goal attainment, James (1890) postulates a “fiat, the element of consent or resolve that the act shall ensue” (p. 418). In the present research, we argue that mental contrasting, by making reality appear as an obstacle to fantasy realization, mobilizes energy that strengthens the transition to goal commitment (i.e., a fiat, an element of consent to realize the desired future). However, this “element of consent” should only be formed if expectations of success are high, signaling that the obstacle can be overcome to reach the desired future. Referring to the temporal notion of goal pursuit in Heckhausen and Gollwitzer’s (1987) and Klinger’s (1975) work, we postulate that

when expectations are high, mental contrasting will mobilize energy that guarantees the transition to commitment (current concern). Now action in a particular direction will follow. If expectations of success are low, energy should not be mobilized and a fiat or consent to forming goal commitment should not ensue. Thus, energy should be saved as it can be spent on more promising endeavors (Janoff-Bulman & Brickman, 1982).

### *The Present Research*

How can mental contrasting help people form goal commitments? Energization is hypothesized to be a key mechanism that translates high expectations of success into goal commitment. The present research adds to the literature on mental contrasting in several ways: First, and most important, to highlight the dynamic motivational processes triggered by mental contrasting, mediation of the expectancy–commitment relation will be addressed (Studies 1 and 2). Second, studies have assessed distal expectancy effects measured after completion of the mental contrasting procedure; in the present research, by focusing on mediation, we measure proximal expectancy dependence as early as during the mental exercise itself, immediately after individuals juxtapose their desired future with negative reality (Study 1). Third, unlike previous research, we assess physiological indicators of expectancy dependence, thus excluding social desirability and rater bias (Study 1). Fourth, previous research has tested other-rated performance indicators of goal commitment in the field and days or weeks later. To exclude influences of intervening variables, we assess other-rated performance in the laboratory and right after the manipulation (Study 2). Fifth, unlike previous research investigating fantasies about relatively long-term concerns, to test for short-term future outcomes, fantasies in the present research pertained to an immediately impending achievement task (Study 2). Sixth, mental contrasting effects have been observed for mundane concerns of everyday life. To test whether the effects hold in highly stressful situations, we employed an acute stress paradigm (Study 2). For both studies we hypothesized that self-regulation strategy (i.e., mental contrasting vs. indulging) will moderate the expectancy–commitment relation and that energization measured by change in systolic blood pressure (SBP; Study 1) and self-report (Study 2) will mediate the predicted expectation–commitment relation in the mental contrasting condition.

### **STUDY 1: THE MEDIATIONAL MECHANISM OF ENERGIZATION: PHYSIOLOGICAL MEASURES**

We assessed cardiovascular response as an indicator of energization. Specifically, we focused on SBP, a reliable

indicator of energization (Cannon, 1915; Wright et al., 1997). Moreover, measuring energization by its physiological manifestations allows for its assessment during the mental exercise itself.

Energization leads to an increased demand for oxygen and nutrients, and the cardiovascular system supplies tissue with energy in the form of oxygen and nutrients. Therefore, energization is manifested in a strong cardiovascular response (Brownley, Hurwitz, & Schneiderman, 2000). The most reliable cardiovascular response for assessing energization is SBP (the maximum pressure exerted by the blood against the vessel walls following a heartbeat; Obrist, 1981). Other cardiovascular responses, such as diastolic blood pressure (DBP; the minimum pressure exerted by the blood against the vessel walls following a heartbeat) and heart rate (HR; the pulse or pace at which the heart pumps) are less consistently related to energization (Obrist, 1981). Importantly, energization indicated by changes in SBP does not only occur as a response to an immediate challenge but also as an anticipatory reaction to thinking about an upcoming task (e.g., when people anticipate that they will perform complex arithmetic or memory tasks important to them; Contrada, Wright, & Glass, 1984).

Our main objective in Study 1 was to investigate whether mental contrasting, that is, elaborating both the positive future and the negative reality, produces expectancy-dependent energization that in turn mediates subsequent expectancy-dependent goal commitment. In line with previous research, participants in the mental contrasting group had to alternate in their mental elaborations between the positive future and the negative reality, starting with the positive future (Oettingen, 2000; Oettingen et al., 2000; Oettingen et al., 2001). As the comparison self-regulation strategy group we chose to have participants elaborate solely on the positive future (indulging) rather than have them solely elaborate the negative reality (dwelling). This decision was guided by the fact that both the mental contrasting and indulging conditions begin the mental exercise by elaborating a positive aspect of the future; that is, the two groups were comparable to each other with regard to their first elaboration. However, in the mental contrasting group, elaboration of the positive future is followed by elaboration of the negative reality, whereas in the indulging group participants subsequently elaborate another positive aspect of the future. Both groups match again in the third elaborated aspect: another positive future aspect. Thus, using these two groups, we could compare the change in blood pressure from the first to the third elaborated aspect. Alternating between a positive aspect of the future and a negative aspect of reality occurred in the mental contrasting group but not in the

indulging group. We hypothesized that mental contrasting will mobilize expectancy-dependent energy that subsequently translates into goal commitment, whereas indulging will lead to expectancy-independent energization. Finally, to measure goal commitment, after the mental exercise we asked participants how disappointed and how bad they would feel if their desired future failed to come true.

### Method

*Participants and design.* Sixty-three undergraduate psychology students (45 female) from the University of Hamburg participated in this study to fulfill a course requirement. They had a mean age of 25.02 years ( $SD = 4.03$ ) ranging from 19 to 38 years. Eligible participants had to be right-handed, free from heart disease and hypertension, and abstain from cigarettes, alcohol, strenuous exercise, caffeine, and medication for at least 2 hr before the session. All participants were randomly assigned to the two experimental conditions—a mental contrasting condition and an indulging condition—and were tested individually.

*Procedure.* We seated participants at a table with a computer and a compressing cuff. The compressing cuff was connected to a blood pressure monitor (Dinamap PRO 100). We placed the monitor in a room adjacent to the experimental cubicle. The apparatus used oscillometry to determine SBP (millimeters of mercury [mmHg]), DBP (mmHg), and HR (beats per minute). The individual SBP measurement periods lasted approximately 30 s. The experimenter placed the compressing cuff over the brachial artery of participants' left arm, gave a brief overview of the procedure, and informed participants that their answers would remain confidential and that their participation was voluntary. Thereafter, we asked participants to rest quietly for 15 min while we familiarized them with the blood pressure measurement procedure (Shapiro et al., 1996). Participants completed the experiment on the computer.

The study consisted of three parts. To begin, participants indicated their most important interpersonal concern. They listed, for example, to get to know someone or to keep up a friendship. We measured participants' expectations of success ("How likely do you think it is that the named concern will have a happy ending?") and their incentive value ("How important is it to you that the named problem will have a happy ending?"). The answer scales ranged from 1 (*not at all*) to 7 (*very*).

In the second part, all participants were asked to list four positive aspects they associated with their interpersonal concern coming to a happy ending (participants named, e.g., not being lonely, having someone to talk

to). Next, we asked participants to list four negative aspects of reality standing in the way of a happy ending to their interpersonal concern (participants named, e.g., being shy, friend living far away). To prevent extensive mental elaborations at this point, we instructed participants to only type in keywords.

In the third part of the questionnaire, we established the two experimental conditions (i.e., mental contrasting condition and indulging condition). In the mental contrasting condition, participants mentally elaborated and wrote about two positive aspects of the desired future and two negative aspects of impeding reality in alternating order beginning with a positive aspect of the future. To accomplish this procedure, participants saw their first positive keyword pertaining to the desired future (i.e., Aspect 1) displayed on the computer monitor with the following instructions:

Think about this aspect and depict the respective events or experiences in your thoughts as intensively as possible! Let the mental images pass by in your thoughts and do not hesitate to give your thoughts and images free rein. Take as much time and space as you need to describe the scenario.

Participants then mentally elaborated the keyword pertaining to the positive future and typed their thoughts and images in the designated space. A participant whose concern was to solve a conflict with her partner elaborated her positive future keyword "harmony": "and my life becomes balanced again, I will feel joy and warmth, and we will talk about the important and meaningful things, feel close, we feel together." After elaborating the positive aspect of the future, participants read on the next screen the first keyword pertaining to the negative reality with the same instructions as given previously. One participant elaborated her negative reality keyword, "my timidness": "I feel nervous, cannot talk, let us talk about something else, but then WHEN will we talk, how long can I go on like this, am I a coward?" After completing their elaboration, participants proceeded to the subsequent screen and elaborated the keyword labeling the second positive aspect of the future. Thereafter, participants elaborated the second keyword pertaining to the negative reality.

Participants in the indulging (positive future only) condition elaborated only the four positive aspects of the desired future. They started with the first keyword, labeling the positive aspect of solving their interpersonal concern and continued with the keywords of the second, third, and fourth positive aspects of solving their interpersonal concern. In sum, all participants' Aspects 1 and 3 pertained to the positive future. However, Aspects 2 and 4 in the mental contrasting condition

were obstacles, whereas in the indulging condition they referred to the positive future.

*Mediating and dependent variables.* We assessed cardiovascular responses two times for each participant: one time while participants elaborated Aspect 1 and a second time while participants elaborated Aspect 3. We assessed cardiovascular responses at Aspects 1 and 3, as these were positive future aspects in both conditions and thus could be directly compared. Importantly, whereas in the mental contrasting condition positive future Aspect 3 followed a negative aspect of reality, in the indulging condition this aspect followed a positive aspect of the future.

Cardiovascular measures were taken 90 s after the elaboration instructions were given. Participants could not proceed to the next screen until an additional 30 s had passed. Thus, participants had in total 120 s for the elaboration of each positive future aspect. To ensure that participants elaborated the positive future aspects and negative reality aspects for equal amounts of time, participants also had a minimum of 120 s for the elaboration of each obstacle.

As all participants followed exactly the same procedure when elaborating Aspect 1 (which was a positive future aspect in both conditions); we used SBP at Aspect 1 as the baseline measure. Calculating change in SBP allowed us to control for individual differences in baseline SBP (Wright et al., 1997). We expected differences between mental contrasting and indulging participants in change of SBP from Aspect 1 (baseline) to Aspect 3. In addition, we calculated DBP and HR change scores similarly to change in SBP score.

To assess our dependent variable (i.e., goal commitment), on the next two screens we asked participants "How disappointed would you feel if your concern did not come to a happy ending?" and "How bad would it be for you if your concern did not come to a happy ending?" The answer scales ranged from 1 (*not at all*) to 7 (*very*). As internal consistency was high (Cronbach's  $\alpha = .88$ ), we combined the two items into an index of commitment to solve the interpersonal concern. The last screen instructed participants to call for the experimenter, who then returned for the debriefing.

## Results

As gender did not lead to any significant main or interaction effects on the dependent and mediating variables, this variable is omitted from further discussion.

*Descriptive analyses.* Correlations and descriptive statistics are provided in Table 1. Commitment scores were based on 59 participants because 4 (6.3%) participants had missing values. Change in SBP was based on

**TABLE 1:** Correlations, Means, and Standard Deviations for Variables Used in Study 1 ( $N = 63$ )

Independent Variable	1	2
1. Expectation of success	—	
2. Incentive value	.22	—
<i>M</i>	4.71	6.24
<i>SD</i>	1.84	0.96
Dependent Variable	1	2
1. Commitment	—	
2. Change in SBP	.46***	—
<i>M</i>	5.70	-0.31
<i>SD</i>	1.27	8.40

NOTE. SBP = systolic blood pressure.

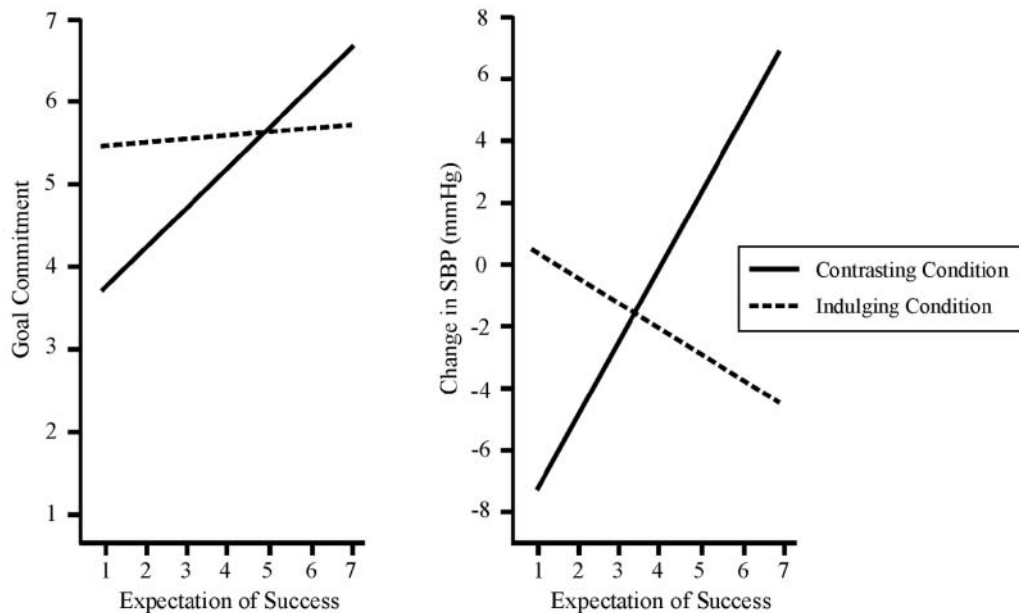
\*\*\* $p < .001$ .

58 participants because of technical difficulties. Finally, because expectations of success correlated with incentive value, to ensure that results were not due to variations in incentive value, we statistically controlled for incentive value in all analyses.

*Goal commitment.* We used a general linear model (GLM) with commitment as the dependent variable, condition as a fixed between-subject factor, and the continuous expectation measure as independent variable entered in the first step; the interaction term of condition by the continuous expectation measure was entered as independent variable in the second step (Hardin & Hilbe, 2001).

We observed no main effect of condition,  $F(55) = .06$ ,  $p > .80$ , but a main effect of expectation,  $F(55) = 9.25$ ,  $p < .005$ , which was qualified by the predicted interaction effect,  $F(1, 54) = 7.00$ ,  $p = .01$ . When comparing the relation between expectation and commitment in the mental contrasting versus indulging condition, the relation was stronger in the mental contrasting condition,  $t(54) = 2.64$ ,  $p = .01$  (Figure 1, left graph). When expectations of success were high, mental contrasting participants were more committed than indulging participants,  $t(54) = 2.51$ ,  $p < .02$ ; when expectations of success were low, they tended to be less committed than indulging participants,  $t(54) = 1.93$ ,  $p < .06$ .

*Change in SBP.* First, we tested whether the Condition  $\times$  Expectation interaction effect observed for commitment also existed for change in SBP. Accordingly, in a GLM we specified the SBP change score as the dependent variable and in Step 1 entered condition as a fixed between-subject factor and the continuous expectation measure as an independent variable; in Step 2 we entered the interaction term of condition and the continuous expectation measure as an independent variable. There



**Figure 1** Study 1: Regression lines depict the link between expectation and goal commitment (left) and expectation and systolic blood pressure (SBP) change in millimeters of mercury (mmHg; right) as a function of mental contrasting and indulging.

was neither a main effect of expectation nor of condition,  $F_s(1, 54) < 2.88$ ,  $p_s > .09$ , but we observed the predicted interaction effect,  $F(1, 53) = 7.67$ ,  $p < .01$ . Again, the link between expectation and change in SBP was stronger in the mental contrasting condition than in the indulging condition,  $t(53) = 2.77$ ,  $p < .01$  (Figure 1, right graph).

To investigate whether SBP increased or decreased from baseline at Aspect 1 to Aspect 3 in mental contrasting participants with high versus low expectations, we conducted a repeated measures GLM with SBP at baseline and at Aspect 3 as within-subject variables and expectations as covariate focusing only on the mental contrasting condition. In these participants, when expectations were high, SBP increased,  $t(24) = 2.99$ ,  $p < .01$ ; when expectations were low, SBP decreased  $t(24) = 2.05$ ,  $p = .05$ .

*Change in SBP as a mediator of the expectancy–commitment link in the mental contrasting condition.* According to Baron and Kenny (1986) mediation is supported if there is (a) a significant association between the initial variable and the outcome variable and (b) a significant association between the initial variable and the mediator variable. The third and fourth steps require showing (c) that the proposed mediator significantly predicts the outcome while controlling for the initial variable and (d) that the association between the initial variable and the outcome variable is attenuated after controlling

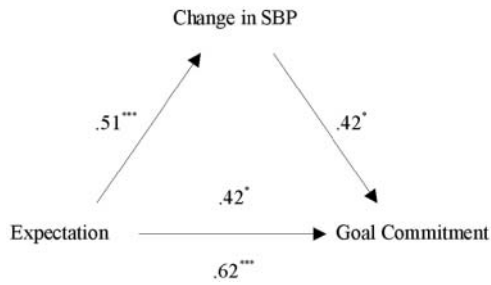
for the proposed mediator. Testing these four steps using hierarchical regression analyses (Baron & Kenny, 1986) showed that change in SBP mediated the relation between expectancy and commitment in the mental contrasting condition (Figure 2). Furthermore, using a bootstrap test (Preacher & Hayes, 2008), we observed a significant indirect effect of expectation on commitment through change in SBP, 95% confidence interval (CI) bootstrap percentile = .02, .49. These findings imply that in the mental contrasting condition, change in SBP partially, but significantly, mediated the relation between expectation and commitment.

*DBP and HR.* To investigate whether changes in DBP and HR do indeed fail to qualify as mediators for the relation of mental contrasting versus indulging to commitment, we repeated Step 1 of the preceding analyses with DBP change score and HR change score, respectively, as the dependent variable. As predicted, we did not observe Condition  $\times$  Expectation interaction effects, both  $F_s < .19$ ,  $p_s > .66$ . This finding implies that neither DBP nor HR qualified as a mediator for the differential relation of mental contrasting versus indulging to commitment.

### Discussion

Using SBP as a cardiovascular measure of energization, the present study showed that energization mediated the relation between expectation and goal commitment after





**Figure 2** Study 1: Change in systolic blood pressure (SBP) as a mediator of the relation between expectation and goal commitment in the mental contrasting condition.  
\* $p < .05$ . \*\*\* $p < .001$ .

mental contrasting. Specifically, we first observed that change in SBP as a cardiovascular indicator of energization showed expectancy dependence in the mental contrasting condition but not in the indulging condition, just as we had observed for commitment to solve the interpersonal concern. Moreover, in the mental contrasting condition, expectancy dependence of commitment was partially mediated by change in SBP. Apparently, mental contrasting produces expectancy-dependent energization during the mental exercise itself and the energization, in turn, influences subsequent goal commitments: When expectations of success were high, but not when they were low, participants formed binding goal commitments. In the indulging condition, we did not observe expectancy dependence in participants' energization or in their commitment.

Importantly, mental contrasting changed the level of energization for both high-expectation and low-expectation participants, albeit in opposite directions. Whereas mental contrasting increased energization in high-expectation participants, it decreased energization in low-expectation participants. To the contrary, changes in energization were not seen in indulging participants. Apparently, mental contrasting evoked energization to commit to the same degree as it evoked a loss in energization to let go, depending on expectations of success.

In Study 1, we assessed the mediating variable (energization) by its physiological manifestation (SBP). However, the data do not speak to whether energization goes beyond physiological measures and whether it can be assessed via its experiential component (i.e., subjective feelings of energization). In addition, in Study 1, we measured goal commitment using an affective indicator (anticipated disappointment) but did not observe behavioral indicators of goal commitment. Thus, Study 2 attended to these matters by using self-report measures of energization and actual performance measures of goal commitment.

## STUDY 2: THE MEDIATIONAL MECHANISM OF ENERGIZATION: SUBJECTIVE FEELINGS

Physiological measures of energy have been found to strongly relate to subjective feelings of energization (Blascovich, 1990; Contrada et al., 1984), even though physiological indicators and self-report indicators of energization do not consistently yield high correlations (Fairclough & Venables, 2006). The inconsistent findings might be explained by the fact that individuals differ in their ability to perceive internal bodily states (i.e., interoceptive sensitivity). For instance, people who were more versus less sensitive to their heartbeats emphasized feelings of activation and deactivation when reporting their experiences of emotion (Feldman-Barrett, Quigley, Bliss-Moreau, & Aronson, 2004). Inconsistencies may also depend on whether people adhere to a repressive coping style (Newton & Contrada, 1992) and whether they comply with norms that allow emotional experience and expression (Rimé, Philippot, & Cisamolo, 1990). Despite such methodological difficulties, researchers still endorse the importance of investigating energization by using both physiological and self-report indicators (Cacioppo & Berntson, 1992).

Whereas in Study 1 we assessed participants' commitment via self-report, in Study 2 we observed participants' actual performance. We used an acute stress paradigm (i.e., giving a talk in front of a camera; al'Absi et al., 1997) and assessed other- and self-rated quality of performance. We hypothesized a moderator effect of self-regulation strategy; specifically, participants who contrast their positive fantasies of giving a good talk with reflections on negative reality should persist (quantity) and perform (quality) in line with their expectations of success. Participants who indulge in their success should persist and perform in an expectancy-independent way. Importantly, feelings of energy should mediate the relation between expectations and goal commitment in the mental contrasting condition.

### Method

**Participants and design.** One hundred sixteen undergraduate economics students (44 female) from the University of Hamburg participated in this study for monetary reward. They had a mean age of 25 years ( $SD = 2.96$ ) ranging from 19 to 38 years. Similar to Study 1, all participants were randomly assigned to the two conditions—a mental contrasting condition and an indulging condition—and were tested individually.

**Procedure.** Participants took part in a study presumably testing a new recruitment tool for university graduates. Their task was to give a presentation in front of a

video camera and to complete a two-part questionnaire. Participants were told that a group of human resources experts would later analyze the videotapes to measure the presenters' professional skills. Participants were also informed that their answers would remain confidential and that participation was voluntary.

To begin, participants indicated their desired level of performance by answering the following question: "How well would you like to do in your presentation?" on a scale ranging from 1 (*sufficient*) to 7 (*excellent*). Participants then reported their expectations of success: "How likely is it that you will do as well as you indicated in question number one?" and on incentive value: "How important is it to you that you will do as well as you indicated in question number one?" The answer scales ranged from 1 (*not at all*) to 7 (*very*).

All participants then listed four positive aspects they associated with performing at the level indicated in question number one (participants named, e.g., good for my self-esteem, feelings of pride). Next, they listed four negative aspects of the reality standing in the way of them performing at that level (participants named, e.g., that stupid camera, not being prepared). We established the two experimental conditions (i.e., mental contrasting condition and indulging condition) similar to Study 1.

*Mediating and dependent variables.* To obtain a measure of feelings of energization, we asked participants immediately after the induction of the two experimental groups: "How incited (in German: *angespornt*) do you feel with respect to the upcoming talk?" and "How full of energy (in German: *voller Energie*) do you feel with respect to the upcoming talk?" The answer scales ranged from 1 (*not at all*) to 7 (*very*). We combined feeling incited and energized ( $r = .50, p < .001$ ; Cronbach's  $\alpha = .66$ ) to form an index of feeling energized. Thereafter, participants had 5 min to prepare for their presentation. When the preparation time was over, the experimenter seated participants in front of a camera and gave them the following instructions:

Your task is to make a presentation in approximately five minutes about the theme "What qualifies me as a present-day professional candidate?" During your presentation I will leave the room and come back when the time is over. If you do not need to use all the time just stop your presentation by saying this was the end of your presentation. Please do not stand up and leave until you have said that your presentation is finished. Just remain seated and wait until I will come back. If you have no further questions, please start right after I have left the room.

We assessed length of talk (ranging from 0 to 5 min) as a measure of persistence. After 5 min, the experimenter

reentered the room and provided the final part of the questionnaire. Participants rated their performance on five items (i.e., "I was eloquent," "I was able to make a good impression," "The pace of my speech was adequate," "The structure of my presentation was logical," and "My presentation was meaningful"). Answer scales ranged from 1 (*not at all true*) to 7 (*very true*). To conclude, we fully debriefed participants about the purpose of the study and encouraged them to contact us at any time with further questions.

To obtain a measure of other-rated quality of performance, we content analyzed the videotapes, employing a 7-point scale ranging from 1 (*very poor performance*) to 4 (*moderate performance*) to 7 (*excellent performance*). A rating of 1 meant participants failed to talk about the topic, chose inappropriate language, and presented themselves in an unfavorable light. For example, participants did not explain their own qualifications or the qualities of an applicant today. They generated loose associations, spoke without structure, used slang words (note that the audience was supposed to be a group of human resources experts), and showed rakish mimics, gestures, and postures. A rating of 4 meant participants partly talked about the topic, chose moderately appropriate language, and presented themselves in a neutral or only partly favorable light. For example, participants referred to their qualifications but did not explicate them, mentioned what qualified an applicant only in passing, loosely associated during parts of the talk while other parts were chronologically structured, used slang words only rarely, and showed awkwardness in mimics, gestures, and postures. Finally, a rating of 7 meant participants focused on the topic, chose appropriate language, and presented themselves in a most favorable light. For example, participants described their background in detail and tailored their qualifications to what they thought would be expected from applicants today. They structured their talk by providing overviews and summaries, showed perspective taking with the audience by choosing sophisticated and professional language, and were friendly in their mimics, as well as confident and assertive in their gestures and postures. Two raters blind to conditions scored 45% of the sample to assess interrater reliability ( $r = .88, p < .01$ ). One rater scored the remaining 55%.

## Results

As gender did not lead to any significant main or interaction effects on the dependent and mediating variables, it will not be mentioned any further.

*Descriptive analyses.* Correlations and descriptive statistics are provided in Table 2. Length of talk was

**TABLE 2:** Correlations, Means, and Standard Deviations for Variables Used in Study 2 ( $N = 116$ )

<i>Independent Variable</i>	1	2	3	
1. Expectation of success	—			
2. Incentive value	.39***	—		
3. Desired level of performance	.01	.34***	—	
<i>M</i>	4.36	4.89	5.42	
<i>SD</i>	1.21	1.44	1.27	
<i>Dependent Variable</i>	1	2	3	4
1. Other-rated quality of performance	—			
2. Self-rated quality of performance	.42***	—		
3. Length of talk	.53***	.37***	—	
4. Feeling energized	.40***	.44***	.30**	—
<i>M</i>	4.50	3.73	3.56	3.56
<i>SD</i>	1.30	1.12	1.35	1.33

\*\* $p < .01$ , \*\*\* $p < .001$ .

based on 111 participants and other-rated quality of performance on 106 participants because 5 (4.3%) and 10 (8.6%) participants, respectively, could not be analyzed because of recording difficulties. Finally, to ensure that the results were not due to variations in incentive value and desired level of performance, we statistically controlled for both of these variables.

*Goal commitment variables.* As in Study 1, we specified a set of GLM analyses in which in Step 1 we entered condition as a fixed between-subject factor and the continuous expectation measure as an independent variable; in Step 2 we entered the interaction term of condition and the continuous expectation measure as an independent variable.

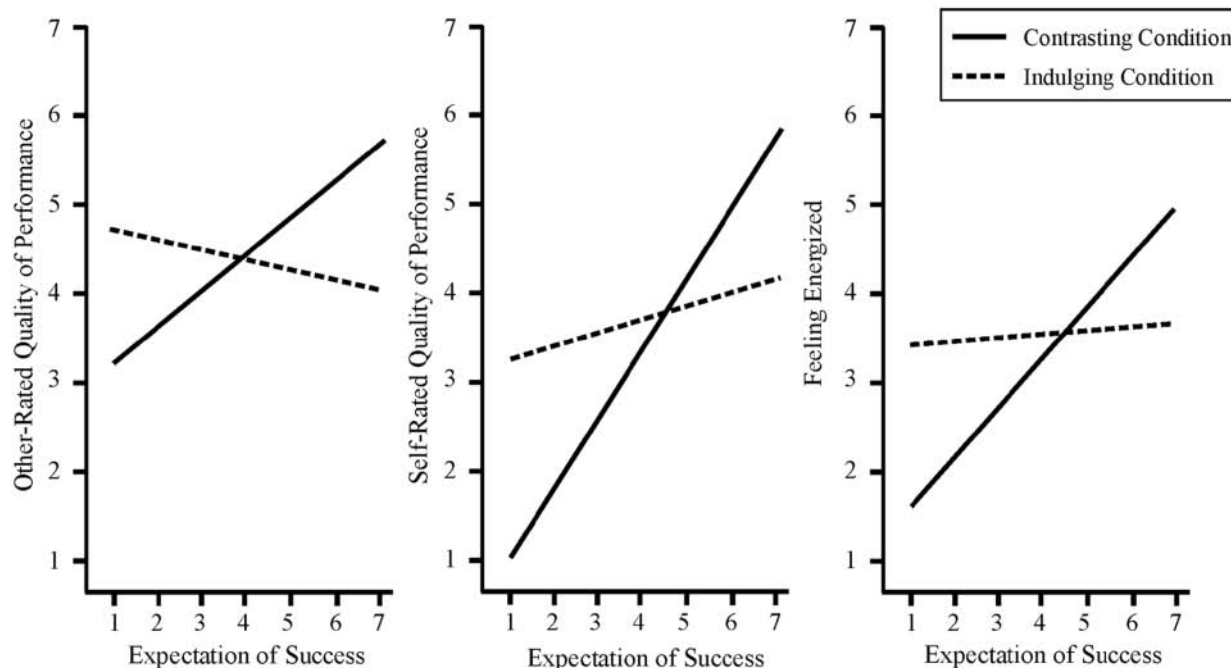
With respect to the dependent variable of other-rated quality of performance, there were no main effects of condition or expectation,  $F_s(1, 101) < 1.31$ ,  $p_s > .24$ . The predicted interaction effect was significant,  $F(1, 100) = 7.82$ ,  $p < .01$ . The link between expectation and other-rated quality of performance in the mental contrasting condition was stronger than in the indulging condition,  $t(100) = 2.80$ ,  $p < .01$  (Figure 3, left graph). When expectations of success were high, mental contrasting participants performed better than indulging participants,  $t(100) = 3.05$ ,  $p < .005$ ; when expectations of success were low, they performed worse than indulging participants,  $t(100) = 2.22$ ,  $p < .03$ .

We observed the same data pattern for self-rated quality of performance. There was no main effect of condition,  $F(1, 111) = .01$ ,  $p > .98$ , but a main effect for expectation,  $F(1, 111) = 31.54$ ,  $p < .001$ , which was qualified by the predicted interaction effect,  $F(1, 110) = 16.02$ ,  $p < .001$ . The link between expectation and self-rated quality of performance was stronger in the mental contrasting condition than in the indulging condition,

$t(110) = 4.00$ ,  $p < .001$  (Figure 3, middle graph). When expectations of success were high, participants in the mental contrasting condition evaluated their performance as being better than did those in the indulging condition,  $t(110) = 3.63$ ,  $p < .001$ , whereas the reverse was true when expectations of success were low,  $t(110) = 3.78$ ,  $p < .001$ .

Finally, with respect to length of talk, the data pattern was the same but only approached significance. We observed no main effects of both condition and expectation,  $F_s(1, 106) = 2.29$ ,  $p_s > .13$ . There was a nearly significant interaction effect,  $F(1, 105) = 3.48$ ,  $p < .07$ . The link between expectation and length of talk only tended to be stronger in the mental contrasting condition than in the indulging condition,  $t(105) = 1.87$ ,  $p < .07$ .

*Mediator variable: Feeling energized.* First, we tested whether the Condition  $\times$  Expectation interaction effect observed for the goal commitment variables existed for feelings of energization. Accordingly, in a GLM we specified feeling energized as the dependent variable and in Step 1 entered condition as a fixed between-subject factor and the continuous expectation measure as an independent variable; in Step 2 we entered the interaction term of condition and the continuous expectation measure as an independent variable. We observed no main effect of condition,  $F(1, 111) = .24$ ,  $p > .62$ , but a main effect of expectation,  $F(1, 111) = 6.33$ ,  $p < .02$ , which was qualified by the predicted interaction effect,  $F(1, 110) = 7.39$ ,  $p < .01$ . Again, the link between expectation and feeling energized was stronger in the mental contrasting condition than in the indulging condition,  $t(110) = 2.72$ ,  $p < .01$  (Figure 3, right graph). Also, when perceived chances of success were high, mental contrasting participants felt more energized than indulging participants,  $t(110) = 2.26$ ,  $p < .03$ ; when perceived chances of success were low, mental



**Figure 3** Study 2: Regression lines depict the link between expectation and other-rated quality of performance (left), self-rated quality of performance (middle), and feeling energized (right) as a function of mental contrasting and indulging.

contrasting participants felt less energized than indulging participants,  $t(110) = 2.73, p < .01$ .

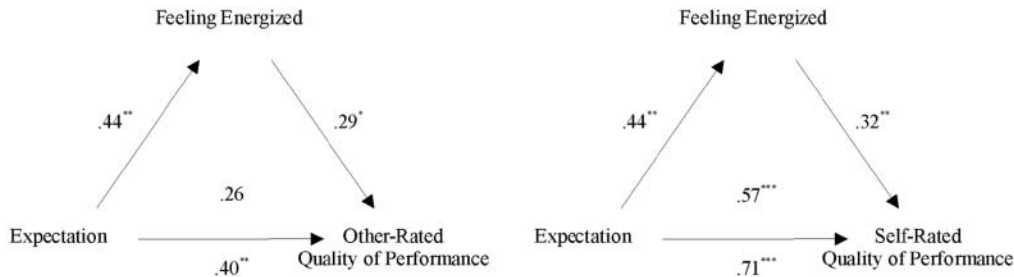
*Feeling energized as a mediator of the expectancy–goal commitment link in the mental contrasting condition.* Mediation analyses (Baron & Kenny, 1986) conducted as in Study 1 showed that in the mental contrasting condition, feeling energized mediated the relation between expectancy and other-rated quality of performance and self-rated quality of performance (Figure 4). Furthermore, bootstrap tests (Preacher & Hayes, 2008) showed that the indirect effects of expectation on other-rated quality as well as self-rated quality of performance through feeling energized were significant, 95% CI bootstrap percentiles = .02, .33 and .07, .33. These findings imply that in the mental contrasting condition, feeling energized partially, but significantly, mediated the relation between expectation and performance as rated by independent raters as well as by the participants themselves.

### Discussion

Participants gave a talk after engaging in mental contrasting or indulging. Mental contrasting, as compared to indulging, produced a stronger link between expectations of success and goal commitment, measured by other- and

self-rated quality of performance. In addition, feelings of energization showed the same pattern of results as the performance indicators of goal commitment. Importantly, a closer look at the mental contrasting condition revealed that expectancy dependence of other-rated and of self-rated quality of performance was mediated by feelings of energization. Accordingly, in line with Study 1, energization qualifies as a mediator between expectations and commitment. Commitment in Study 2 was measured by performance, a particularly accurate measure of commitment (Locke et al., 1988).

Different from past research on mental contrasting that measured performance in the field as well as days and weeks after the manipulation, in this study we measured other-rated performance in the lab, immediately after the manipulation. We thus interpret the moderator effect of self-regulation strategy on the expectancy–commitment link as direct and not needing an intermediate variable. For example, past research in which performance was measured days and weeks after the manipulation could not rule out that the moderator effects were caused by the use of different behavioral means (e.g., differential seeking of social support, differential ways of procrastination). The present research shows that performance differences arise directly from differential feelings of energization in the mental contrasting versus indulging conditions.



**Figure 4** Study 2: Feeling energized as a mediator of the relation between expectation and other-rated quality of performance (left) and expectation and self-rated quality of performance (right) in the mental contrasting condition.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Finally, because we used an acute stress paradigm, we know that self-regulation strategy moderates the expectancy–commitment link, even under highly stressful conditions. Importantly, mental contrasting in high-expectancy participants led to strong goal commitment to solve a very taxing problem: giving a good talk in front of an evaluative audience. As a result, mental contrasting can be considered a strategy that not only produces binding goal commitments to feasible wishes but, when expectations of success are high, also fosters successful mastery of an acute stressor.

## GENERAL DISCUSSION

In two studies, mentally contrasting positive fantasies about the future with negative reality produced expectancy-based goal commitment via the motivational mechanism of energization. Specifically, using SBP as a physiological indicator of energization in Study 1, mental contrasting participants exhibited energization in line with their expectations of success. Energization emerging *during* the thought process of mental contrasting itself in turn predicted participants' commitment to resolve their interpersonal concern. In Study 2, mental contrasting participants indicated feeling energized in line with their expectations of success. These feelings of energization in turn predicted other- and self-rated quality of performance when giving a presentation in front of a video camera.

Energization instigated in line with expectations of success emerges when individuals contrast positive fantasies with thoughts about obstacles of present reality. This energization in turn directly fuels individuals' goal commitment as measured by affective and behavioral indicators. Thus, engaging in mental contrasting as a self-regulation strategy provides those with high expectations of future success necessary energy to commit and strive to realize the desired future. Adopting a temporal perspective, our results imply that energization

resulting from mentally contrasting future and reality helped high-expectancy participants consent to realizing their positive fantasies (form a goal commitment, Heckhausen & Gollwitzer, 1987; form a current concern, Klinger, 1975).

### *Mental Contrasting and the Cardiovascular System*

In line with previous findings, our research points to the importance of the cardiovascular system for the preparation of action. The function of the cardiovascular system is to supply cells with energy in the form of oxygen and nutrients. Thus, an increased energy demand due to physical or mental effort results in a stronger cardiovascular response.

However, cardiovascular adjustments not only occur as a reaction to increased effort investment but may also occur in preparation of an immediate challenge (Contrada et al., 1984). Because initial energization level strongly predicts successful performance (Matthews, Davies, & Lees, 1990), it is important to know how an anticipatory mobilization of physiological resources can be triggered. Our research points to mental contrasting future and reality as a cognitive strategy that elicits a cardiovascular response in preparation for goal commitment and effective goal striving.

Our results are in line with theory and findings from the biopsychosocial model of challenge and threat (Blascovich, 1990; Seery, Blascovich, Weisbuch, & Vick, 2004). This theory postulates that in the case of challenge (i.e., resources seem greater than the demand), physiological, cognitive, and behavioral changes are observed that indicate activation; to the contrary, in the case of threat (i.e., demand seems greater than resources), changes are observed that indicate inhibition. Note that Blascovich and colleagues (Blascovich, 1990; Seery et al., 2004) use physiological indices of cardiac output that differ from our measures of SBP change; also, the model and research pertains to participants who are already engaged in a task, whereas our participants start out precommittal. Still, one

could speculate that high-expectancy mental contrasting participants behaved in line with a challenge interpretation, as the activation of physiological processes readied them for energy expenditure. To the contrary, low-expectancy mental contrasting participants showed deactivation of physiological processes of energy expenditure, leading to low commitment. This deactivation response in mentally contrasting low-expectancy participants differs from the threat response postulated by Blascovich (1990), who assumes that people already engaged in the task interpret overwhelming demands as threat.

### *Mental Contrasting and Approach Versus Avoidance Motivation*

Our results also have implications for the hierarchical model of approach and avoidance motivation (Elliot, 2006; Elliot & Church, 1997), which distinguishes motivation and goals as different entities of goal pursuit. Whereas the underlying motivation provides the energy, goals provide the direction to act. In the framework of the hierarchical model, one might speculate that mental contrasting of a positive future with the negative reality would provide the underlying motivation, but only if expectations of success are high. After mental contrasting, expectations provide the assurance and energy for the organism to commit (consent). As positive fantasies show the direction by pointing to the desired outcomes, an approach goal is formed.

However, fantasies about the future may also pertain to negative, feared outcomes. Such a negative future may be contrasted with a positive present reality that needs to be preserved. Indeed, in a study on smoking cessation, mental contrasting of a negative future (e.g., lung disease) with the positive reality that needs to be preserved (e.g., healthy breathing) effectively committed high-expectancy participants to goals of avoiding the negative future (e.g., participants reported to have promptly acted to avoid cigarette consumption; Oettingen, Mayer, & Thorpe, 2009). Importantly, fantasizing about the (negative) feared future alone, without juxtaposing the positive reality, did not activate expectations. After such one-sided thinking about the negative future, efforts to avoid the dreaded future were moderate and expectancy independent.

Avoidance-based energization can be detrimental for performance and well-being, whereas approach-based energization is beneficial. People with an avoidance motivation suffer from test anxiety (Covington & Roberts, 1995), from a lack of intrinsic interest in the subject matter, and from relatively poor performance (Elliot & Church, 1997). Thus, we recommend mental contrasting of a negative future with the positive reality only when people are not able to generate positive fantasies about

the future and therefore mentally contrasting a positive future with negative reality is not possible. For example, depressive affect might prevent people from fantasizing positively about the future in general, or a strong addiction might prevent them from fantasizing about the positive consequences of abstaining. In the case of addictions, building avoidance goals by mentally contrasting a negative future with a positive reality may be an adequate way to commit people to change their detrimental behaviors.

### *Limitations of the Present Research*

Mentally contrasting the future with the reality is conducive to forming expectancy-dependent goal commitments, irrespective of whether the future is positive or negative (i.e., commitment to approach or avoidance goals are formed; Oettingen et al., 2009). As for the mediating role of energization, the present research speaks to mental contrasting of the positive future with the negative reality (i.e., forming expectancy-dependent commitment to approach goals). Research still needs to test the mediating role of energization in mental contrasting of a negative future with positive reality, that is, its role in forming expectancy-dependent commitment to avoidance goals.

We measured energization via SBP and self-reported feelings of energization. Future research needs to establish whether energization as measured via other parameters would show similar patterns of results. For example, one could measure energization via nonverbal behavior such as facial expression, posture, or speech modulation. Moreover, we found significant but partial mediation in both studies. It is important to know which other mechanisms mediate the expectancy–commitment link after mental contrasting. For example, it might be that mental contrasting not only changes the level of energization but also cognitive variables such as memory processes (e.g., working memory, episodic memory), attention processes (salience of relevant stimuli), or vividness of imagery (Achtziger, Fehr, Oettingen, Gollwitzer, & Rockstroh, 2009).

Furthermore, we do not know how long the observed energization will last. Maybe it vanishes quickly but leaves commitment intact; maybe it is conjured up each time a person thinks about the positive future that was elaborated in the mental contrasting exercise. How exactly expectancy-dependent commitment is sustained over time and across obstacles and what the role of energization is still needs to be explored.

### *Implications for Goal Research*

The results of the two studies presented here allow for speculation regarding the transfer of energization resulting from mental contrasting in one domain to

other unrelated domains. For example, when one engages in mental contrasting with regard to an interpersonal concern, energization resulting from this process could transfer to an unrelated task, such as studying for an upcoming test, thus potentially influencing subsequent commitment and action toward an unrelated desired outcome.

However, energization as a result of mentally contrasting a particular desired future (e.g., increased energy to work toward improving a relationship with a significant other) could have the opposite effect by distracting or even inhibiting energy mobilization toward other endeavors, thereby impeding progress (e.g., decreased energy dedicated to building relationships with friends). Energization, in this sense, could shield goals from derailment. Future studies should consider both kinds of transfer effects of energization as a result of engaging in mental contrasting.

### Implications for Applied Research

Training programs in achievement, health, and interpersonal communication commonly focus on the strengthening of efficacy beliefs (Bandura, 1997; Schunk, 1989). Such programs could enhance their benefits by complementing their efficacy-heightening procedures with mental contrasting, thus providing those with high efficacy expectations with the necessary energy to commit to and pursue their goals. To the contrary, when expectations of success are low and cannot be strengthened, mental contrasting is an advisable strategy as it opens up creative re-engagement to more feasible projects. Only when more promising alternatives are not available, indulging is expedient as it keeps people engaged at least to a moderate degree.

### Conclusion

The study of motivation is concerned with the processes that give behavior energy and direction. How people treat their fantasies about a desired outcome determines the energy that will be mobilized to commit and pursue goals. The present research suggests that using the strategy of mental contrasting enables those with high expectations to deploy the necessary energy to make their dreams come true.

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