From Desired Futures to Goals: Mental Contrasting Effects on Goal Commitment Mediated

by Future-Reality Associations

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Abstract

Mentally contrasting a desired future with the impeding reality transforms desired futures into binding goals in line with one's expectations of success (Oettingen et al., 2001). A series of three studies shows that mental contrasting achieves this transfer by affecting the associations between future and reality: when expectations of success were high, mental contrasting established strong future-reality associations; when expectations were low, mental contrasting established weak future-reality associations (Study 1, Study 2). The future-reality associations in turn mediated mental contrasting effects on self-reported goal commitment indicators (Study 1) as well as on goal-striving behavior (Study 2). Finally, mental contrasting effects on future-reality associations prevailed until the goal was achieved (Study 3). Implications for research on the self-regulation of goal setting and goal representations are discussed.

Introduction

Goals can be defined as "cognitive representations of a future object that the person is committed to approach or avoid" (Elliot & Fryer, 2008, p. 244). This definition encompasses the basic features that most research implicitly or explicitly ascribes to goals, and highlights two distinctive features. First, goals emerge when people commit to take action in order to reach (or avoid) a future object. Without this commitment, the object is just a wish (Gollwitzer, 1990), an incentive (Klinger, 1977), a goal candidate (Elliot & Friedman, 2007), or a fantasy (Oettingen, 1999). Focusing on this goal characteristic, research on how people set themselves goals has identified mentally contrasting thoughts of the desired future with thoughts of the impeding reality (i.e., potential obstacles standing in the way of the desired future) as a strategy that transforms desired futures into binding goals (Oettingen, Pak, & Schnetter, 2001). Second, goals are cognitively represented. Without the idea of a cognitive representation that guides the striving, mechanical devices that use a standard for regulation could even be said to have goals (Elliot & Fryer, 2008). Research on the cognitive representations of goals indicates that these representations share some characteristics with other cognitive representations (e.g., Bargh, 1990), but also have unique characteristics that set them apart (e.g., Förster & Liberman, 2007). However, little is known about what distinguishes goal representations from representations of merely desired futures or fantasies – that is, how goal commitment is cognitively represented.

Building on research on both the self-regulation of goal setting and on goal representations, we address this question by examining the changes in the mental representations of the desired future engendered by mental contrasting and relating these changes to goal commitment. Thereby, the present research shows not only how mental contrasting creates goal commitment, but also which changes in mental representations mark the transformation of a desired future into a goal people are committed to strive for.

In the first part of the present work, the theoretical background of fantasy realization theory and the corresponding empirical evidence and research on cognitive representations of motivational constructs and goal pursuit is reviewed, and then, the predictions of fantasy realization theory and research on cognitive representations of motivational constructs are related in order to derive testable predictions about the changes in the cognitive representation of the desired future after mental contrasting. In the second part, a set of studies that empirically tested these predictions is presented. And in the last part, the presented results and their implications for research on the self-regulation of goal setting as well as research on cognitive representations of motivational constructs are discussed.

1. The Self-Regulation of Goal Setting

A long tradition of research suggests that people strive for goals that are desirable and feasible (e.g., Atkinson, 1957; Bandura, 1977; Gollwitzer, 1990; Klinger, 1975; Locke & Latham, 1990). The underlying idea is that people entertain at any given moment more wishes than they have resources to realize (Baltes, 1997; Heckhausen & Gollwitzer, 1987). Hence, people must select some wishes for investing their resources into, and the criteria for this wish selection are the perceived desirability and feasibility. Desirability comprises the summarized expectations of the pleasantness of short-term and long-term consequences of goal attainment (Heckhausen, 1977). Feasibility is defined as expectations that future events and actions will occur (Gollwitzer, 1990). Prominent examples include expectations of whether one can execute a behavior necessary for realizing a specific outcome (i.e., self-efficacy expectations; Bandura, 1977), expectations that a behavior will lead to a specified outcome (i.e., outcome expectations; Bandura, 1977; instrumentality beliefs; Vroom, 1964), and judgments about the general probability of a certain outcome (i.e., general expectations; Heckhausen, 1991; Oettingen & Mayer, 2002).

However, the notion of people striving for goals that are desirable and feasible leaves the question of how desirability and feasibility are translated into goal setting unanswered.

Thereby, the approach cannot explain why, for example, high expectations of reaching a desired future not automatically guarantee the emergence of strong goal commitments (cf. Oettingen & Gollwitzer, 2001). Fantasy realization theory (Oettingen, 1999; Oettingen et al., 2001), addressing the question of how goal commitment emerges, identified a way of thinking about the future that translates the expectations of reaching a desired future into goal commitment with subsequent goal striving: Mentally contrasting a desired future with the reality that impedes its realization.

In mental contrasting, people imagine the attainment of a desired future (e.g., becoming a lawyer, writing an article) and then reflect on the reality that stands in the way of attaining the desired future (e.g., excessive partying, having little time). Fantasy realization theory assumes that the conjoint envisioning of future and reality brings both simultaneously to mind and links them together in the sense of the reality obstructing the realization of the desired future. This sense of the reality standing in the way of the desired future activates the expectations of overcoming the reality in order to reach the desired future. Subsequently, these expectations set the course for a person's goal commitment and goal striving. When expectations of success are high, people will actively commit to and strive toward reaching the desired future; when expectations of success are low, people will refrain from doing so. To summarize, fantasy realization theory predicts that mental contrasting brings goal setting in line with one's expectations of success by inducing the sense that the reality is obstructing the desired future. Consequently, other self-regulatory strategies of goal settings that do not induce this sense of a conflict between desired future and impeding reality will fail to bring goal setting in line with one's expectations of success.

The model of fantasy realization specifies three additional modes of thinking about the future; all fail to lead to goal commitment and goal striving guided by the perceived likelihood of attaining the desired future. People may either solely envision the attainment of the wished-for future (i.e., indulging), solely reflect on the impeding reality (i.e., dwelling), or

contrast the impeding reality with the desired future (i.e., reverse contrasting). Following

fantasy realization theory, using any of these strategies should fail to translate the

expectations of success into goal commitment. For example, merely indulging in the desired

future or merely dwelling on aspects that impede the realization of the desired future does not

induce a sense of the impeding reality obstructing the realization of the desired future.

Interestingly, also contrasting the impeding reality with the desired future (i.e., reverse

contrasting) should not induce the sense that the reality obstructs the realization. Oettingen

and colleagues (2001, p. 743) theorize that only when the desired future is taking as a

reference point for contrasting with the impeding reality, will a sense of the impeding reality

standing in the way of the desired future will occur. Hence, starting with the impeding reality

and then contrasting it with the desired future will fail to activate the expectations of success.

For all the three outlined self-regulatory strategies, the level of goal striving is determined by

the a priori commitment that the person holds with respect to attaining the desired future.

Thus, it is mental contrasting, and it is not indulging, dwelling, or reverse contrasting that

succeeds in strengthening goal commitment with subsequent goal striving when expectations

of success are high and in weakening it when expectations of success are low.

1.1 Mental Contrasting and Goal Commitment

A multitude of studies tested the effects of mental contrasting, indulging, dwelling,

and reverse contrasting on goal commitment and goal striving (Oettingen, 2000; Oettingen,

Hönig, & Gollwitzer, 2000; Oettingen, Mayer, Thorpe, Janetzke, & Lorenz, 2005; Oettingen

et al., 2001). For example, in a typical study, students were invited to a study about

interpersonal problems, were asked to name their most important interpersonal problem, to

indicate the expectations of successfully solving that problem, and to note down four aspects

associated with the desired future, and four aspects associated with the impeding reality

(Oettingen et al., 2001, Study 3). Then four experimental conditions were established: a

mental contrasting, a reverse contrasting, an indulging, and a dwelling condition. In the

mental contrasting condition, participants wrote about the desired future and the impeding reality in alternating order, starting with a desired future aspect. In the reverse contrasting condition, participants wrote about the impeding reality and the desired future in alternating order, starting with the impeding reality. In the dwelling condition, participants exclusively wrote about the impeding reality; in the indulging condition they wrote exclusively about the desired future. To measure the dependent variables, participants reported directly after the experiment how energized they felt, and two weeks later, they indicated when they had started to implement the two most difficult steps towards solving their interpersonal problem. Results showed, as predicted, that participants in the mental contrasting with high expectations of solving their interpersonal problem reported the strongest feelings of energization compared to the other experimental conditions, and started to strive for solving their problem immediately after leaving the lab; whereas participants with low expectations in the mental contrasting condition felt the least energized, and delayed their actions the longest. In contrast, participants in the reverse contrasting, dwelling, and indulging conditions reported intermediate feelings of energization and delay of steps towards solving the problems independent of their expectations of success.

This pattern of results was replicated in a variety of studies. For example, experiments pertained to studying abroad (Oettingen et al., 2001, Study 2), acquiring a second language (Oettingen et al., 2000, Study 1), getting to know an attractive stranger (Oettingen, 2000, Study 1), finding a balance between work and family life (Oettingen, 2000, Study 2), improving one's self (Oettingen et al., 2005, Study 1), and to idiosyncratic interpersonal wishes of great importance (Oettingen et al., 2001, Study 1, Study 3). Further, goal striving was assessed by cognitive (e.g., making plans), affective (e.g., feeling responsible for the wished-for ending), motivational (e.g., feelings of energization), and behavioral indicators (e.g., invested effort and achievements). Indicators were measured via self-report or observations and either directly after the experiment or weeks later. In all of these studies the

same pattern of results appeared: Given high expectations of success, participants in the

mental contrasting group showed the strongest goal commitment and goal striving; given low

expectations, people showed least goal commitment and goal striving. Participants who

indulged in images about the desired future, dwelled on images of the impeding reality, or

contrasted the impeding reality with the desired future intermediately committed to and

strived for realizing their wishes independent of their expectations of success.

An important point for the replication of effects is that they are not bound to a specific

experimental paradigm, but also occur when the procedure of the induction is changed.

Inducing the experimental conditions with different procedures strengthens the validity of the

empirical results and provides a more stringent test of the theory. Consequently, Oettingen

and colleagues developed an alternative procedure labelled as reinterpretation paradigm

(Oettingen, 2000, Study 2; Oettingen, Mayer, Thorpe, Janetzke, & Lorenz, 2005). The new

method of inducing the experimental conditions focuses all participants on both future and

reality but then selectively deemphasizes either the reality (indulging condition) or the future

(dwelling condition), or neither the reality nor the future (mental contrasting). Specifically, all

participants were first asked to elaborate the future and the reality, but depending on the

condition, they were then encouraged to elaborate the reality from different points of view. In

the indulging condition the subjects were led to trivializing the reality; in the dwelling

condition participants were led to overemphasize the reality. The reinterpretation of the reality

leads to devaluing the reality (indulging) or to becoming fully engrossed in it (dwelling). In

sum, this paradigm establishes the conditions by making the participants differentially

reinterpret the reality.

Oettingen (2000, Study 2) used this paradigm in the interpersonal domain, namely for

inducing different self-regulatory strategies for the desired future of mastering the difficult

balance between work and family life. Female doctoral students first thought about their lives

ten years from now and wrote down anything that came to their mind. After this fantasizing

procedure, expectations were measured. Experimental conditions were established via different elaborations of provided statements from mothers about the harsh realities of being both mother and a career woman. In the mental contrasting group the students were asked to give their thought and fantasies about the statements free reign and write them down. In the indulging and dwelling groups participants received additional instructions. In the indulging group the doctoral students were asked to think about false pretense in the statements (trivializing the reality) and in the dwelling group they were asked to think about why they did not yet have a child (becoming fully engrossed in reality). Two weeks later, the willingness to exert effort, the anticipated disappointment in case of failure, and the use of simulations of the process for combining work and family were assessed. The results showed the same pattern as in the studies reported before. High-expectancy participants in the mental contrasting group reported the highest willingness to exert effort, the highest anticipated disappointment and the highest frequency of using process simulations; low-expectancy students in the mental contrasting group showed the lowest scores on all dependent variables. In contrast, participants in the indulging and dwelling group had intermediate scores on these variables independent of their expectations of success. The reinterpretation paradigm was also applied to the domain of self-improvement goals (Oettingen et al., 2005, Study 1) and to negative, xenophobic fantasies about suffering from the influx of immigrants (Oettingen et al., 2005, Study 2). Once again, the same pattern of results was found in both studies.

1.2 Mental Contrasting and Negative Feedback

As outlined, previous research showed that mental contrasting establishes goal commitments in line with one's expectations of success. In a next step, research tested whether mental contrasting establishes goal commitments strong enough to ensure goal striving despite negative feedback (Pak, Oettingen, & Kappes, 2009). Negative feedback is an inevitable part of goal striving and, according to Lewin (1948) mastering negative feedback is a paradoxical task. On the one hand, persistent and effective goal striving after negative

feedback demands keeping an optimistic future outlook and maintaining confidence in oneself. On the other hand, successful goal striving also demands realistic appraisal of the present situation to ensure progress towards the goal. Hence, when people are confronted with negative feedback, they need to acknowledge it in order to extract important information for subsequent goal striving, but they also need to protect their positive self-view and optimistic future outlook to stay motivated on their way to goal achievement. Consequently, research focuses on the role of mental contrasting with regard to the three critical features of upholding goal striving in the face of negative feedback: processing goal-relevant information embedded in negative feedback, protecting one's positive self-view in the face of negative feedback, and maintaining an optimistic future outlook in one's attributions for negative feedback.

Successfully handling negative feedback requires extracting meaningful knowledge from it. However, negative feedback may not be readily processed, because the information entailed in the negative feedback may diminish one's self-view and negative stimuli are less likely to be processed than positive stimuli in general (Taylor, 1991). By forging strong goal commitments, mental contrasting in light of high expectations should help people effectively processing negative feedback. To test this hypothesis, students were invited to participate in two supposedly independent studies (Pak, et al., 2009, Study 1). In the first part, they named an important interpersonal concern (e.g., improving relationships with one's parents, getting to know somebody) and reported their expectations of successfully dealing with it. In the second part, students completed an ostensible test of social competence. After completing the test, participants received false feedback statements about their social competence that focused on situations where participants supposedly show interpersonal weaknesses and failings. Finally, a mental contrasting, an indulging, and a dwelling condition were established. At the end of the experiment, all participants were confronted with a surprise cued recall test for the feedback received, with the number of recalled adjectives describing participants' social weaknesses serving as the dependent variable. Results showed that

participants in the mental contrasting condition with high expectations for reaching the desired future were most successful in extracting meaningful information from the negative feedback and participants in the mental contrasting condition with low expectations of success were least successful in extracting meaningful information. Finally, participants in the indulging and dwelling groups recalled a moderate number of negative adjectives and recall was independent of expectation level.

Although mental contrasting in light of high expectations promotes effective processing of negative feedback, it may incur the cost of damaging the goal striver's self-view. However, goal commitments established by mental contrasting might be strong enough to protect the positive self-view despite the processing of the negative feedback. For testing the latter prediction, students were again invited to participate in two supposedly independent studies (Pak, et al., 2009, Study 2). In the first study, participants named an important interpersonal concern and rated their expectations of success. In the second study, they completed the same aforementioned social competence test. This time, however, normative rather than non-comparative negative feedback was provided. Negative feedback that includes a comparison to a norm has been shown to exert a more detrimental influence on self-views than non-comparative feedback including task-oriented information (Butler, 1987; Kluger & DeNisi, 1997). After receiving the feedback, the three self-regulatory strategies of goal setting were induced (i.e., mental contrasting, indulging, and dwelling). The change in pre- to post-manipulation self-views served as the dependent variable. Results showed, that participants in the mental contrasting condition showed expectancy-dependence in their self-view change scores: Those with high expectations of success sustained their view of their social abilities while those with low expectations showed a comparatively diminished self-view. In the other two conditions (i.e., indulging and dwelling), no expectancy-dependent change was observed.

Another facilitator of successful goal striving is an optimistic attribution pattern in response to negative feedback, because such attributions influence a person's outlook for

future goal striving (Seligman, 1991). To test whether mentally contrasting a feasible wish promotes optimistic explanations of negative feedback, students were invited to participate in a study about social competence (Pak et al., 2009, Study 3). In the first part, students were asked about their expectations to perform well on an upcoming social competence test. Next, a mental contrasting condition and an indulging condition were established. In the second part, students completed the social competence test and then received normative negative feedback on their performance. Finally, participants indicated what they thought caused their negative performance and then rated this cause on the three explanatory dimensions: stable versus unstable, global versus specific, and internal versus external. These three dimensions encompassed an overall index of optimistic attributions (Seligman, 1991). Participants in the mental contrasting condition with high expectations of success used optimistic attributions to explain the negative feedback, whereas those with low expectations of success used pessimistic attributions. Participants in the indulging condition used moderately optimistic attributions to explain their negative feedback, independent of their expectations of success.

In conclusion, the outlined research on mental contrasting and negative feedback suggests that the goal commitments established by mental contrasting are strong enough to keep people on their goal striving track despite negative feedback by helping them to extract the important information from negative feedback, protect their self-view of competence, and explain negative feedback in optimistic terms.

1.3 Motivational Mechanism of Energization

After a variety of studies established that mental contrasting translates desired futures into goals people a committed to strive for in line with one's expectations of success, research examined a proposed mechanism that supports this translation, energization (Oettingen et al., 2009). Research on the mechanism of energization is based on the idea that energization helps to initiate goal commitment by providing the needed energy for traversing from a precommitment to a commitment state. Additionally, energization provides the needed energy

for the resource-demanding endeavor of goal striving (Locke & Latham, 2002; Muraven, Tice, & Baumeister, 1998; Vallerand et al., 2007).

As a mechanism, mental contrasting should instigate expectancy-dependent energization that then helps people to commit to their goals. Forming commitments is an effortful process; hence energization instigated by mental contrasting should help people transfer their expectations of success into goal commitment. Motivational research traditionally emphasized the importance of energization. Broadly, energization can be defined as the "extent to which the organism as a whole is activated or aroused" (Duffy, 1934, p. 194) and is either measured by self-report (e.g., activity incitement, Brunstein & Gollwitzer, 1996; subjective vitality, Ryan & Frederick, 1997) or by cardiovascular responses (Wright, 1996). Oettingen and colleagues (2009) theorized that mental contrasting in light of high expectations of success turns the perception of the impeding reality into an obstacle, that needs to be overcome and additionally, that can be overcome. This perception should energize people, and this energization in turn helps people to form strong goal commitments.

Energization has been observed as a mediator of mental contrasting effects on goal commitment in two studies (Oettingen et al., 2009). In the first study, physiological indicators (i.e., cardiovascular responses) of energization were used. Cardiovascular responses, such as systolic blood pressure, are shown to be reliable indicators of physiological arousal states and effort mobilization (Gendolla & Wright, 2005; Wright & Kirby, 2001). Indeed, in this study, objective measures of change in energization via systolic blood pressure during the process of mental contrasting and indulging showed that in the mental contrasting condition, high expectations led to an increase in energization, and low expectations led to a decrease in energization, whereas in the indulging condition, no change in energization was found. Further, the effects of mental contrasting on goal commitment where mediated by the change in energization.

In the second study, using an acute stress paradigm (i.e., videotaped public speaking; al' Absi et al., 1997), goal commitment was measured by objectively rated performance and subjectively experienced performance. Economics students participating in this study were informed that they were to deliver a speech in front of a video camera to help researchers to develop a measure of professional skills for a human resource department. Participants were randomly assigned to either a mental contrasting or an indulging condition. As dependent variables, participants' initial feelings of energization (e.g., how energized they felt thinking about giving their talk) and evaluations of their own presentations were measured via self-report. Persistence, as an indicator of goal commitment, was measured by the length of each participant's presentation; performance quality was measured via independent raters' evaluations of the quality of the videotape content (Oettingen et al., 2009, Study 2). Again, consistent with findings of previous mental contrasting studies, individuals in the mental contrasting group, contrary to those in the indulging condition, evinced a strong link between perceived expectations of success and goal commitment as measured by subjective self-evaluations of performance and objective ratings of the videotaped presentations. Moreover, feelings of energization showed the same pattern of results as the goal striving variables. Finally, in the mental contrasting condition, feelings of energization fully explained the relationship between expectations of success and both subjective and objective performance quality.

Summary

The outlined research on mental contrasting shows that mental contrasting in light of high expectations of success instigates motivational energization which then furthers the establishment of strong goal commitments, strong enough even to withstand negative feedback. Mental contrasting in light of low expectations leads to disengagement, indicated not only by the withdrawal of resource investment but also by the actual decrease in energization after mental contrasting. On the other hand, other strategies of goal setting such

as reverse contrasting, indulging, and dwelling do not affect goal commitment, independent of whether the expectations of success are high or low. However, little is known about how mental contrasting achieves its effects on energization and goal commitment. Drawing on the notion that goals are cognitive representations, the question is how mental contrasting changes the underlying cognitive representation of the desired future, which then lead either to strong goal commitment (i.e., in light of high expectations) or disengagement (i.e. in light of low expectations).

2. Cognitive Representations of Motivational Constructs and Goal Pursuit

The previously described research showed that mental contrasting turns desired futures into binding goals in line with one's expectations of success; hence mental contrasting should change the representation of the desired future into a goal representation. Research on the cognitive representations of motivational constructs such as goals, means to achieve a goal, or temptations undermining the achievement of a goal points out that even though cognitive representations of motivational constructs share some features with other cognitive representations, they have additional features that set them apart. So, in order to understand how mental contrasting might turn the desired futures into goal representations, it is important to first examine the special features of cognitive representations of motivational constructs.

William James's famous observation more than a century ago, "My thinking is first and last and always for the sake of my doing" (1890, p. 333) still best encapsulates research on the cognitive representations of motivational constructs. From this perspective, human cognition in general stands in the service of action. This should be especially true for motivational constructs because they strongly impact actions. Derived from this notion is a functional perspective on motivational constructs, stating that the features and the organizational structure of motivational constructs should serve the successful accomplishment of the goal (Förster, Liberman, & Higgins, 2005; Gollwitzer, 1990; Goschke & Kuhl, 1993; Higgins, 1996; Kruglanski et al. 2002; Marsh, Hicks, & Bink, 1998). One line

of research on motivational constructs has addressed goal representations directly, focusing mainly on the flow of accessibility in goal representations from the onset of the goal to the achievement of the goal. Another line of research on motivational constructs has addressed the associations between different motivational constructs and their impact on goal commitment and goal striving. Both lines of research will be reviewed next to offer ideas how the transition from a desired future into a goal representation can be conceptualized.

2.1 Goals Representation and Goal Pursuit

The cognitive representation of goals is one key feature of the definition of goals. Given the popularity of goals in psychological research and their impact on behavior, it is surprising how little is known about their cognitive features and structure (Elliot & Fryer, 2008). Critically, research on goal representations has not yet directly addressed what constitutes a goal representation and what sets them apart from representations of mere wishes or desired futures. Goals in the subsequently reviewed research are either preexisting goals or assigned goals and are mostly measured by using the object of the goal; i.e., "the hub or focal point of regulation" (Elliot & Fryer, 2008, p. 245). However, the object of the goal does not constitute the goal itself and does not set it apart from merely desired futures. Rather, goals and merely desired futures share the same object. For example, the goal of excelling at an upcoming exam and the mere desired future of excelling at an upcoming exam share the same object (i.e., excelling at an upcoming exam). It is the commitment to strive for the object and its impact on behavior that sets goals and wishes apart. Hence, research so far does not provide insight about the constituting features of goal representations which distinguish them from desired futures. However, research so far provides insight into the flow of accessibility of goal representations, thereby identifying a key cognitive feature of goal representations that sets them apart from other cognitive representations.

Research on the accessibility of goal representations examines the flow of accessibility of the goal-representation and related information from the onset of a goal to its termination.

Accessibility in these studies is broadly defined as the activation potential of a memory structure: The higher the accessibility of a specific memory structure, the greater the probability that it becomes activated (Förster & Liberman, 2007; Higgins, 1996). Based on the functionality perspective on goal representation, several theories predict that the accessibility of goal representations depends on whether the goal is active or not (Anderson, 1983; Lewin, 1965; Förster, Liberman, & Higgins, 2005; Goschke & Kuhl, 1993; Marsh et al., 1998; Klinger, 1977; Zeigarnik, 1927). In a nutshell, the main prediction of this line of research is that the act of setting a goal charges the cognitive structure with activation, thereby binding mental resources and supporting the realization of the goal. Once the goal is achieved or people disengage from it, the goal representation is inhibited, thereby freeing mental resources and facilitating subsequent, goal-unrelated actions.

Research on the accessibility of active goals predicts that the accessibility of the goal representation should persist until the goal is realized. Thereby, the persistence of goal representation accessibility ensures the implementation of goal-relevant behavior, the detection of goal-relevant stimuli in the environment and ultimately, facilitating the achievement of the goal. This research was started by the studies of Zeigarnik (1927). Zeigarnik's research was guided by Lewin's (1926) theorization about goals, predicting that an active goal, a quasi-need in his terminology, creates a tension which persists till the goal is achieved. This goal-related tension also keeps the goal active in one's memory, thereby ensuring that people do not forget to act on their goal. Testing this prediction, Zeigarnik (1927) instructed participants to perform 42 different tasks (e.g., to draw an animal). On half of these tasks, participants were interrupted before they had completed the task; on the other half, participants were given enough time to complete the task. Afterwards, the participants were asked to recall all of the tasks. A superior recall of the interrupted tasks compared to the complete tasks was found. Hence, participants had a higher accessibility for task goals (e.g., drawing an animal) that were still active because of the interruption compared to task goals

that were already achieved. Subsequent research using similar paradigms replicated that effect and further showed that the superior accessibility of active goals occurs in comparison not only to fulfilled goals, but also to neutral standards (Goschke & Kuhl, 1993; Marsh et al., 1998; Marsh, Hicks, & Bryan, 1999).

Besides the heightened accessibility of active goals, research has also examined the accessibility of completed goals. Drawing again on the functionality notion of goal representations, research predicts that once people either achieve or disengage from a goal, the accessibility of goal-related information drops below the level of the goal-irrelevant information (i.e., post-fulfillment inhibition). Inhibition is defined either as lower accessibility of goal-related words compared to goal-unrelated words (Förster, Liberman, & Higgins, 2005) or compared to the accessibility of goal-related words in a control group (e.g., Marsh, et al., 1998). For example, Marsh and colleagues (1998; see also Marsh et al., 1999) put participants either in a goal or no-goal condition and found by using a lexical decision task that after goal completion the accessibility of goal-related information in the goal condition was lower than in the no-goal condition (see also Rothermund, 2003). Such inhibition after goal completion was only observed for goal-related constructs, not for semantic constructs (Marsh, et al., 1998). This inhibition after goal completion might reflect that the goal-associated stimuli had lost their functionality for the individual; the inhibition ensures that this information does not interfere with subsequent tasks and goals by binding mental resources (Liberman, Förster, & Higgins, 2007). In line with this idea, goal hierarchy models (Carver & Scheier, 1998; Vallacher & Wegner, 1987) theorize that the fulfilled goal is deactivated and a higher-order goal which gave the fulfilled goal its meaning is reinstated. Thereby, the cognitive system clears up and frees resources to pursue the next goal.

Goals can not only be distinguished by whether people are actively pursuing or have already achieved them, but also by the degree to which people are committed to achieve the goal. Examining the influence of goal commitment, Förster, Liberman, and Higgins (2005;

Study 4, 5, & 6) found that the described phenomena of accessibility increased with the onset of a goal, and the accessibility decrease upon the completion of a goal is related to the strength of one's commitment to achieve the goal. Specifically, the higher one's commitment is to reach a goal, the higher the accessibility of goal-relevant information, and the lower the accessibility of goal-relevant information after goal fulfillment. Building on expectancy-value models of motivation (e.g., Atkinson, 1957) Förster et al. (2005) manipulated either the expectations of reaching the goal (Study 4), or the value of reaching the goal (Study 5), or the expectations and value of the goal (Study 6). Results showed that when the expectations of reaching the goal were high (versus low), or when the value of reaching the goal was high (versus low), or when the expectations and value were high (versus low), the accessibility of the goal-relevant stimuli was comparatively stronger when the goal was not yet achieved, and the inhibition of the goal-relevant stimuli was comparatively stronger when the goal was achieved.

To summarize, in line with the functional view on goal representations, research on the flow of accessibility in goal representations has found that the onset of a goal is accompanied by an increase in the activation of the goal representation, and the completion of a goal is accompanied by an inhibition of the goal representation. Additionally, these effects are related to the degree of goal commitment. However, none of the studies so far has directly tested whether the increase in accessibility of goal representations supports goal striving and goal achievement. One potential argument for the lack of such studies is that accessibility of the goal representation per se might not exert a strong influence on goal striving; rather, the activation of specific goal-related motivational constructs connected to the goal representations might have a strong influences on goal commitment and goal striving. This idea underlies research on the associations between different motivational constructs and their impact on goal commitment and goal striving.

2.2 Associations between Motivational Constructs and Goal Pursuit

Accessibility of a construct means not only that the construct itself is more accessible, it also means that associated information is co-activated (Wyer, 2007). Based on this principle, research on the associations between different motivational constructs has started to examine the role of certain associations between goals and other relevant constructs for goal commitment and goal striving. Most of this research is conducted under the theoretical framework of goal-system theory (Kruglanski, 1996; Kruglanski et al. 2002) which assumes that goal systems are memory networks consisting of associations between one goal and means to achieve the particular as well as between the goal and other goals,. Hence, research has focused mainly on the function of these two different kinds of associations. First, research has focused on the associations between goals and corresponding means (e.g., Shah, Friedman, & Kruglanski, 2002, Kruglanski et al. 2002, Aarts & Dijksterhuis, 2000). Second, research has examined the effects of associations between goals and other goals, such as associations between related versus competing goals and subordinate versus superordinate goals (e.g., Shah et al., 2002, Fishbach, Friedman, Kruglanski, 2003, Papies, Stroebe, & Aarts, 2008). Not all of these studies are of interest for the presented work (for reviews see Kruglanski et al., 2002; Shah & Kruglanski, 2008; Ferguson, Hassin, & Bargh, 2008); hence we will review an exemplary subset of these studies pertaining to associations between goals and means as well as between goals and competing goals (i.e., temptations). Importantly for the present research, both research lines suggest that cognitive representations of motivational content exert their influence on goal commitment and goal striving via specific associations between these motivational constructs.

One line of research focuses on the role of associations between goals and means for goal commitment. Starting from the classical notion that goal commitment is a multiple function of the expectations of reaching the goal and value of reaching the goal (e.g., Atkinson, 1957), goal system theory states that the associations between goals and means

impact the expectations of reaching a goal, thereby influencing goal commitment (Kruglanski et al., 2002). Specifically, the theory states that strong goal-means associations increase the perceived likelihood of reaching the goal, which results in stronger goal commitment, whereas weak goal-means associations decrease the perceived likelihood of reaching the goal, which results in weaker goal commitment. Kruglanski and colleagues (2002) report one study which was designed to test this hypothesis. Participants reported current goals they were striving for and the corresponding means to reach each goal. Then, all participants participated in a subliminal priming task with two different conditions. In the experimental condition, participants were repeatedly primed with their goals and had to respond to the previously reported means. This condition should increase the goal-means association strength. In the control condition, participants were primed with control words and had also to respond to the previously reported means. Afterwards, all participants indicated their goal commitment. As predicted, reported commitment in the experimental condition was higher than in the control condition. Kruglanski and colleagues (2002) interpret this finding as support for their notion that the strengthening of goals-means associations furthers goal commitment. However, the nature of the experimental manipulation offers also a different explanation. In the experimental condition, the goal was repeatedly primed subliminally whereas in the control condition no goal primes occurred. Hence, the reported difference between the two conditions might be due to the higher accessibility of the goal per se, rather than be caused by the strengthening of the goals-means associations. Even more important for the present research is that the underlying mechanism, i.e., the increase in the expectations of reaching the goal, was not measured.

Interestingly, Kruglanski et al. (2002, p. 351) argue that mental contrasting effects on goal commitment might be interpreted via the outlined mechanism. In this reasoning, mentally contrasting a desired future with the impeding reality should instigate a means-generating attempt. If successful, the generated means increase the perceived likelihood of

reaching the desired future, thereby fostering goal commitment. If not successful, the lack of means to reach the desired future should lower expectations, thereby depressing commitment. Even though the instigation of a means-generating attempt by mental contrasting is an interesting idea meriting closer examination, the commitment induction via the alteration of expectations of success contradicts previous research showing that mental contrasting does not alter the expectations of success (Oettingen, Pak, & Schnetter, 2001). To summarize, goal system theory assumes that goal-means associations might play a role in goal commitment. However, more research is needed to support this notion. Yet, the outlined research is the first directly addressing the role of associations between motivational constructs in goal commitment.

There is now considerable research which describes self-control, one's ability to overcome situational impulses such as temptations in order to achieve long-term goals (Vohs & Baumeister, 2004), in terms of goal representations (Fishbach et al., 2003; Papies, Stroebe, & Aarts, 2008; Strobe et al., 2008). Temptations can be described as short-term goals competing with long-term goals. For example, when a person has the wish to lose weight (i.e., long-term goal) and now is confronted in the office with a delicious-looking donut (i.e., competing short-term goal), he has to decide whether to reject it or not. The basic idea is that it would help the person in that situation if the temptation would automatically activate the long-term goal - this reminder should then support acting in line with one's long-term goal, and prevent giving in into the temptation (Fishbach, Friedman, & Kruglanski, 2003). Testing this idea, Fishbach and colleagues (2003) measured students' associations between long-term goals and temptations with a lexical decision task by priming students with the long-term goals and recording the reaction times for the temptation target. Additionally, they measured the associations in the opposite direction, i.e., between the temptations (prime) and the long-term goals (target). Recent research points out that the direction of the association reflects their functionality (e.g., Shah & Kruglanksi, 2003; Webb & Sheeran, 2007). In particular, the

authors argued that whereas temptation-goal association should remind people of their long-term goal when faced with a temptation and thereby help people to overcome the temptation, goal-temptation associations should serve no function (see also below); rather, the automatic activation of a temptation when the goal is activated should be inhibited. In line with these predictions, results showed a comparatively higher accessibility for goals when the prime was a temptation compared to when a prime was something unrelated (Fishbach et al., 2003, Study 1, Study 2). Further, reaction times for temptations were slower when primes were participants' goals compared to unrelated primes. This pattern of results only emerged in students reporting high self-regulatory success, not for students who reported low self-regulatory success (Study 3), and for students reporting a high subjective importance of the goal, not for students with low subjective importance (Study 4). Finally, priming participants with fattening food (i.e., temptation) lead to a higher accessibility of diet-related words (i.e., long-term goal) compared to participants primed with nothing, but not compared to participants primed with diet goals (Study 5). Further, participants in the temptation prime condition and in the goal prime condition more often chose a healthy snack over an unhealthy snack than did participants in the control condition. The outlined pattern of results was replicated in three additional studies (Papies et al., 2007, Study 1; Strobe et al., 2008; Study 2, Study 3).

These results are interesting for the present work for multiple reasons. First, even though the focus was on a specific situation during goal striving (i.e., when self-control is needed), they point out that associations might play a crucial role for achieving one's goals. Second, temptations can also be described as obstacles standing in the way of achieving one's goal. In their theorizing, the authors assumed that associations from the goal to the temptation do not serve a function; rather, the inhibition of a temptation by the goal is an indicator of successful self-regulation. This interpretation is based on the repeated observation that self-reported good self-regulation goes along with comparatively slower reaction times on goal-

temptation trials. However, the interpretation of an inhibition of the temptation by the goal is not clearly supported by the data because of the lack of a neutral standard which would indicate whether real inhibition occurred or just a weaker or no activation of the temptation by the goal. Third, the presented research was the first to look at the role of associations between potential obstacles and goals in self-regulation. However, given the fact that the associations between temptations and goals were never manipulated and the meditational role was never tested directly, interpretation of the results must be cautious.

The presented work on associations between goals and means as well as goals and temptations suggests that cognitive representations of motivational content affect goal commitment and goal striving via specific associations between goal-relevant constructs. The associations between these constructs lead to a simultaneous activation of the constructs, which then influence goal commitment and goal striving. For example, the activation of a higher order goal by the corresponding temptation might help people to overcome the tempting situation and to act in line with their long term goals. This leads to the question of how associations between goal-relevant constructs are established.

2.3 The Establishment of Associations between Motivational Constructs

One final aspect of cognitive representation of motivational constructs is of particular interest for the present research; namely, how associations between motivational constructs are established. Basically, research proposes two different ways, one via repeated pairing, and the other one via a self-regulatory act. The repeated pairing hypothesis assumes that association can develop during the learning history of the individual. Specifically, the repeated and consistent simultaneous activation of two elements in the goal representation might lead to the establishment of associations between the elements (Bargh, 1997). For example, Bargh (1990) assumes that goals can be activated automatically in certain situations when the individual in similar situations always strove for a certain goal. Thus, the co-activation of a situation and a goal establishes an association between a goal-relevant situation

(e.g., the classroom) and a certain goal (e.g., achievement goal). Further, if the goal striving is always accomplished by a certain set of behaviors, then these behaviors might also be associated with the goal (Bargh et al., 2001). Hence, the situation might automatically activate a goal which in turn activates corresponding goal-relevant behavior (cf. Aarts & Dijksterhuis, 2000). Inhibitory associations might be established in the same way. Fishbach and colleagues (2003) speculate that through contextual priming, opposing goals may be simultaneously activated, competing for cognitive resources. Repeatedly resolving the conflict by selecting one goal over the other (e.g., by selectively focusing on one goal) might lead to inhibitory associations between the goals.

On the other hand, the hypothesis that self-regulatory acts can establish associations between motivational constructs rests on the assumption that self-regulatory strategies need to alter the properties of the motivational constructs in order to impact goal striving (Aarts & Dijksterhuis, 2000; Shah & Kruglanski, 2003; Webb & Sheeran, 2007). Hence, one self-regulatory act should have the potential to establish or diminish associations between motivational constructs. In particular, studies testing this hypothesis have focused on planning activities which research has found to be helpful for goal striving (e.g. Gollwitzer & Sheeran, 2006). For instance, forming an If-then plan which links a critical situation to a goal-relevant behavior (i.e., implementation intention; Gollwitzer, 1999) heightens the accessibility of the critical situation and forms an association between the situation and the behavior, and importantly, both of these effects on the motivational constructs mediate the effects of implementation intentions on goal striving (Webb & Sheeran, 2007). For the present research, the important point is that self-regulatory strategies can have a profound impact on associations between motivational constructs, and can thereby influence goal striving.

Summary

The outlined research on the cognitive representation of motivational constructs helps to specify how mental contrasting should alter the cognitive representation of the desired

future in order to turn it into a binding goal. First, research on the flow of accessibility in goal representations suggests that mental contrasting should affect the accessibility of the goal representation. Specifically, mental contrasting in light of high expectations should increase the accessibility, thereby signaling the activation of the goal; mental contrasting in light of low expectations should decrease the accessibility of the goal, thereby signaling the disengagement from the goal. The latter statement is somewhat speculative because even though research assumes that disengagement should lead to a deactivation of the goal (Martin & Tesser, 1996), this assumption has never been tested directly. Second, research on the associations between motivational constructs suggests that associations between goal-relevant constructs play a key role for goal commitment and goal striving. Hence, mental contrasting might translate the desired future into a goal by adding associations between the desired future and other goal-relevant constructs. Third, research on the establishment of associations between motivational constructs suggests that mental contrasting indeed has the potential to alter associations via a self-regulatory act. Even though the outlined findings help to narrow the anticipated effects of mental contrasting on the cognitive representation of the desired future, they leave open what exact changes mental contrasting causes in the representations of the desired future. A closer examination of the construal of the desired future during the self-regulatory act of mental contrasting has the potential to answer this question.

3. Mental Contrasting Effects on the Cognitive Representation of the Desired Future

Examining research on goal representations revealed that little is known about what constitutes cognitive representations of goals. Research on the self-regulation of goal setting might offer an answer to this question, because it identified mental contrasting as a strategy that turns desired futures into goals. However, in order to study the changes in the representation of the desired future caused by mental contrasting, the exact nature of these changes needs to be clarified. In general, changes in cognitive representations can be caused by the way people construal a mental representation (Wyer, 2007). For example, the construal

of a bad grade as an indicator of a lack of ability not only determines how you immediately feel about the bad grade, but also alters your cognitive representation of your abilities, thereby influencing future behavior (cf. Molden & Dweck, 2006). In a similar vein, the way participants construe the desired future during mental contrasting should lead accordingly to changes in the cognitive representation; changes that mark the transition from a desired future into a goal.

3.1 Mental Contrasting and the Construal of the Desired Future

Fantasy realization theory proposes that mental contrasting leads to the representation of the impeding reality as something standing in the way of the desired future, thereby making people question the realization of the desired future. This questioning of the desired future then activates the expectations of success. One question that arises is how mental contrasting achieves the construal of a representation of the desired future that questions its realization. Research on mental construal offers two explanations, accessibility effects and situated cognitions effects (Schwarz, in press; Schwarz & Bless, 2007; Wyer, 2007).

The accessibility effects hypothesis holds that when people construct a mental representation, they don't use all the information that might be relevant; rather, they use the information that is most accessible at the moment (Higgins, 1996). Accordingly, the information that is most accessible in memory at that moment exerts a strong influence on the construction of the representation. For instance, when asking survey respondents to report their marital satisfaction and their general life satisfaction, the question order has strong influence on the relation of the two questions (Schwarz, Strack, & Mai, 1991). When general life satisfaction was asked first, it correlated weakly with the marital satisfaction, but when marital satisfaction came first, it correlated strongly with the life-satisfaction. One potential explanation is that the martial question increased the accessibility of martial-related information, hence when participants were afterward asked to assess their life satisfaction

they strongly related their general life to the available martial information (Schwarz, 1999).

Yet, when they were first asked to judge their general life satisfaction, a more diverse range of

information was activated, so that construal of marital satisfaction was not influenced by this

information, and no relation between the two concepts was constructed.

The situated cognition hypothesis holds that the context - that is, the background that

frames a stimulus - determines which features of a concept are activated and thereby guide the

construal of the concept (Yeh & Barsalou, 2006). For instance, the concept of a chair is

associated in memory with a diverse set of information. However, when one thinks about a

chair, the context specifies which information becomes activated. For instance, people think

about different aspects of a chair in the context of a classroom versus an airplane. Testing this

idea, Wittenbrink and colleagues (2001) found that students think about different aspects of

an African-American person when this person was shown in the context of a church than

when shown in the context of a street corner, leading to quite different judgments of the

African-American person (see Yen & Barsalou, 2006, for a comprehensive overview). Hence,

the context exerts a strong influence on how representations are formed. Thinking first of a

church, and then about an African-American person leads to a different representation than

thinking first of a street corner and then about an African-American person.

Both the accessibility and the situated cognition hypothesis are helpful for explaining

mental contrasting effects on the construal of the desired future. In mental contrasting, people

first elaborate the desired future and then elaborate the impeding reality. Following the

accessibility hypothesis, when participants form a representation of the impeding reality, the

information about the desired future is still accessible, hence it should be incorporated into the

representation of the reality, and thereby a strong relation between future and reality should

emerge. Following the situated cognition hypothesis, the previously activated desired future

provides the context for the construction of the impeding reality, thereby activating features of

the impeding reality that are related to the desired future, and a strong relation between future

and reality should emerge. For example, when a college student first thinks about the desired future of maintaining close relationships with his high school friends, information about spending the weekends together or having long telephone conversations could come to mind. Following the accessibility hypothesis, when he then turns to the impeding reality, the construal of the impeding reality should be guided by the still-accessible information about the desired future. Following the situated cognition hypotheses, the desired future should provide the context for the elaboration of the impeding reality. Both hypotheses suggest that the order of mental contrasting should highlight information that directly contradicts the desired future, such as having to study on the weekend for exams, or having no time for lengthy telephone conversations at night. Thereby, the reality is constructed in relation to the desired future and is perceived as standing in the way of the desired future. This leads to the questioning of the desired future, activating the expectations of success.

Another question is how the activated expectations then impact the construal of the representation of the desired future during mental contrasting which then instigates either commitment or disengagement processes. Once the expectations are activated, the construal of the questioned desired future should be guided by expectations. When expectations are high, participants should form a representation of the questioned desired future as something that needs to be achieved. Hence, participants form a representation of the desired future that incorporates the impeding reality. Such a mental representation should then instigate processes towards committing to realize the desired future. Further, this newly formed representation should alter the cognitive representation of the desired future. In particular, strong associations between the desired future and the impeding reality should be formed, indicating the incorporation of the impeding reality into the desired future. For example, the student from the example above could see that he is capable of maintaining close relationships with his high school friends but that he needs to take actions to have the needed time for his friends. Hence, whenever he thinks of his high school friends, he should be reminded by the

established associations that actions are necessary to maintain the relationship with them. When expectations are low, participants should see the questioned desired future as something that can't be achieved and hence, no actions should be instigated in order to reach it. Thus, there is no need to incorporate the impeding reality into the representation of the desired future to guide actions. Therefore, no associations between the desired future and the impeding reality are formed. For example, the student could also see that he is not capable of maintaining close relationships with his high school friends; hence, he does not need to worry about overcoming his lack of time.

The outlined process of constructing the desired future by mental contrasting helps also to understand why other self-regulatory strategies of goal setting (i.e., indulging, dwelling, and reverse contrasting) fail to activate the expectations of success. In the case of indulging and dwelling, a representation of the impeding reality as standing in the way of the desired future can't emerge because only focusing on the desired future (i.e., indulging) or only focusing on the impeding reality (i.e., dwelling) does not provide the needed information for relating the desired future to the impeding reality. Put differently, the simultaneous accessibility of future and reality during the construal process is necessary for seeing the impeding reality as standing in the way of the desired future (Oettingen, et al., 2001).

But what happens during reverse contrasting? As outlined above, when people first elaborate the impeding reality and then the desired future, the expectations of success are not activated, even though both the desired future and the impeding reality are brought to mind. Fantasy realization theory states that this is the case because reversing the order does not lead to construal of the impeding reality as standing in the way of the desired future; hence, the desired future is not questioned and thereby expectations are not activated (Oettingen et al., 2001). Supporting this prediction, research on mental construal suggests that when participants start with elaborating the impeding reality first, the construal of the reality is not guided by the desired future because the related information is not accessible and / or the

desired future does not provide a context. Thereby, participants first think about a wide array of aspects of the impeding reality that are not related to the desired future; hence, when participants second think about the desired future, no relations between future and reality are established. The student from the example above might first think about how having so little time stresses him out or how much fun he has pursuing all the different activities that occupy his schedule. Hence, when he then starts to think about the desired future, the previously activated information bears no relation to the desired future, the desired future is not put in relation to the impeding reality, and thereby it is not questioned.

Another hypothesis that can be derived from the analysis of the construal process of the different self-regulatory strategies of goal setting is that even when participants elaborate both future and reality, their attention needs to be guided to the relevant features that relate future and reality. Mental contrasting achieves this effect by first activating the desired future, which then guides the attention during the construction of the impeding reality towards the features that relate the impeding reality to the desired future. However, when participants first elaborate the desired future and then elaborate the impeding reality, but their attention is guided away from the features relating future and reality, then the expectations of success should not be activated too. This is exactly what Oettingen and colleagues (2005) tested with the reinterpretation paradigm outlined above (p. 12). All participants first elaborate the future and then the reality, but depending on the condition, they were then led to elaborate different aspects of the impeding reality. In the indulging condition the subjects were led to trivializing the reality; in the dwelling condition participants were led to overemphasize the reality. Hence, in both conditions the attention was guided away from the features that relate the reality to the desired future and consequently, no activation of the expectations was observed.

3.2 Effects of Future-Reality Associations on Goal Commitment

The outlined construal of the desired future during mental contrasting highlights the integration of the impeding reality into the representation of the desired future in line with

one's expectations of success. This integration is signified by altering the associations between future and reality. In light of high expectations, a strong integration of the impeding reality into the desired future should occur, marked by the establishment of strong associations between future and reality. In light of low expectations of success, a disintegration of future and reality should occur, marked by the weakening of associations between future and reality. In the presented theorization, strong future-reality associations are responsible for the commitment to mobilize resources to reach the desired future established by mental contrasting; weak future-reality associations are responsible for the disengagement from mobilizing resources. This prediction underlies the assumption that goal commitment is determined by the degree to which people see that they have to do something in order to reach the desired future. Forged future-reality associations endow the desired future with the capacity to automatically activate the impeding reality. This automatic reminder of the impeding reality when the desired future is brought to mind should energize people to take action, and further, should guide the investment of the resources needed for goal striving.

Oettingen and colleagues (2009) showed that mental contrasting provides the needed energy to traverse from a precommitment to a commitment state; that is to transform a merely desired future into a desired future people are committed to strive for. From the perspective of the present research, the establishment of associations of the future and reality of mental contrasting, caused by integrating the impeding reality into the representation of the desired future, should have an immediate energetic effect by highlighting what needs to be overcome in order to reach the desired future. Indeed, in the first study (Oettingen et al., 2009) energization measured via cardiovascular activity was measured directly after participants elaborated the impeding reality; that is, directly after the future-reality associations should have been established. Further, once established, future-reality associations should provide the needed motivational energization during goal striving by constantly reminding people that actions are needed to realize the desired future. In line with this prediction, in the second

study of what, energization was measured via self-reported feelings of energization before and during goal striving (Oettingen et al., 2009). Hence, future-reality associations should not only provide the initial energy to commit to realizing a desired future, but should also have an energizing effect until the desired future is realized.

Future-reality associations should have additional effects. In particular, they should guide thoughts, feelings, and behavior during the goal-striving process by highlighting what needs to be done to overcome the impeding reality in order to realize the desired future. For example, the sense induced by future-reality associations that people need to do something in order to reach the attainable, desired future should instigate feelings of being responsible for achieving the desired future. Such feelings of responsibility are an important indicator of goal commitment because the more that people feel that they are responsible for achieving the desired future, the more likely it is that they will take action (Oettingen et al., 2001). Furthermore, future-reality associations should not only make people realize that they have to do something to reach their desired future, the associations should also provide a sense of clarity about what needs to be done in order to reach the desired future; an effect that reflects the integration of future and reality and should resemble "Aha!" feelings in the process of solving insight problems (Metcalfe, 1998). Hence, these associations should not only instigate the investment of resources into goal striving, but should also guide the investment by pointing out how the impeding reality stands in the way of reaching the desired future. Ultimately, the combination of these effects of future-reality associations should express itself in behavior.

Theoretical Summary

The starting point of the presented research is that goals are cognitive representations that emerge when people commit to take action in order to reach a desired future. Yet, little is known about what distinguishes the cognitive representation of a goal from that of a mere fantasy or a desired future. Research on the self regulation of goal setting showed that

mentally contrasting a desired future with the impeding reality transfers desired futures into binding goals in line with one's expectations of success. Yet, little is known about how mental contrasting engenders its effects. Combining both lines of research offers the opportunity to first, learn about what sets goal representations apart from representations of desired futures, and second, learn about how mental contrasting engenders its effects on goal commitment.

More specifically, we argued that mental contrasting in light of high expectations should lead to the integration of the impeding reality into one's cognitive representations of the desired future, thereby instigating commitment processes. Mental contrasting in light of low expectations should lead to a disintegration of the desired future and the impeding reality, thereby instigating disengagement processes. These changes in the cognitive representation should be signified by the associations between the desired future and the impeding reality. The integration of the impeding reality should be marked by the establishment of strong associations between the future and the reality; the separation of the impeding reality from the desired future should be marked by the weakening of associations between the desired future and the impeding reality. Relating these considerations to the outlined flow of accessibility in cognitive representations of goals further predicts that after mental contrasting in light of high expectations, future-reality associations should increase in accessibility, indicating the establishment of the goal. In contrast, after mental contrasting in light of low expectations, future-reality associations should decrease in accessibility, indicating the disengagement from the desired future. Importantly, the future-reality associations should engender mental contrasting effects on goal commitment and goal striving - i.e., strong future-reality associations should energize and guide people during goal striving. The outlined process of mental contrasting and its effects are summarized in Figure 1.
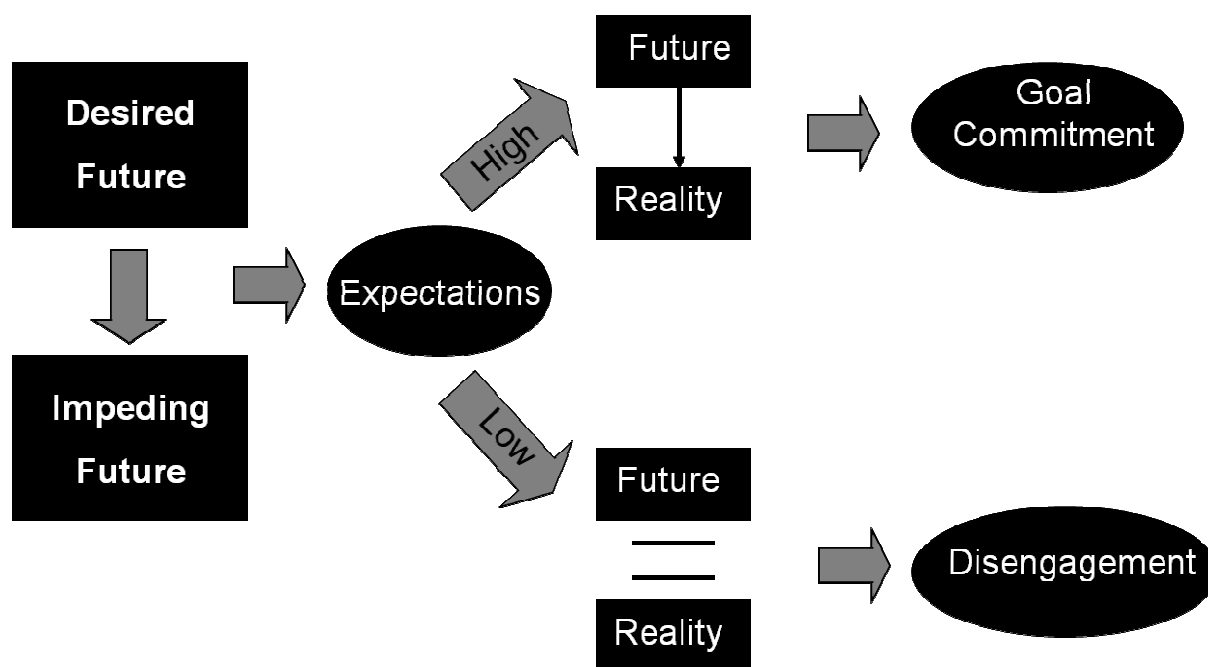
Figure 1. The process and of mental contrasting and its effects on goal commitment and disengagement

The outlined process of mental contrasting leads to the following predictions. Mental contrasting in light of high expectation of success should establish strong future-reality associations which in turn are responsible for the mental contrasting effects on energization, goal commitment, ad goal striving. Mental contrasting in light of low expectations of success should weaken future-reality associations, leading to disengagement from pursuit of the desired future. Furthermore, mental contrasting effects on future-reality associations should prevail until the desired future is realized, ensuring the constant commitment to investing resources. Other self-regulatory strategies such as reverse contrasting should not exert any effects on future-reality associations because they fail to integrate the impeding reality into the representation of the desired future. We tested these predictions in three studies.

4. Experiment 1: Future-Reality Associations and Goal Commitment

In the first study, we examined whether mental contrasting in line with one's expectations of success affects (i.e., either fosters or weakens) associations between the

desired future and the impeding reality, measured via a sequential priming task. Further, we tested whether these future-reality associations mediate mental contrasting effects on goal commitment, measured via three commitment indicators. First, we measured perceived energization as an important precursor of goal commitment (Wright, 1996; Oettingen et al., 2009). We hypothesize that strong future-reality associations would instigate energization by reminding people of the need to take actions in order to reach the desired future. Second, we measured feelings of responsibility as an important goal commitment indicator (Cantor, Norem, Niedenthal, Langston, & Brower, 1987) because future-reality associations should strengthen such feelings by showing people that the desired future is in reach, yet actions are needed in order to achieve it. Past research found mental contrasting effects on both energization and feelings of responsibility (Oettingen et al., 2001). Third, we measured perceived clarity of goal striving as an indicator of insight into the goal striving process (Emmons, 1986). By highlighting what has to be overcome to reach the desired future, future-reality associations should induce a sense of clarity.

In addition to measuring the associations between reality and future, we also measured the accessibility of future and reality, in order to provide a strong test of the hypothesis that it is the future-reality associations, and not merely the accessibility of this information, which are responsible for the transfer of expectation of success into goal commitment. Strong commitments make goal-relevant information more accessible (Gollwitzer & Moskowitz, 1996), so mental contrasting in light of high expectations of success should also make the desired future and the impeding reality more accessible, indicating strong goal commitment. Thus, we have to make sure that mental contrasting effects on future-reality associations are not merely an effect of heightened accessibility of the desired future and the impeding reality.

Furthermore, as recent research has pointed out, effects of associations in goal representations often depend on the direction they are measured (e.g., Shah & Kruglanski,

2003, Webb & Sheeran, 2007). Thus, in order to fully test the prediction that future-reality associations transfer expectations into goal commitment, we additionally measured reality-future associations to examine their influence on goal commitment. We hypothesize that mental contrasting only affects future-reality associations, and does not affect reality-future associations.

Two additional conditions were included: a reverse contrasting and a control condition. In the reverse contrasting condition, participants first elaborated the impeding reality, then the desired future. Hence, reverse contrasting participants elaborated the same content as mental contrasting participants but in the reversed order. This condition provides a strong test for our prediction that the simultaneous activation of future and reality is not enough to affect future-reality associations and goal commitment. In the control condition, participants first elaborated a positive experience, then a negative experience. Including a no-manipulation condition in which we did not manipulate the way participants thought about their desired future gives us the opportunity to see whether mental contrasting fosters or weakens future-reality associations in line with one's expectations of success by comparing the results of the mental contrasting condition to this control condition.

4.1 Method

Participants

One hundred and thirty-four New York University students (age *Mean* = 19.67, *SD* = 1.01, female = 91) participated in return for partial course credit. Participants were randomly assigned to either a mental contrasting condition (N = 41), a reverse contrasting condition (N = 47), or a control condition (N = 46).

Procedure and Measures

Participants were told that the study dealt with important life task in the social domain and how verbal abilities are related to success at these goals. Then, participants read an instruction designed to prompt thoughts about their important life tasks (Cantor et al., 1987;

Zirkel & Cantor, 1990). Participants learned that life tasks are important, "since the individual's energies will be directed toward pursuing them" and were provided three examples of current life tasks of a retired person. Next, participants were asked to think about their most important life task in the social domain and to write it down (participants named e.g., *finding a girlfriend*, *becoming more independent from my parents*, or *to make close friendships with other students*). We used this procedure to ensure that participants named life tasks from the same domain with approximately the same degree of complexity, difficulty, and importance. To measure the expectations of success, students were asked to estimate how likely they thought it was that they would succeed in their life task, using a scale ranging from 1 (*not at likely*) to 7 (*extremely likely*).

Next, participants were asked to list one aspect (i.e., desired future aspect) that they associated with the best possible outcome of their life task (participants named e.g., *happiness and joy*, *more respect*, or *trusting relationships*) and one aspect that could stand in the way of being successful in their life task (i.e., impeding reality aspect*;* participants named e.g., *being shy*, *depending on their financial support*, or *little time).* In order to obtain words for use in the lexical decision task, we asked participants to summarize the named desired future and impeding reality aspect with one word (i.e., the future word and the reality word) that best represented the aspect. Participants summarized the desired future aspects with words such as *happiness*, *respect*, or *trust* and the impeding reality aspects with words such as *shy, dependence, or time.*

Thereafter, we established three experimental conditions: a mental contrasting condition, a reverse contrasting condition, and a control condition. In the mental contrasting condition, participants were instructed to mentally elaborate on and write about their desired future aspect and their impeding reality aspect, beginning with the desired future aspect. To elicit the intended thoughts and images when thinking about the aspects, participants read the following instructions for both of the aspects:

Think about this aspect in vivid detail and write about all the thoughts and images that come to your mind. Let your mind wander and allow these events and experiences to play out. Don't hesitate to give your thoughts and images free reign. Take as much time as you need.

In the reverse contrasting condition, participants received exactly the same instructions but started with elaborating the impeding reality aspect. We included this condition to control for mere priming effects of the mental contrasting procedure on the dependent variables by letting participants elaborate exactly the same content, only in the reverse order. In the control condition, participants were asked first, to imagine and elaborate a positive experience with one of their teachers at school and second, to think about a recent, negative experience with one of their teachers and elaborate this experience as well. We included this condition to control for the order of affect activation (i.e., first positive affect and then negative affect) in the mental contrasting condition.

Dependent Variables: Reaction Times

A sequential priming paradigm adapted from Shah and associates (Shah, Friedman, & Kruglanski, 2002; Shah & Kruglanski, 2003) was used to measure the accessibility of future and reality aspects (i.e., accessibility), the associations between future and reality (i.e., future-reality associations), as well as the associations between reality and future (i.e., reality-future associations). Participants were told that the next task on the computer would measure the speed with which they recognized personally important and unimportant words and that this was a valid indicator of verbal ability which might influence success in the social domain. As personally important words, students were told that we would use the words they previously entered (i.e., the future word and the reality word). Finally, they were asked to indicate as quickly as possible whether each item presented on the screen was a word or a non-word by pressing one of two labeled keys.

Each experimental trial started with the presentation of a white fixation cross on a black screen for 500ms followed by the presentation of a white prime word for 50ms which was backward masked by a random letter string (e.g., HKELKQPWRSD) for 100ms to prevent participants from consciously seeing the primes. The mask was replaced by the presentation of a black screen which varied randomly from 100ms to 300ms to prevent participants from anticipating the presentation of the target. Finally, the target word appeared in red on the screen. All the stimuli appeared at the same location on the screen. An exemplary trial is depicted in Figure 2. To assure that participants did not perceive the prime consciously, participants were asked at the end of the experiment during a funneled debriefing (Bargh & Chartrand, 2000) whether they saw one of the primes presented before the target word appeared (see Shah & Kruglanski, 2003, for a comprehensive discussion). Six participants reported at the end of the experiment having seen some words, but could not identify what words they saw. Removing these participants from the sample did not change the presented results[1].

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[1] Note that for none of our hypothesis actual subliminal presentation of the primes, neither objectively nor subjectively measured, is necessary. We used the procedure only to ensure that participants don't start thinking about how the primes might relate to the targets during the lexical decision task; something that might interfere with automatic processes (cf. Bargh et al., 1996).
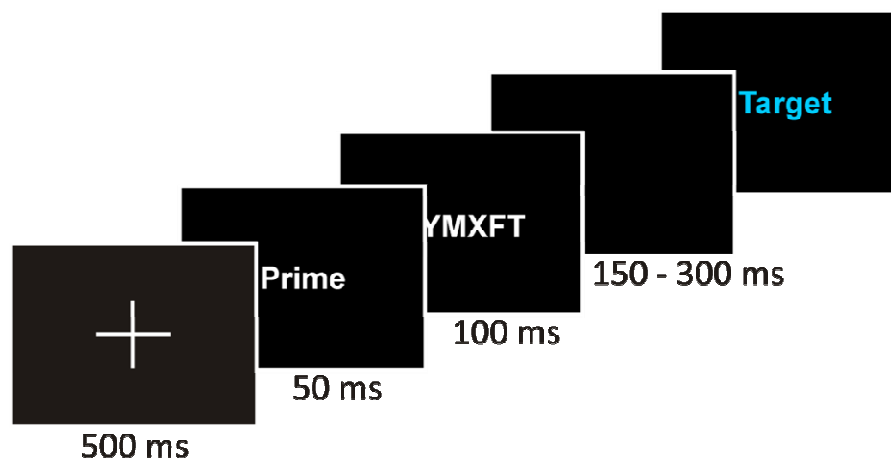
Figure 2. Depiction of an exemplary trial used in the lexical decision tasks in all three studies (ms = milliseconds)

Accessibility of the future and reality aspects was measured by participants' mean reaction times on two trials comprising unrelated negative words (e.g., radiation, corruption; Bargh, Chaiken, Govender, & Pratto, 1992) as the prime and the desired future word as the target, and two trials comprising unrelated positive words as the prime (e.g., nice, friendly, Bargh et al., 1992) and the impeding reality word as the target (see Table 1). We choose unrelated positive and negative words as primes to control for the influence of the prime valence on the subsequent processing of the target (Bargh et al., 1992; Bargh, Chaiken, Raymond, & Hymes, 1996) in comparison to the other critical trials. The strength of the associations between future and reality was determined by participants' mean reaction times on two trials comprising the desired future word as prime and the impeding reality word as target. The strength of the associations between reality and future was indexed by participants' mean reaction times on two trials comprising the impeding reality word as prime and the desired future word as target. Finally, 24 filler trials containing neutral words as primes and as targets (e.g., *umbrella*, *noon,* Fishbach, Friedman, & Kruglanski, 2003) and 32 non-word trials were included. Thus, the complete lexical decision task contained 64 trials; half were real word trials of which one-fourth were critical trials.

Table 1. Prime-target combinations used to measure the dependent variables in the lexical decision tasks. * Primes used in Study 2 and Study 3

Dependent variable	Prime	Target
Accessibility	Negative word / XXXXX*	Desired future word
	Positive word / XXXXX*	Impeding reality word
Future-reality associations	Desired future word	Impeding reality word
Reality-future associations	Impeding reality word	Desired future word

Dependent Variables: Goal Commitment

Finally, participants completed a questionnaire designed to measure their *energization*, *feelings of responsibility* for the life task, and *clarity* of the life task, indicating their goal commitment. For all questions, the response scale ranged from 1 (*not at all*) to 7 (*extremely*). In order to measure energization, participants were asked to think about their life task and then to rate to which extent they were feeling encouraged, active, and incited. Internal consistency was high ($\alpha = .95$). Feelings of responsibility were measured by using the control item from the life task questionnaire (Cantor et al., 1987) asking participants how much they felt in control of their life task. Reporting that one is in control of one's life task is a strong indicator that a person feels responsible for achieving the life task and will take initiative (Cantor et al., 1987). Perceived clarity was assessed with the clarity dimension of the Striving Assessment Scales (Emmons, 1986) asking participants to indicate how clear an idea they had of what they need to do to be successful in their life task.

4. 2 Results

Data Preparation

Only correct responses on the lexical decision trials were included in the analyses (error rate was 3.4%). Reaction times slower than 1500ms or faster than 250ms were excluded to lessen the influence of outliers. Gender and age had no significant main effects or interaction with any of the variables reported here, and thus, will not be discussed further.

Associations between Future and Reality

In a first step, we tested our main prediction that mental contrasting alters the future-reality associations in line with the expectations of success. To ensure that the effects of mental contrasting on the future-reality associations are not mere accessibility effects, we controlled in the following analyses for the accessibility of the impeding reality word; thus we controlled for the accessibility of the target stimuli per se. We specified a GLM with reaction times on future-reality trials as dependent variable, condition as a fixed between-subject factor, entered in the first step the continuous expectations measure and the reaction times on reality accessibility trials as independent variable[2]; and in the second step the interaction term of condition by the continuous expectations measured. We found no main effect of condition, $F(2, 130) = 0.14$, $p = .87$, a main effect of expectations, $F(1, 130) = 4.23$, $p = .04$, $\eta_p^2 = .03$, which was qualified by the predicted interaction between condition and expectation, $F(2, 130) = 3.37$, $p = .04$, $\eta_p^2 = .03$. In line with our predictions, results further showed that the translation of expectations into future-reality associations in the mental contrasting group was stronger than in the reverse contrasting condition, $t(130) = 2.15$, $p = .03$, and stronger than in the in the control condition, $t(130) = 2.15$, $p = .03$ (Figure 2). Further, comparing participants with high expectations in the mental contrasting condition with participants with high expectations in the other two conditions revealed that those in the mental contrasting condition had stronger future-reality associations than participants in the reverse contrasting condition, $t(130) = 1.96$, $p = .05$, and than participants in the control condition, $t(130) = 2.12$, $p = .04$. Finally, participants with low expectations had significantly weaker future-reality

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[2] In all of the reported studies, the accessibility of the impeding reality correlated highly significantly with the future-reality associations, r < .70, and the accessibility of the desired future correlated highly significantly with the reality-future associations, r < 72. Because these effects were always in the predicted direction and have no theoretical implications, we do not further elaborate them.

associations in the mental contrasting condition than in the in the reverse contrasting condition, $t(130) = 2.08$, $p = .04$ or the control condition, $t(130) = 2.01$, $p = .05$.
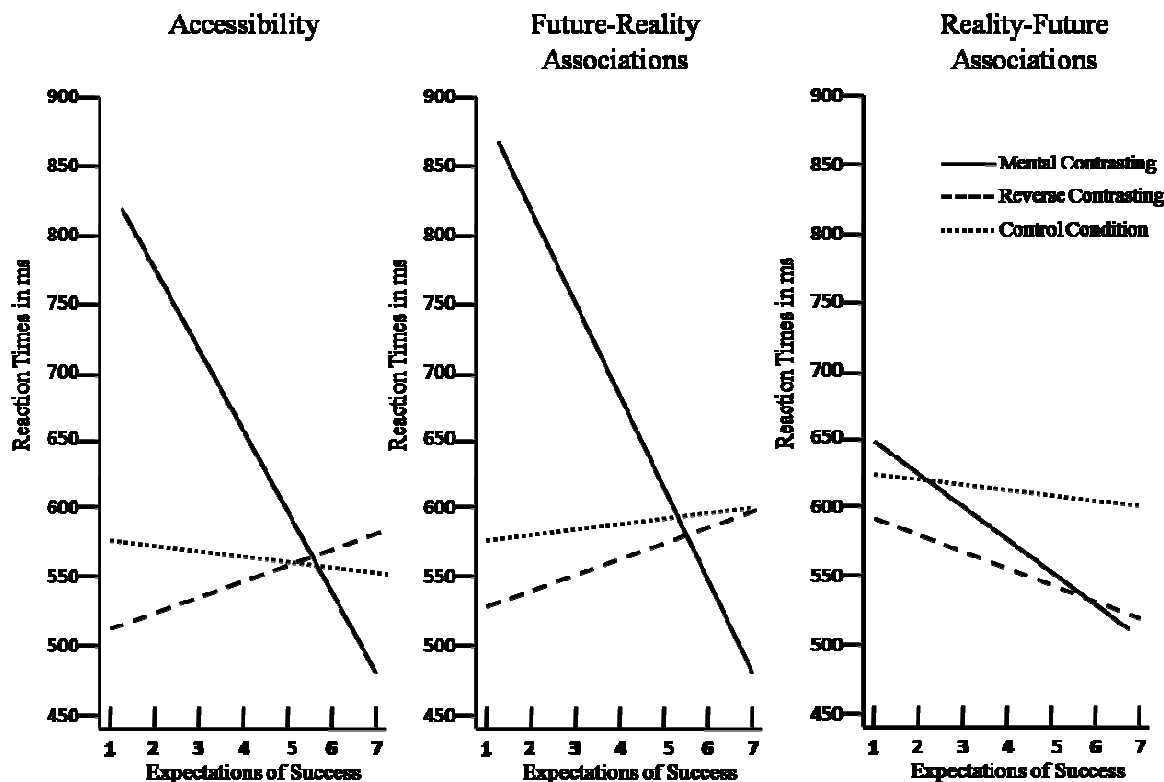
Figure 3. Regression lines depicting the link between expectation of success and accessibility of goal-relevant aspects (left) and future-reality associations controlled for the accessibility of the reality (middle) and reality-future associations controlled for the accessibility of the future (right) as a function of self-regulatory strategy.

Associations between Reality and Future

In a next step, we tested whether mental contrasting effects on the associations between future and reality are directed, i.e., whether mental contrasting also affects the associations between reality and future. We controlled again for the accessibility of the stimulus per se (i.e., the accessibility of the desired future word) to exclude accessibility effects as alternative explanation for the results. Using a GLM with reaction times on reality-future trials as dependent variable, condition as a fixed between subject factor, the continuous expectation measure and the reaction times on future accessibility trials as independent variables entered in the first step, and the condition by continuous expectation measure as

independent variable entered in the second step, we found no main effect of condition, $F(2,$ 130$) = 0.25$, $p = .78$, no main effect of expectations, $F(1, 130) = 2.08$, $p = .15$, and no interaction between condition and expectation, $F(2, 130) = 0.47$, $p = .63$ (Figure 1).

Accessibility

Next, we tested whether mental contrasting in light of high expectations of success increases the accessibility of the desired future and the impeding reality. This increase would be an indicator of the establishment of the goal by mental contrasting because goal-related information increases with the activation of a goal (Goschke & Kuhl, 1993). We used a General Linear Model (GLM) with the reaction times on accessibility trials as dependent variable, condition as a fixed between-subject factor, and the continuous expectations measure as independent variable entered in the first step; the interaction term of condition by the continuous expectations measure entered in the second step (Hardin & Hilbe, 2001). The GLM showed no main effect of condition, $F(2, 130) = 0.21$, $p = .81$, and no main effect of expectations $F(1, 130) = 1.65$, $p = .11$. Most important, we found the expected significant interaction between condition and expectation, $F(2, 130) = 4.08$, $p = .02$, $\eta_p^2 = .06$. As depicted in Figure 1, the expectancy-dependence of the accessibility of goal-relevant aspects in the mental contrasting condition was stronger than in the reverse contrasting condition, $t(130) = 2.50$, $p = .01$ as well as in the control condition, $t(130) = 2.21$, $p = .03$. Additionally, when expectations of success were high (i.e., expectations = 7), participants in the mental contrasting condition had a higher accessibility of relevant aspects than participants in the reverse contrasting condition, $t(130) = 2.04$, $p = .04$, or the control condition, $t(130) = 2.13$, $p = .04$. Further, when expectations of success were low (i.e., expectations = 1), participants in the mental contrasting condition had a lower accessibility of relevant aspects than participants in the reverse contrasting condition, $t(130) = 2.48$, $p = .01$, or the control condition, $t(130) = 2.09$, $p = .04$.

Goal Commitment

Next, we tested whether mental contrasting produces expectancy-dependent goal commitment, as has been shown in past research. The three goal commitment indicators (i.e., energization, feelings of responsibility, and perceived clarity) correlated all significantly with each other, ranging from $r = .33$ to $r = .49$. These correlations show that even though they share some variance with each other, they are distinct indicators of goal commitment, representing different aspects of goal commitment. For each goal commitment indicator, we specified a GLM with condition as fixed between subject factor, the continuous measure of expectations as independent variable entered in the first step, and condition by expectation interaction term as independent variable entered in the second step. We found the predicted effects for the interaction between condition and expectation on energization, $F(2, 130) = 4.27$, $p = .02$, $\eta_p^2 = .06$, on feelings of responsibility, $F(2, 130) = 6.12$, $p < .01$, $\eta_p^2 = .09$, and on perceived clarity, $F(2, 130) = 3.09$, $p = .05$, $\eta_p^2 = .05$ (Figure 2).
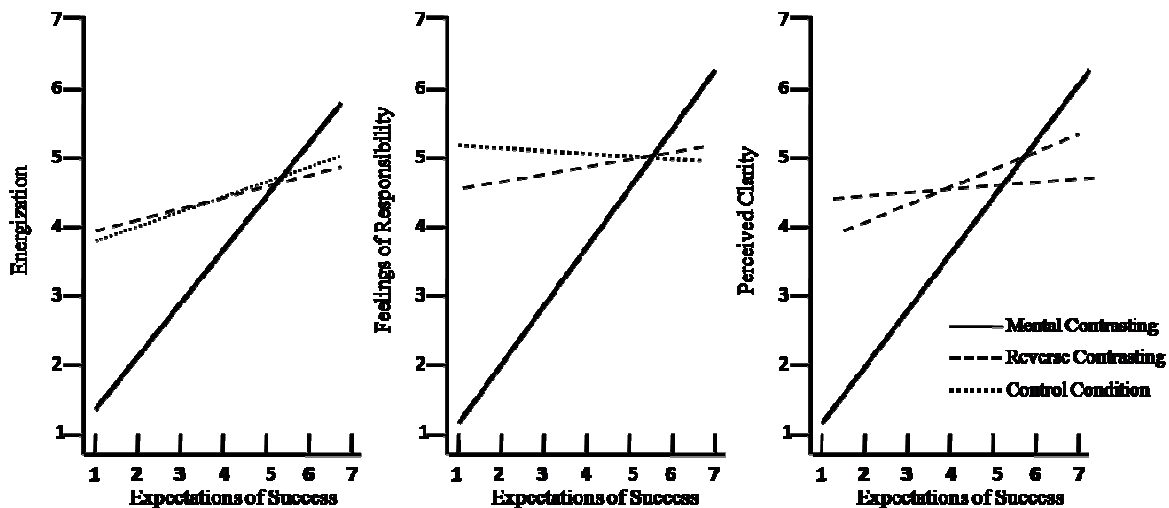

Figure 4. Regression lines depicting the link of expectation of success and energization (left) and feelings of responsibility (middle) and perceived clarity (right) as a function of self-regulatory strategy.

Next, we tested whether the link between expectations and goal commitment was stronger in the mental contrasting condition than in the other conditions by examining the

expectancy-dependence of each goal commitment indicator in the three different experimental conditions. In the mental contrasting condition, the expectancy-dependence of energization was stronger than in the reverse contrasting condition, $t(130) = 2.53$, $p = .01$, and stronger than in the control condition, $t(130) = 2.28$, $p = .02$. Further, the expectancy-dependence of feelings of responsibility in the mental contrasting condition was again stronger than in the reverse contrasting condition, $t(130) = 2.88$, $p < .01$, and stronger than in the control condition, $t(130) = 2.91$, $p < .01$. Finally, the perceived clarity in the mental contrasting condition tended to be stronger than in the reverse contrasting condition, $t(130) = 1.77$, $p = .08$, and was stronger than in the control condition, $t(130) = 2.66$, $p = .01$.

In a next step, we tested whether mental contrasting in light of high expectations produces forges strong goal commitments. Comparisons showed that participants with high expectations in the mental contrasting condition reported higher energization than participants in the reverse contrasting condition, $t(130) = 2.50$, $p = .01$, reported higher energization than participants in the control condition, $t(130) = 2.03$, $p = .04$, tended to report higher feelings of responsibility than participants in the reverse contrasting condition, $t(130) = 1.79$, $p = .08$, and than participants in the control condition, $t(130) = 1.51$, $p = .13$, and finally, reported higher perceived clarity than participants in the reverse contrasting condition, $t(130) = 2.35$, $p = .01$, but not than participants in the control condition, $t(130) = 1.13$, $p = .26$.

Finally, we tested whether mental contrasting in light of low expectations of success weakens goal commitments. Comparing participants with low expectations in the mental contrasting condition with those in the other two experimental conditions showed that participants in the mental contrasting condition reported being less energized than participants in the reverse contrasting condition, $t(130) = 2.36$, $p = .01$, and less than in the control condition, $t(130) = 2.22$, $p = .03$, felt less in control of their life task than participants in the reverse contrasting condition, $t(130) = 3.06$, $p < .01$, or the control condition $t(130) = 3.21$, $p < .01$, and had a perceived clarity than participants in the reverse contrasting condition $t(130)$

= 2.15, p = .03, and tended to have a less clear idea than in the control condition, $t(130)$ =

1.75, p = .08.

Mediational Analysis

So far, we found that mental contrasting in light of high expectations of success

establishes strong future-reality associations, and strong goal commitments, in light of low

expectations of success weak future-reality associations and weak goal commitments. In a

final step, we tested our prediction that mental contrasting effects on goal commitment are

mediated by future-reality associations. Specifically, we predicted that mental contrasting in

light of high expectations of success commits people to realize the desired future by

establishing strong future-reality associations and in light of low expectations leads to

disengagement by inhibiting future-reality associations. Hence, we tested the meditational

role of future-reality associations for goal commitment in the mental contrasting condition.

We showed that mental contrasting translates expectations of success into future-

reality associations as well as into goal commitment. Hence, there were significant relations

between the initial variable (i.e., expectations of success) and the mediator (i.e., future-reality

associations) and the outcome variables (i.e., energization, feelings of responsibility,

perceived clarity). To show mediation, we therefore have to additionally find that the

proposed mediator significantly predicts the outcome variables while controlling for the initial

variable and that the relation between the initial variable and the outcome variable is

attenuated after controlling for the proposed mediator (Baron & Kenny, 1986).

Testing these two additional relations using hierarchical regression analyses, we found

that the future-reality associations at least partially mediated the relation between expectations

and energization, feelings of responsibility, and perceived clarity (see Figure 5). Furthermore,

using a bootstrap test (Preacher & Hayes, 2008) we observed a significant indirect effect of

expectation on energization through future-reality associations, 95% confidence interval (CI)

bootstrap percentile = .05, .51, a significant indirect effect of expectations on feelings of

responsibility, 95% confidence interval (CI) bootstrap percentile = .03, .43, and a significant

indirect effect of expectations on feelings of responsibility, 95% confidence interval (CI)

bootstrap percentile = .05, .52.
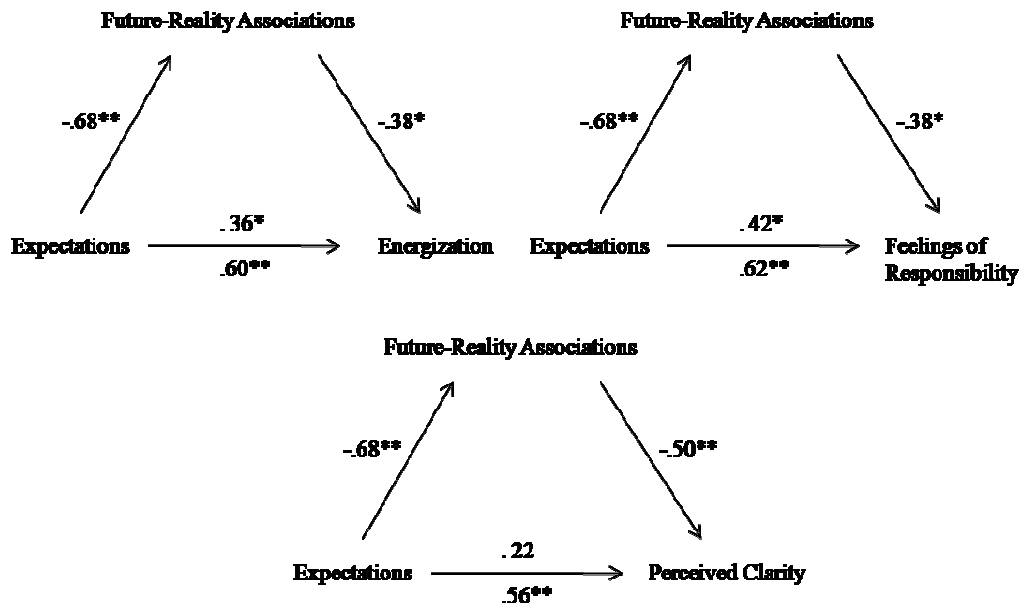
Figure 5. Future-reality associations as a mediator of the relation between expectations and energization (left), feelings of responsibility (right), and perceived clarity (bottom) in the mental contrasting condition.

4.3 Discussion

Comparing the results of the mental contrasting condition with the control condition

showed that mental contrasting in light of high expectations of success fosters future-reality

associations but not reality-future associations; mental contrasting in light of low expectations

weakens future-reality associations but again, not reality-future associations. In line with

previous research, we additionally found that mental contrasting establishes strong goal

commitments when expectations of success where high (indicated via motivational

energization, responsibility feelings, and perceived clarity) and weak commitments when

expectations of success were low. Most important for the present research, future-reality

associations mediated the effects of expectations on goal commitment in the mental

contrasting conditions. These findings underpin our prediction that mental contrasting exerts

its influence on goal commitment via associations between future and reality. Furthermore,

they also support our view that future-reality associations are connected to goal commitment. In line with this argument, participants in the reverse contrasting as well as in the control condition showed, independent of their expectations, intermediate future-reality associations as well as intermediate goal commitment.

One aspect of the results merits closer inspection. We asked participants in the beginning to name their most important interpersonal life task, which may have caused students to name life task with high preexisting commitments. If so, then mental contrasting should have exerted a stronger impact on the future-reality associations as well as goal commitments when expectations were low compared to high. Closely examining the displayed results supports these predictions. Even though mental contrasting in light of high expectations significantly strengthened future-reality associations as well as commitments compared to the control conditions, the mental contrasting effects on future-reality associations and goal commitments in light of low expectations were stronger in light of low expectations in comparison to the control conditions. More specifically, the difference between the control condition and the mental contrasting condition for future-reality associations and goal commitment is larger when expectations are low than when expectations were high. Furthermore, fantasy realization theory (e.g., Oettingen et al., 2001) predicts that non-mental contrasting ways of thinking about the future, as in our present research in the reverse contrasting and in the control condition, leave preexisting commitments untouched. Hence, students in the reverse contrasting as well as in the control condition reported on average moderately high levels of commitment. Additionally, their reaction times on future-reality association trials were rather fast on average compared to the reaction times of mental contrasting participants with low expectations. If our analysis is right, then we should see the opposite pattern (i.e., larger difference between mental contrasting condition and control conditions for future-reality associations when expectations of success are high compared to low) when we do not ask participants to elaborate about

preexisting goals, but about a new desired future. Hence, in Experiment 2, we used a desired future that participants have probably not thought about before. Specifically, we used the desired future of presenting oneself favorably in front of a camera.

Further, in Experiment 1 we used self-reported measures as goal commitment indicators. However, past research found that mental contrasting exerts its effects not only on self-report, but also on actual behavior (e.g., Oettingen et al, 2009). So, in order to show that future-reality associations are responsible for mental contrasting effects, ranging from self-report to actual behavior, we test the impact of future-reality associations on behavior in Experiment 2. Finally, in Experiment 1, future-reality associations and reality-future associations were each measured by only two trials. To increase the reliability of our measure, we added another block of trials to the lexical decision task.

5. Experiment 2: Future-Reality Associations and Goal-Striving Behavior

In this experiment, we invited economic students to a study about a new recruitment tool, supposedly developed by human resource experts (see Oettingen et al., 2009). Part of the study entailed presenting oneself in front of the camera and explaining why one is a ideal job candidate. Students were also told that human resource experts would evaluate their performance afterwards. We used the desired future of performing as well as desired for the induction of the self-regulatory strategies of thinking about the future (i.e., mental contrasting, reverse contrasting, and the control condition). Given the novel situation and the specificity of the desired future, it seems plausible that participants did not have preexisting mental representations of that desired future. After the induction of the self-regulatory strategies, students performed a lexical decision task, measuring the future-reality association, reality-future associations, and the accessibility of the future and reality aspects. Thereafter, they were asked to present themselves in front of the camera. As our main dependent variable, independent raters evaluated participants' performance.

First, we predicted that we could replicate the results from Study 1 for mental contrasting effects on future-reality associations. In light of high expectations, mental contrasting should forge strong future-reality associations; in light of low expectations, it should weaken future-reality associations. Second, we expected to replicate past research finding on mental contrasting effects on goal-striving behavior (Oettingen et al., 2009), showing that mental contrasting in light of high expectation fosters goal-relevant behavior, whereas in light of low expectations, mental contrasting should have the opposite effects. Finally, we hypothesized that mental contrasting effects on goal-relevant behavior are mediated by future-reality associations.

5.1 Methods

Participants

One hundred- fifteen economic students of the University of Hamburg (age *Mean* = 26.96, *SD* = 9.44, female = 75) received 8€ (approximately 11$) in return of participating in the study. Participants were randomly assigned to either a mental contrasting condition (N = 41), a reverse contrasting condition (N = 35), or a control condition (N = 39).

Procedure and Measures

Participants were invited to a study presumably designed for the development of a human resource recruitment instrument. Their main task was to give a presentation about their professional skills in front of a camera which then would be evaluated by human resource experts in terms of their professional skills. Additionally, they were asked beforehand to answer some questions about the upcoming presentations and to write down some thoughts about aspects of the presentation. Next, we measured the expectations of success by asking participants to indicate how likely they think it is that they will present themselves in front of the camera as well as they desired, on a scale ranging from 1 (*not at all likely*) to 7 (*extremely likely*). All participants then listed one aspect (i.e., desired future aspect) that they associated with performing at the desired level (participants named e.g., *feeling proud, boost in self-*

esteem), and one aspect (i.e., impeding reality aspect) that might prevent them from performing at the desired level (participants named e.g., *anxiety in front of a camera, feeling unprepared*). As in Experiment 1, they were also asked to provide for both aspects one word that best captured the meaning of the named aspect (i.e., future word, reality word).

Thereafter, we established again three experimental conditions: a mental contrasting condition, a reverse contrasting condition, and a control condition. For the mental contrasting and the reverse contrasting condition we used the same instructions as in Experiment 1. Hence, mental contrasting participants were asked to first write about the desired future, then about the impeding reality. Reverse contrasting participants were asked to write first about the impeding reality, then about the desired future. In the control condition, we asked participants this time to first write about a desired interaction with a supervisor, and then about a recently experienced negative interaction with a supervisor.

Dependent Variables: Reaction Times

For measuring the accessibility of future and reality, the associations between future and reality, and the associations between reality and future, we used the same sequential priming paradigm with a lexical decision as in Experiment 1. However, in order to increase the reliability of the measure, we added another block of trials with exactly the same trials as described in Experiment 1 (see also Table 1), which doubled the number of trials. Hence, we measured the accessibility of the future on four trials, the accessibility of the reality on four trials, the future-reality associations on four trials, and the reality-future associations on four trials. Further, 48 filler trials and 64 non-word trials were provided; the whole task comprised 128 trials. Further, we measured the accessibility of the future and reality this time by priming participants with a string of Xs, and then provided either the future or reality as target.

Thereafter, participants learned that they now had to present themselves in front of a camera and explain what qualified them as present-day professional candidate. The following instructions were provided:

We start now with the presentation. You have up to seven minutes in front of the camera to introduce yourself and explain why you are a present-day professional candidate: What makes you a valuable, modern professional candidate? Describe your professional strengths and potentials. To ensure anonymity, please try not to say your full name. Before we start, you have five minutes to prepare yourself for the talk and note down some thoughts. After these five minutes, the experimenter will come into the room, start the camera, and then leave the room again. Now, you have up to seven minutes to present yourself. You don't have to use all of the time. If you're done, please say "end" into the camera.

After participants read these instructions, the experimenter entered the room and guided them to a table where participants found sheets of paper for the preparation and an alarm clock. After ensuring that participants understood what their task was, the experimenter started the alarm clock and left the room. After five minutes, the experimenter returned, started the camera, reset the alarm clock, and left the room again. After seven minutes elapsed or after the participant contacted her, the experimenter guided participants to the computer to provide their demographics and answer funneled debriefing questions. At the end participants were fully debriefed, paid, and thanked for their participation.

Dependent Variables: Performance

To obtain an objective measure of performance, two independent raters blind to condition content-analyzed the videos and rated the overall performance of the participants. The raters were asked to base their evaluations on seven dimensions: mimic/gestures, structure of the presentation, connections to one's own biography, talking speed, content, self-presentation, and used expressions. For each dimension, examples for all levels of presentations were provided in a script. For example, a score of 1 was given when the participant's presentation included improper gestures, was confused and unstructured, failed

to connect the participant's potential professional skills to their biography, talked either too fast or too slow, lacked relevant content, presented the participant in an unfavorable light, and used inappropriate expressions such as slang. On the other hand, a score of 7 was assigned when the participant's presentation used substantive gestures, was clear and well structured, frequently connected the participant's professional skills to their biography, spoke at a moderate speed, included highly relevant content, presented the participant in a favorable light, and used appropriate expressions. Two raters independently coded 30 presentations. Interrater reliability was high ($r = .83$, $p < .01$). Each of the raters then coded half of the remaining videos.

5.2 Results

Data Preparation

Again, only correct responses on the lexical decision trials were included in the analyses (error rate was 2.1%). Reaction times slower than 1500ms or faster than 250ms were excluded to lessen the influence of outliers. Gender and age had no significant main effects or interaction with any of the variables reported here, and thus, will not be discussed further.

Associations between Future and Reality

First, we tested whether mental contrasting again produced expectancy-dependent future-reality associations. To ensure that the effects of mental contrasting on the associations between future and reality are not mere accessibility of the impeding reality word, we again controlled in the following analyses for the the accessibility of the target (i.e., impeding reality word). We specified a GLM with the reaction times on the future-reality trials as dependent variable, condition as a fixed between subject factor, the continuous expectation measure and the accessibility of the reality as independent variables entered in the first step, the condition by continuous expectation measure entered in the second step. We found no main effect of condition, $F(2, 112) = 1.87$, $p = .16$, , a trend towards a main effect of expectations, $F(1, 112) = 2.72$, $p = .10$, $\eta_p^2 = .02$, and the expected interaction between

condition and expectation, $F(2, 112) = 4.80$, $p = .01$, $\eta_p^2 = .09$. The expectancy-dependence in the mental contrasting group was stronger than in the reverse contrasting condition, $t(112) = 2.68$, $p = .01$, and stronger than in the in the control condition, $t(112) = 2.58$, $p = .01$ (Figure 6). Further, comparing participants with high expectations (expectations = 7) in the mental contrasting condition with participants with high expectations in the other two conditions showed that those in the mental contrasting condition had stronger future-reality associations than participants in the reverse contrasting condition, $t(112) = 2.63$, $p = .02$, and than participants in the control condition, $t(112) = 3.07$, $p = .003$. Finally, participants with low expectations (expectations = 1) had significantly weaker future-reality associations in the mental contrasting condition than in the in the reverse contrasting condition, $t(112) = 2.63$, $p = .02$, but not than participants in the control condition, $t(112) = 1.63$, $p = .11$.
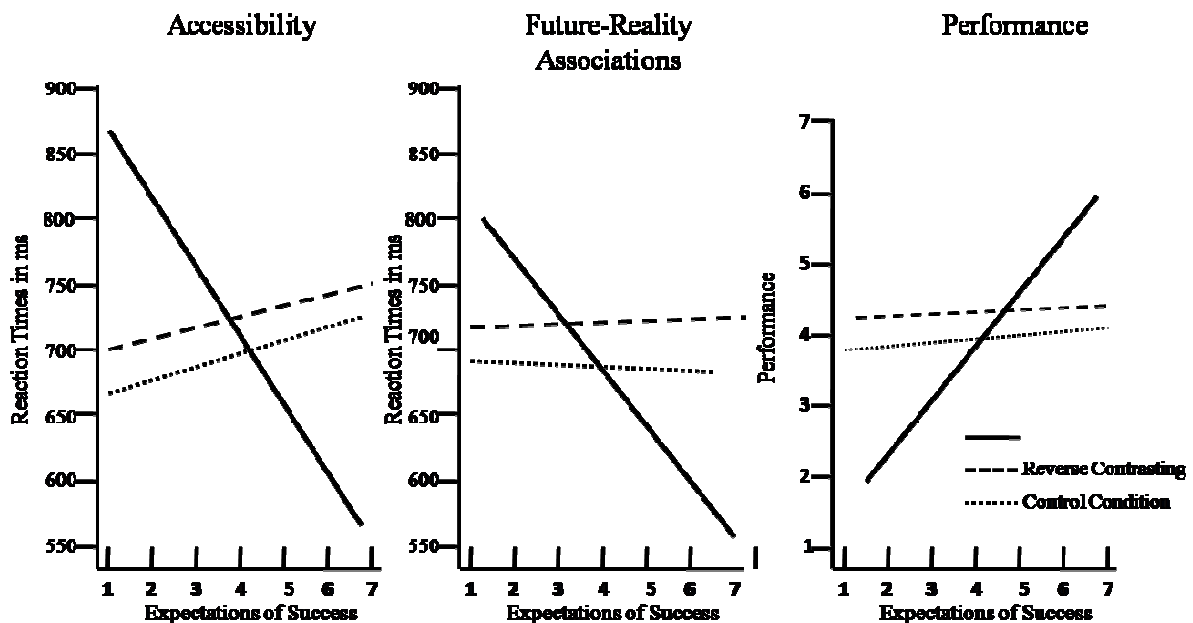

Figure 6. Regression lines depict the link of expectation of success to accessibility of goal-relevant aspects (left) and to future-reality associations controlled for the accessibility of the reality (middle) and to performance (right) as a function of self-regulatory strategy.

Associations between Reality and Future

In a next step, we tested whether mental contrasting fosters also associations between reality and future. We controlled again for the accessibility of the future (i.e., the target) to exclude accessibility effects as alternative explanation for the results. Using a GLM with condition as a fixed between subject factor, the continuous expectation measure and the accessibility of the future as independent variables entered in the first step, the condition by continuous expectation measure entered in the second step, and the reaction times on reality-future trials as dependent variable, we found no main effect of condition, $F(2, 112) = 1.89$, $p = .16$, no main effect of expectations, $F(1, 112) = 0.70$, $p = .67$, and no interaction between condition and expectation, $F(2, 112) = 0.97$, $p = .38$, $\eta_p^2 = .02$.

Accessibility

To test whether mental contrasting again produces an expectancy-dependent accessibility of future and reality aspects, we specified a GLM with the reaction times on the accessibility trials as dependent variable, condition as a fixed between subject factor, entered the continuous expectation measure as independent variable in the first step, and then interaction between condition and the continuous expectations measure in the second step. There was no main effect of condition, $F(2, 112) = 0.54$, $p = .17$, and no main effect of expectations $F(1, 112) = 1.37$, $p = .26$. However, we found the expected significant interaction between condition and the continuous expectation measure, $F(2, 112) = 3.23$, $p = .04$, $\eta_p^2 = .06$. As depicted in Figure 4, the expectancy-dependence of accessibility in the mental contrasting condition was stronger than in the reverse contrasting condition, $t(112) = 2.27$, $p = .03$, and than in the control condition, $t(112) = 2.01$, $p = .05$. Additionally, when expectations of success were high (i.e., expectations = 7), participants in the mental contrasting condition tended to have a higher accessibility of relevant aspects than participants in the reverse contrasting condition, $t(112) = 1.61$, $p = .10$, and had a higher accessibility than participants in the control condition, $t(112) = 1.91$, $p = .05$. On the other

hand, when expectations of success were low (i.e., expectations = 1), participants in the mental contrasting condition had lower accessibility of relevant aspects than participants in the reverse contrasting condition, $t(112) = 2.42$, $p = .02$, yet only tended to have a lower accessibility than in the control condition, $t(112) = 1.75$, $p = .08$.

Performance

Finally, we looked whether mental contrasting also brought the performance in front of the camera in line with expectations of success. To do so, we specified a GLM with rater-evaluated performance at the presentation as dependent variable, condition as a fixed between subject factor and the continuous expectation measure entered as independent variables in the first step, and the condition by continuous expectation measure entered in the second step. We found a trend towards a main effect for condition, $F(2, 112) = 1.12$, $p = .08$, and a main effect of expectations, $F(1, 112) = 10.29$, $p = .002$, $\eta_p^2 = .09$, which was qualified by the expected interaction effect between expectation and condition, $F(2, 112) = 7.45$, $p < .001$, $\eta_p^2 = .13$. As hypothesized, the expectancy-dependence in the mental contrasting group was stronger than in the reverse contrasting condition, $t(112) = 3.38$, $p < .01$, and stronger than in the in the control condition, $t(112) = 3.14$, $p < .01$ (Figure 4). Further, comparing participants with high expectations (expectations = 7) in the mental contrasting condition with participants with high expectations in the other two conditions revealed that those in the mental contrasting condition had better rater-evaluated performance than participants in the reverse contrasting condition, $t(112) = 3.12$, $p < .01$, and than participants in the control condition, $t(112) = 2.43$, $p = .02$. Finally, participants with low expectations (expectations = 1) had significantly worse rater-evaluated performance in the mental contrasting condition than in the in the reverse contrasting condition, $t(112) = 2.86$, $p = .01$ or the control condition, $t(112) = 3.28$, $p < .01$.

Mediational Analysis

In a last step, we tested whether the future-reality associations mediate the expectations effects on the quality of the performance in the mental contrasting condition. We

applied the same meditational analysis as in Experiment 1. The results show (Figure 7) that the relation between expectations of success and the quality of performance (β = .57, p < .001) drops below significance (β = .25, p > .05), when the future-reality associations are entered into the regression analysis (β = -.52, p < .001). A bootstrap test further showed a significant indirect effect of expectation on the overall performance through future-reality associations, 95% confidence interval (CI) bootstrap percentile = .06, .55.
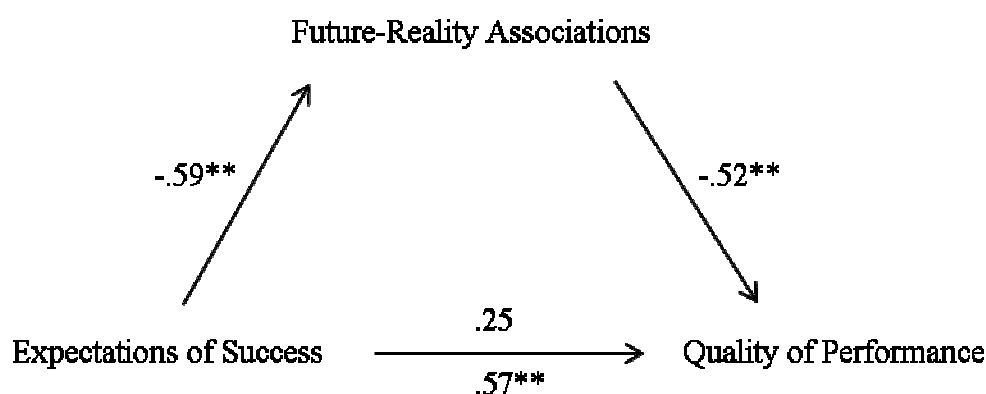
Figure 7. Future-reality associations as a mediator of the relation between expectations and performance in the mental contrasting condition.

5.3 Discussion

Experiment 2 replicated the results of Experiment 1, using desired futures that participants had presumably never mentally elaborated beforehand, and using a different goal commitment indicator: goal-striving behavior. We found again that mental contrasting translates expectations of success into future-reality associations as well as into goal commitment. Importantly, future-reality associations again mediated the relation of expectations of success and goal commitment in the mental contrasting condition. Neither the reverse contrasting nor the control condition showed expectancy-dependent future-reality associations or goal commitment.

The results of the experiments so far support our hypothesis that future-reality associations are crucial for the mobilization of resources for goal achievement. Whereas in Experiment 1, future-reality associations affected participants' feelings of commitment

toward the upcoming goal striving, in Experiment 2 these associations had an impact on actual goal striving behavior. However, if future-reality associations are responsible for the mobilization of resources for achieving one's desired future, then these associations should stay strong until the goal is achieved, thereby ensuring the investment of the needed resources. However, when the goal is achieved, there is no need for further resource investment; at this point the future-reality associations should vanish, thereby ensuring that no resources are wasted.

6. Experiment 3: Future-Reality Associations before and after Goal Completion

In our last experiment, we examined mental contrasting effects on future-reality associations before and after goal completion. We invited participants to participate in a study about creativity, and induced a mental contrasting and a control condition by using the desired future of being more creative than an average student. Afterwards, participants were asked to perform on a creativity test. Completed goals were operationalized with bogus positive feedback stating that the creativity test showed that participants' creative abilities are higher than average students. Incomplete goals were operationalized with a bogus negative feedback stating that the creativity test showed that participants' creative abilities were slightly below average. In order to test our hypothesis that future-reality associations only prevail until the goal is achieved, we measured the future – reality associations after the feedback manipulation. We predicted that we would find expectancy-dependent effects of mental contrasting on future-reality associations after negative feedback, but not after positive feedback.

6.1 Methods

Participants

One hundred forty-two New York University students (age *Mean* = 20.14, *SD* = 6.78; 103 female) participate in return for partial fulfillment of course credits. Participants were randomly assigned to either a mental contrasting condition (N = 74) or a control condition (N

= 68). The experiment had a 2 (mental contrasting versus control condition) x 2 (negative versus positive feedback) between subject design.

Procedure and measures

Participants were invited to a study about creativity. They were told that the aim of study was to learn more about how students think about creativity and how these thoughts relate to their creative performance. Their task was to first write down some of their thoughts about creativity and then perform on four creative tasks. Further, we informed them that after the creativity task, they would receive feedback about their creativity. Finally, a short test of their verbal abilities would be administered to test how these abilities relate to their creativity.

Next, participants read a brief introduction about what defines creativity and that it is a valuable ability that predicts success in different life domains; hence, being more creative than the average student would contribute to future success. In order to measure the expectations of success, we asked participants to indicate how likely it was that they were more creative than the average New York University student on a 7-point scale, ranging from 1 (*not at all*) to 7 (*extremely likely*). They were asked then to name one positive aspect that they associated with being more creative than the average NYU student (i.e., future aspect), and one aspect that might prevent them from being more creative than the average NYU student (i.e., reality aspect). Thereafter, they were instructed to provide one word that summarizes the named future and reality aspect best.

Using the same instructions as in Experiment 1, we established a mental contrasting and control condition. Hence, participants in the mental contrasting condition wrote first about their desired future aspect of being more creative than the average NYU student, and then about the impeding reality aspect. In the control condition, participants were asked to first write about a positive experience with one of their teachers at NYU, and then about a recent negative experience they had with one of their teachers.

Afterwards, we introduced the creativity test for which we made up the name Cambridge Creativity Test (CCT). Participants read the following description: Next, we will ask you to work on four creativity tasks from the Cambridge Creativity Test (CCT). In the last two years, over 1000 NYU students have completed the same tasks from the CCT. Access to this database of scores allows us to accurately assess your creative abilities. We will give you your score and the percentile you are in after the test. On all of these tasks, you are asked to provide as many creative solutions for the described problems as possible. The CCT defines creative as something that is unusual (i.e., not many people thought of it before), but also realistic (i.e., you can implement the solution in the real world).

On top of the page, they saw a fake logo comprised of the three letters CCT, supposedly representing the logo of the Cambridge Creativity Test. Further, they read that they would have two minutes for each of the tasks. On each of the four creative tasks, participants should note as many unusual but at the same time realistic solutions. For example, participants had to note down as many as possible novel and creative uses of a brick or ways to greet a person (Friedman & Förster, 2001; Förster, Friedman, & Liberman, 2004). We hoped that it would be hard for the participants to assess whether they had performed well or poorly on the tasks, because they had no standard to which to compare their performance. This should increase the credibility of the feedback.

After they completed working on the tasks, they were informed that the computer was now calculating their creative scores by using the NYU students' database. Additionally, they read that the computer would supposedly compute the creativity score by using two different scores: one indicated how likely their answers were and the other indicated the usefulness of their answers. The latter score was presumably based on ratings of professionals of the previous answers of the NYU students. After two minutes, the feedback appeared on the

computer screen. Students in the positive feedback condition read that they had a creative score of 786, and that they were in the 87th percentile of NYU students. Hence, participants in this condition learned that their creativity was above average. In contrast, students in the negative feedback condition read exactly the same feedback, but learned that they were in the 43th percentile of NYU students; their creativity as slightly below average.

Immediately thereafter, participants were informed that they would perform a lexical decision task in order to measure their verbal abilities. This lexical decision task was the same as described in Experiment 2, with one exception: We added another block of trials to further improve the reliability of the measure. Hence, we measured the accessibility of the future on six trials; the accessibility of the reality on six trials, the future-reality associations on six trials, as well as the reality-future associations on six trials. Further, 72 filler trials, and 96 non-word trials were provided. The whole task comprised 192 trials.

In a last step, participants were asked what they thought the purpose of the study was, whether they found something suspicious about it, and how credible they perceived the feedback. For the last question, a 7-point scale was provided ranging from 1 (*not at all credible*) to 7 (*extremely credible*). Thereafter, they were fully debriefed, thanked, and dismissed.

6.2 Results

Data Preparation

Again, only correct responses on the lexical decision trials were included in the analyses (error rate was 2.3%). Reaction times slower than 1500ms or faster than 250ms were excluded to lessen the influence of outliers.

Credibility of the Feedback

First, we tested whether participants perceived the feedback as credible. When examining the answers to the open questions of what the purpose of the study was or of whether there was anything suspicious about the study, none of the answers indicated

suspicion of the credibility of the feedback. However, when directly asked to rate the credibility of the feedback, six participants (four of them in the negative feedback condition, two of them in the positive feedback condition) rated the credibility of the feedback with a one or a two (*Mean* = 5.1, *SD* = 1.2). Excluding these participants from our analyses did not change the pattern of results.

Accessibility and Future-Reality Associations Dependence on Type of Feedback

In a next step, we tested our hypothesis that the mental contrasting effects on mental representations would differ for incomplete goals (i.e., negative feedback condition) versus complete goals (i.e., positive feedback condition). To do so, we tested whether the, the future-reality associations, reality-future associations, and the accessibility of the future and reality aspects differed as a function of expectations, condition, and type of feedback.

First, we tested whether the effects of mental contrasting on the future-reality associations differed for the type of feedback. Using hierarchical regression analyses, we entered the condition, expectation measure, type of feedback (i.e., positive versus negative feedback), and the accessibility of reality words (i.e., controlling for mere accessibility effects) in a first step, all the two-way interactions between condition, expectation measure, and feedback in a second step, and the three-way interaction of condition, expectation measure, and feedback in a third step. The results showed the expected three-way interaction, $t(125) = 2.16$, $p = .03$ (Figure 8).
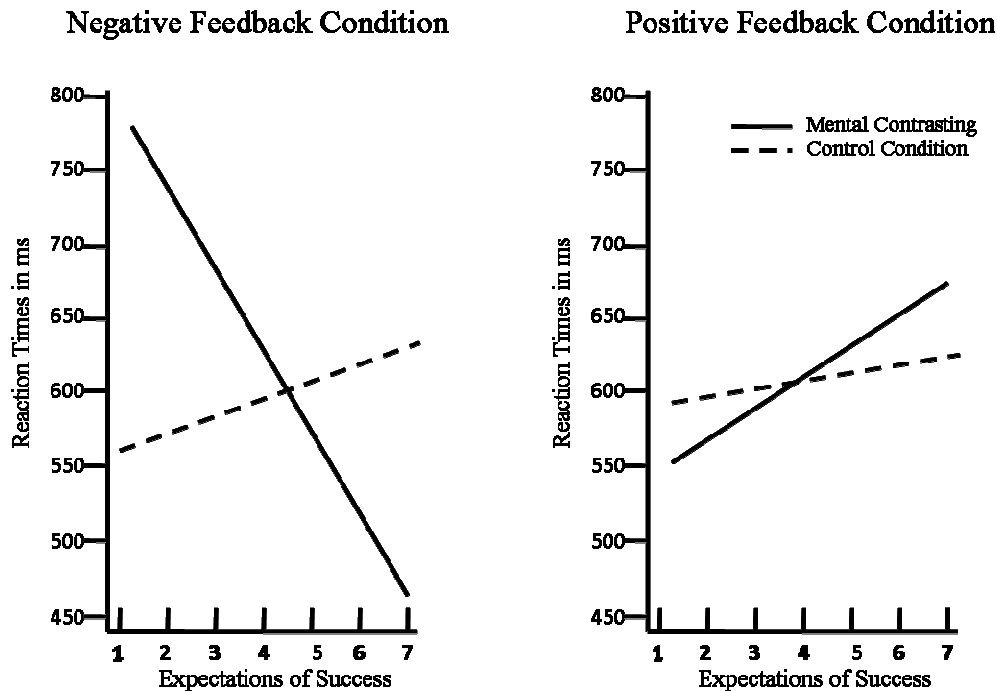
Negative Feedback Condition

Positive Feedback Condition

Figures 8. One the left side, regression lines are displayed depicting the link between expectations of success and future-reality associations as a function of self-regulatory strategies in the negative feedback condition. On the right side, the same regression lines are displayed for the positive feedback condition.

Then, we tested whether reality-future associations differed as a function of condition, expectation measure, and type of feedback. Using again hierarchical regression analyses, we entered the condition, expectation measure, type of feedback, and the accessibility of future words (i.e., controlling for mere accessibility effects) in a first step, all the two-way interactions between condition, expectation measure, and feedback in a second step, and the three-way interaction of condition, expectation measure, and feedback in a third step. The results showed the expected three-way interaction, $t(125) = 2.16$, $p = .03$. Finally, we tested whether the accessibility of future and reality differed as a function of condition, expectation measure, and type of feedback. We entered again the condition, expectation measure, type of feedback in a first step, all the two-way interactions in a second step, and the three-way interaction between the expectation measure, condition, and type of feedback in a third step. There was no significant three-way interaction, $t(125) = .39$, $p =.68$ (see Figure 9).

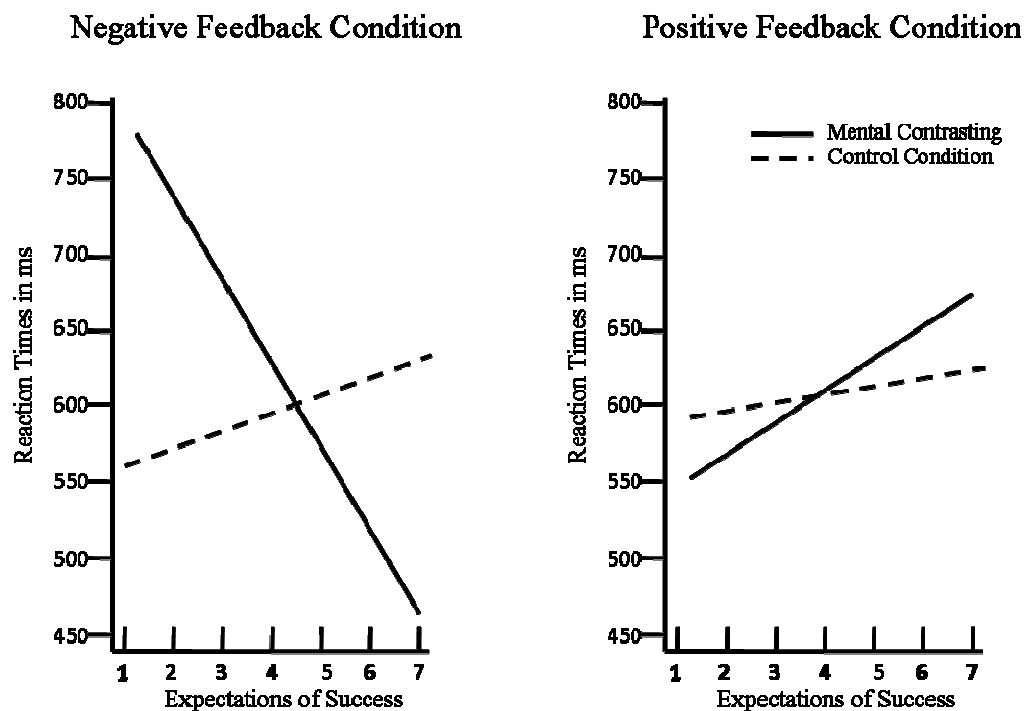Negative Feedback Condition   Positive Feedback Condition

Figure 9. One the left side, regression lines are displayed depicting the link between expectations of success and accessibility of future and reality aspects as a function of self-regulatory strategies in the negative feedback condition. On the right side, the same regression lines are displayed for the positive feedback condition.

To summarize, these analyses indicate that only in predicting future-reality associations did the condition by expectation interaction effects differ as a function of the type of feedback. This pattern of results is in line with the prediction that future-reality associations should be different when the goal is not achieved yet (i.e., negative feedback condition) versus when the goal is achieved (i.e., positive feedback). However, this pattern of results is not in line with the prediction that the accessibility of the future and reality aspects should also differ for whether the goal is achieved or not. Next, I examined how future-reality associations differ in the two conditions.

Future-Reality Associations after Negative versus Positive Feedback

To test the prediction that mental contrasting effects on future-reality associations prevail when the goal is not achieved yet by analyzing participants in the negative feedback conditions. We controlled again for the accessibility of the reality (i.e., the target) to exclude accessibility effects as alternative explanation for the results. Using a GLM with condition as

a fixed between subject factor, the continuous expectation measure, the accessibility of the reality, and the condition by continuous expectation measure as independent variables and reaction times on future-reality trials as dependent variable, we found no main effect of condition $F(2,60) = 0.19$, $p = .67$, no main effect of expectations, $F(1,60) = 2.12$, $p = .15$, and a main effect of the accessibility of reality words, $F(1,60) = 2.12$, , $p = .01$, $\eta_p^2 = .1$. Most importantly, we found the predicted interaction effect of condition and expectations on the future-reality associations, $F(2,60) = 5.15$, , $p = .03$, $\eta_p^2 = 0.08$. In contrast, when applying the same analyses for the positive feedback condition, we found no main effect of condition $F(2,70) = 0.25$, $p = .60$, no main effect of expectations, $F(1,70) = 0.69$, , $p = .41$, a main effect of the accessibility of reality words, $F(1,70) = 111.01$, $p < .001$, $\eta_p^2 = 0.60$, and importantly, no interaction effect of the condition by continuous expectation measure on future-reality associations, $F(2,70) = 0.25$, $p = .62$ (Figure 8).

Further analysis of the future-reality associations in the negative feedback condition revealed the familiar pattern. Thus, the expectation-dependence was stronger in the mental contrasting condition than in the control condition, $t(60) = 2.27$, $p = .03$. Additionally, future-reality associations were stronger in the mental contrasting condition than in the control condition when expectation were high (i.e., expectations = 7), $t(60) = 2.22$, $p = .03$. , and future-reality were weaker in the mental contrasting condition than in the control condition when expectations were low (i.e., expectations = 1), $t(60) = 2.01$, $p = .05$.

6.3 Discussion

In our last study, we found that mental contrasting effects on future-reality association differ when the goal is not yet achieved (i.e., negative feedback condition) or is achieved (i.e., positive feedback condition). Consequently, we found that mental contrasting establishes future-reality associations in line with one's expectations of success which then prevail after negative feedback, but vanish after positive feedback. In the control condition, the pattern of results did not differ for positive and negative feedback. After both types of feedback, control

condition participants had expectancy-independent, intermediate reaction times on the future-reality trials.

Two aspects of the results of Study 3 merit closer examination. First, even though mental contrasting effects on future-reality associations did not prevail after positive feedback, these associations were also not significantly slower compared to the control conditions. Derived from previous research on inhibition after goal fulfillment (e.g., Marsh, et al., 1998) we expected that future-reality associations after positive feedback in the mental contrasting condition should be significantly weaker in light of high expectations compared to the control condition. Second, and related, the results didn't confirm our prediction that the accessibility of future and reality words was different for participants in the mental contrasting condition who received negative feedback versus positive feedback. However, when looking at the results for the accessibility in both feedback conditions, it shows the predicted pattern (see Figure 9), yet the difference between the feedback conditions was not strong enough to reach significance.

One possible explanation for both points is related to the desired future we used, being more creative than the average students. Förster, Liberman, and Higgins (2005) argued that post-fulfillment inhibition might differ for the different types of goals and thereby, might be less pronounced if the goal does not provide a clear sense of fulfillment. Research on post-fulfillment inhibition uses goals that have a clear standard of achievement, such as finding a specific target or performing a certain task. However, when the standard is less clear – for example, being more creative than the average, or being an egalitarian person – complete goal fulfillment is never achieved. From a functional view of goal-related accessibility, these goals should exhibit lesser or no inhibition after they are completed in one situation, thereby ensuring that subsequent relevant situations still have the potential to activate them again (cf. Förster, Higgins, & Liberman, 2005). When applied to our study, this reasoning suggests that for students in the mental contrasting condition with high expectations of success, after

positive feedback pursuit of the goal was put on pause, rather than being cleared from the cognitive systems, resulting in no significant decrease in the future-reality associations after positive feedback and no significantly different accessibility pattern for the positive versus negative feedback condition.

7. General Discussion

Our theorization started with two observations. First, despite the importance of goal representations for research on goals, nothing is known about what distinguishes merely desired futures from goals people are committed to strive for. Second, past research has repeatedly shown that the self-regulatory strategy of mental contrasting a desired future with the impeding reality transfers desired futures into goals people are committed to strive for, yet little is known about how mental contrasting engenders its commitment inducing effects. Combing research on goal representations and mental contrasting enabled us to address both questions. We theorize that mental contrasting transfers desired futures into binding goals by integrating the impeding reality into the representation of the desired future. This integration is indicated by associations between the desired future and the impeding reality which then energize the individual to strive for the realization of the desired future, guide feelings towards the desired future, mobilize the needed resources for the realization and thereby, activate goal striving behavior. Finally, associations between future and reality should continue to exist till the desired future is realized, thereby securing the continuous investment of the needed resources, and associations between future and reality should cease to exist when the desired future is realized, thereby stopping the investment of resources. We tested these predictions in a set of three studies.

The converging results of the present studies support our hypothesis that mental contrasting achieves its goal commitment effects by affecting the associations between future and reality. Specifically, when expectations of reaching one's desired future are high, mental contrasting establishes strong future-reality associations (Study 1, Study 2) which in turn

activate the commitment to mobilize the needed resources for goal striving, whether measured via self-report (Study 1) or objective indicators (Study 2). These mobilizing effects of the future-reality associations seem to prevail till the desired future is realized, since after realization the future-reality associations vanish (Study 3). In contrast, when expectations of reaching one's desired future are low, mental contrasting weakens the future-reality associations (Study 1, Study 2), which in turn instigates goal disengagement (Study 1, Study 2). Neither in the reverse contrasting condition nor in the control condition did expectations of success affect future-reality or goal commitment. This pattern of results supports the notion that mental contrasting engenders expectancy-dependent goal commitment by establishing future-reality associations, and that the future-reality associations are crucial for goal commitment. Furthermore, the present research suggests that desired futures are turned into binding goals by integrating potential obstacles into their mental representation.

7.1 Potential Limitations of the Presented Results

In the present research future-reality associations were manipulated in all studies by inducing different self-regulatory strategies, which in turn differentially affected the associations' strength. So far, in gaining first insight into the role of associations between different cognitive representations of motivational constructs, research has focused mostly on measuring existing associations and relating them to diverse outcomes (e.g., Fishbach et al., 2003; Kruglanski et al., 2002; Shah et al., 2002; Shah & Kruglanski, 2003). Going beyond this research, the manipulation of the associations' precursor (i.e., mental contrasting) in our studies provided a more direct test for the predicted role of future-reality associations in turning desired futures into binding goals. Yet, one potential limitation of the presented studies is that we did not manipulate the expectations of success. In our reasoning, the expectations of success are activated by contrasting the desired future with the impeding reality, and then determine whether people see the desired future as something that can be achieved or not, thereby affecting the future-reality associations. Hence, the likelihood

perception of the activated expectations (i.e., either high or low) should determine the restructuring of the goal representation, which then guides the subsequent goal striving.

Nevertheless, the activation of the expectations might have co-activated associated constructs in memory – past episodes of goal striving including plans, behavioral means, and outcomes – which theoretically could have influenced the subsequent restructuring of the representations of the desired future. However, past research showed that measured and manipulated expectations seem to have the same effects on goal commitment and goal striving (Feather, 1982), suggesting that there should also be no difference in the effect of measured versus manipulated expectation effects on goal representations. Furthermore, based on expectancy - value models of motivation, Förster et al. (2005, Study 4, Study 6) manipulated participants' expectations of success for an assigned goal, and found that as predicted, high expectations increased the accessibility of goal-related words compared to low expectations. This result mirrors our findings that students with high expectations in the mental contrasting condition had a higher accessibility for goal-related constructs, suggesting that it were the expectations of success that determined the mental contrasting effects on goal representations. However, manipulating expectations of success is one important future direction for research on the self-regulation of goal setting in order to rule out potential alternative explanations.

8. Implications for Research on the Self-Regulation of Goal Setting

8.1 Mental Contrasting Effects on Future-Reality Associations and Energization

The present results suggest that mental contrasting in light of high expectations establishes a representation of the desired future that integrates the impeding reality. This representation then energizes and guides the goal striving process. Accordingly, we found in Study 1, that feelings of energization after mental contrasting are mediated by future-reality associations. This finding is in line with previous research showing that after mental contrasting, people report motivational energization (Oettingen et al., 2001). Importantly, in a

recent study, mental contrasting effects on energization indexed via cardiovascular activity were found during mental contrasting itself, immediately after individuals juxtaposed their desired future with the impeding reality (Oettingen et al., 2009, Study 1); that is, immediately after the future-reality associations should have been established. However, we would further predict that the future-reality associations energize the individual for as long as the desired future is not realized, by constantly reminding of the necessity to act in order to reach the desired future. This energizing function of the desired future after mental contrasting would also underline the completed transition from a merely desired future to a binding goal, because the latter posses an energizing function (Locke & Latham, 2002).

Future research could test the energizing function of the desired future after mental contrasting in light of high expectations to clarify the function of this energization not only for the transfer from a precommitment to a commitment state, but also during goal striving. Based on the results of the presented studies, we would argue that mental contrasting in light of high expectations establishes strong associations between future and reality which then not only provide the needed energization to form strong commitments, but also provide the needed energization for effort-demanding goal striving activities. Drawing on this hypothesis, several testable predictions can be made. First, after mental contrasting in light of high expectations, the activation of the desired future during goal striving should energize the individual. For example, activating the desired future days after mental contrasting via mere priming should result in an increase in motivational energization, measureable via cardiovascular changes or self-reported changes in feelings of energization. Second, the energizing function of the desired futures should also foster goal striving behavior. For example, the activation of the desired future should help people to better perform goal-relevant behaviors such as complex, effortful problem-solving activities. However, energization is conceptualized as an undirected motivational mechanism, which primarily provides the needed arousal for effortful behavior, but not the direction for which the

provided arousal is used. Hence, activating the energizing desired future should also foster effort-demanding behaviors that are unrelated to the desired future itself. This reasoning offers an explanation for potential transfer effects of mental contrasting from the domain of the desired future to unrelated domain (see also Oettingen & Kappes, 2009). Third, the energizing function of the desired future should be determined by the strength of the future – reality associations; i.e., the energizing function of the desired future should be mediated by the strength of future-reality associations. Testing the outlined predictions would help to connect recent mental contrasting research on the motivational mechanism of energization for the emergence of goal commitment and the presented research on associations between future and reality.

8.2 Mental Contrasting and the Construal of the Impeding Reality

The present work focuses on mental contrasting effects on the transition from a merely desired future to a goal people are committed to strive for. We argued and provided empirical evidence that this transition occurs after mental contrasting in light of high expectations of success by the integration of the impeding reality into the representation of the desired future. However, this integration should not only affect the way the desired future is perceived, but also the way the impeding reality is perceived. For instance, strong future-reality associations (i.e., after mental contrasting in light of high expectations) should not only turn the desired future into something that needs to be achieved, but also the impeding reality into something that needs to be overcome. Hence, the impeding reality should be perceived as an obstacle standing in the way of the desired future. Weak future-reality associations (i.e., after mental contrasting in light of low expectations) should not only turn the desired future into something that can't be achieved but also the impeding reality into something that doesn't need to be overcome. Hence, the impeding reality should be perceived as independent from the desired future. For example, a student who wants to improve his Grade Point Average (GPA) by excelling at a final exam could see his extensive television consumption as potentially

standing in the way of realizing this desired future. Given high expectations of success, after mental contrasting he should perceive his television consumption as an obstacle towards excelling at the final exam, instigating actions to address his television consumption. Given low expectations of success, after mental contrasting he should perceive his television consumption as unrelated to success at the final exam, instigating no actions to address this television consumption.

Such a change in the way the impeding reality is represented could express itself in the way people evaluate the impeding reality; people seeing the impeding reality as standing in the way of the desired future should automatically evaluate the impeding reality as more negative compared to people who do not perceive the impeding reality as standing in the way of the desired future (cf. Ferguson & Bargh, 2004). In the example above, given high expectations, the student should perceive watching television as something negative because it stands in the way of success at the final exam. Such a negative evaluation should foster the commitment to excel at the final exam and to avoid watching television (cf. Chen & Bargh, 1999). Given low expectations, the student should *not* perceive watching television as something negative because it is not related to his success at the final exam anymore. The student might even see watching television rather positively because he can now enjoy watching television without feeling guilty because there is no need to reduce the consumption anymore.

We tested exactly the outline predictions in a recent study (Kappes, Singman, & Oettingen, 2008). We predicted that mental contrasting in light of high expectations leads to a comparatively negative evaluation of one's impeding reality which in turn furthers goal commitment and goal striving, whereas mental contrasting in light of low expectations leads to a comparatively positive evaluation of one's impeding reality which in turn furthers goal disengagement. To test this prediction, we first established three experimental conditions by letting participants differently think about their wished-for grade in one final exam: a mental

contrasting condition, a reversed contrasting condition, and a dwelling condition (i.e., solely reflecting on the impeding reality). Second, participants were asked to rate the pleasantness of their impeding reality aspect. Third, participants indicated their goal commitment. Finally, participants received in average two weeks after the session in the lab and two weeks before the final exam an email in which they were asked to indicate their persistence via self-report (e.g., we asked how much effort they invested in studying for their final exam during the last week).

The results show that in the mental contrasting condition, participants with high expectations of success indicated a negative evaluation of their impeding reality, showed strong goal commitments, and high persistence in goal striving; participants with low expectations of success indicated a positive evaluation of their impeding reality, showed weak goal commitments, and low persistence in goal striving. In the other two experimental conditions (i.e., reverse contrasting, dwelling), participants indicate intermediate evaluations of their impeding reality, goal commitments, and persistence independent of their expectations. Finally, in the mental contrasting condition, the evaluation of the perceived obstacles mediated the relation between expectations and goal commitment, and showed a trend for mediating the relation between expectations and persistence.

These results provide preliminary support for our notion that after mental contrasting the impeding reality is perceived differently depending on one's expectations of success. In the outlined study we used the evaluation of the impeding reality as an indicator of whether participants perceive the impeding reality as an obstacle, indicate by a negative evaluation, or not as an obstacle, indicate by a positive evaluation. Research on the evaluation of goal-relevant constructs shows that such evaluations are capable of inducing avoidance motivation in the case of negative evaluations and approach motivation in the case of positive evaluations (cf. Chen & Bargh, 1999). Yet, we would predict that the relation between the construal of the impeding reality and goal-relevant behavior is more complex. Specifically, we hypothesize

that the integration of the impeding reality into the desired future leads not only to negatively evaluating the impeding reality but to perceiving the impeding reality as an obstacle, a perception that should enable more complex ways to address the impeding reality. Often, things that stand in the way of a desired future can't be overcome by merely avoiding them. For example, the impeding reality of being shy in front of other people might prevent one from asking out a person one has a crush on. The shyness must be addressed rather than avoided; hence, effective goal striving would call for more complex ways of handling the impeding reality.

In a first attempt to test these predictions, we examined whether mental contrasting in light of high expectations of success activates the perception of the impeding reality as an obstacle (Kappes, Reinelt, & Oettingen, 2009). The study used the performance on two chess tasks as critical dependent variables, was conducted with children between the ages of 8 and 12 with approximately the same chess abilities, and consisted of three parts. First, we took baseline measures of participants' chess ability in order to control for ability effects on the chess performance. Specifically, we assessed the performance on two chess tasks as well as how early they started to exercise playing chess. Second, in order to induce the different self-regulatory strategies, we introduced a lottery in which participants could win tickets according to their performance on subsequent chess tasks. For the induction of the self-regulatory strategies, we took the wish to win a desired number of tickets and induced a mental contrasting as well as a reverse contrasting condition. Finally, we assessed as dependent variables the performance on two chess tasks. Critically, on one of these chess tasks, the children had to identify one of their own pieces as *standing in the way* to checkmate (i.e., obstacle task), whereas on the other task they did not have to identify a piece standing in the way to checkmate (i.e., non-obstacle task). Figure 10 depicts the two different chess tasks.
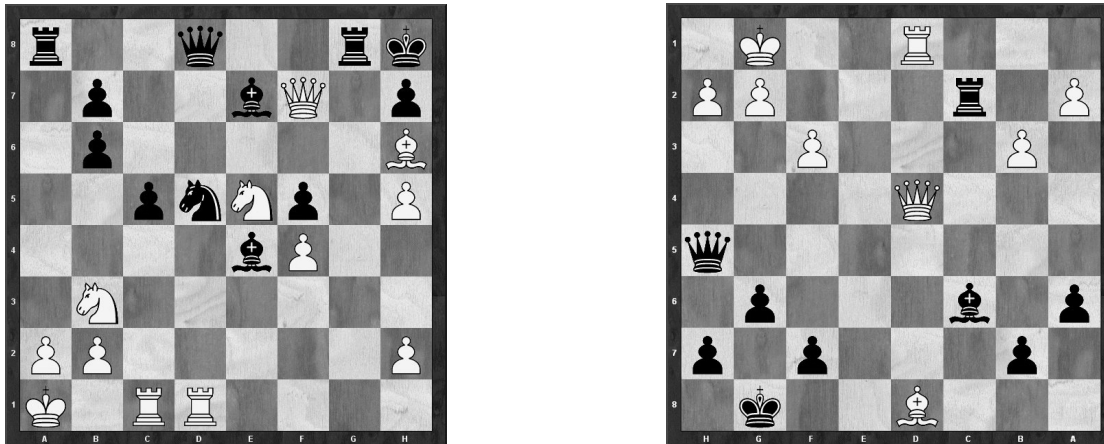
Figure 10. Critical chess tasks. In the left task, the solution of the task requires identifying the white queen as standing in the way of the checkmate, whereas the right task does not.

We theorized that after mental contrasting in light of high expectations of success, participants perceived the impeding reality as standing in the way of the desired future. Following research on construct accessibility (Higgins, 1996), this perceptual change of the reality should also ready participants to perceive obstacles in their environment. Hence, participants in the mental contrasting condition with high expectations should perform better on the obstacle task than on the non-obstacle task. Participants with low expectations in the mental contrasting condition perceive the negative reality as no obstacle; hence they should show no performance difference between the obstacle and the non-obstacle task. Finally, participants in the reverse contrasting condition should show no performance difference independent of their expectations of success. The results confirmed our predictions, thereby providing first evidence that after mental contrasting, participants with high expectations of success perceive the impeding reality as an obstacle. However, the outlined study has two limitations. First, even though participants in the mental contrasting with high expectations exhibited a higher perceptual readiness for obstacles, it remains unclear whether the perceptual readiness is caused by change in the perception of the impeding reality. More direct ways of testing whether the impeding reality is perceived as on obstacle are needed to test this prediction. Second, it remains to be shown whether this change in the perception of

the impeding reality helps participants to effectively address their obstacles. We addressed the latter prediction in another study (Kappes & Oettingen, 2009).

To recapitulate, we predict that the recognition of the impeding reality as an obstacle enables people to effectively address the impeding reality. One efficient way of addressing the impeding reality would be to plan how to overcome the impeding reality; to determine which behavioral means would be effective when the impeding reality is encountered. Relating this reasoning to mental contrasting, we would predict that in light of high expectations of success, people would automatically perceive the impeding reality as an obstacle, which in turn should instigate planning for how to overcome the obstacle. Planning, in turn, should establish associations between the impeding reality and behavioral means to overcome it. Indeed, in a recent study we found that after mental contrasting, people with high expectations of success exhibited strong associations between the impeding reality and behavioral means helpful to overcome the impeding reality, measured via a lexical decision task (Kappes & Oettingen, 2009). Such associations should foster goal-directed behavior when the impeding reality is encountered. However, the latter prediction remains to be tested.

8.3 Mental Contrasting and Disengagement

The presented studies bear also implications for mental contrasting effects on disengagement. In all three studies, there was a significant decrease in the activation of the future-reality association after mental contrasting given low expectations of success compared to the control group. These findings resemble findings of post-fulfillment after the completion of a goal which could indicate a clearing of goal-related information from the cognitive system, thereby ensuring that this information doesn't receive further cognitive resources or interferes with subsequent tasks (cf. Förster, Liberman, & Higgins, 2005). In the same way, the decrease in activation of the future-reality associations after mental contrasting in light of low expectations might indicate that cognitive resources are freed to further disengagement processes. Thereby, mental contrasting in light of low expectations might first, prevent people

from ruminating about a desired future that is unlikely to achieve and second, help people to focus on engaging in pursuing alternative desired futures.

Ruminative thoughts are characterized by repetitively thoughts about distress, its possible implications and consequences (Nolen-Hoeksema, 1991). Ruminative thoughts are linked to depressed mood and low well-being (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Martin and Tesser (1996) argue that ruminative thoughts might be caused by the heightened activation of stimuli related to unfulfilled desires and goals might: The individual who is neither able to achieve nor to disengage successfully from his goal might also not be able to stop thinking about it. This argument is in line with research showing that people with high levels of depressive mood and low levels of well-being report having desires and goals that are abstract, highly difficult, in conflict with other goals, and low in expectations of success (Emmons, 1992, 1996). Hence, unsuccessful disengagement might endanger people to ruminative thoughts via the heightened accessibility of goal-relevant information, potentially leading to depressed mood and low levels of well-being. However, our findings suggest that mental contrasting in light of low expectations of success decreases the activation of goal-relevant stimuli and might thereby prevent the onset of ruminative thought. Therefore, we think it would be a fruitful research direction to examine the level of ruminative thought about the desired future after mental contrasting with low expectations of success and the role of the accessibility of future-reality associations in this relationship. Eventually, this might help to reduce depressive mood and low well-being caused by unsuccessful disengagement.

Even though successful disengagement is important for one's well-being, engagement into pursuing new desired futures is equally important for one's well-being (Brandtstädter & Rothermund, 2002). Hierarchical models of goals (Vallacher & Wegner, 1989; Carver & Scheier, 1998) assume that after fulfillment of goals or disengagement from goals, not only become these goals inhibited, indicated by the decrease in activation, but additionally higher-order goals become activated that gave the fulfilled or dismissed goal their meaning. These

activated higher-order goals guide then subsequent actions. For example, disengaging from the desired future of becoming a medical doctor might activate the higher-order goal of helping people. This activation of the higher-order goal should help people to find an alternative, more likely desired future which has the potential to replace the former. This notion suggest that after mental contrasting in light of low expectations of success, the successful disengagement from the desired future might activate a higher-order goal which then fosters processes of engaging in pursuing alternative desired futures.

8. 4 Mental Contrasting Effects: Summary

The theoretical considerations of the present research in conjunction with the reported findings and their implications lead to new insights into how mental contrasting engenders effects on goal commitment and goal striving as well as on disengagement and reengagement. Figure 11 depicts a schematic model which summarizes these theoretical considerations and empirical finding. We theorized that mental contrasting in light of high expectations of success leads to the construction of the desired future as something that needs to be achieved by integrating the impeding reality into the representation of the desired future. This integration is signified by associations between the future and reality which in turn provide the needed energization to commit to striving for the realization of the desired future. Additionally, theses future-reality associations guide also thoughts, feelings, and behavior during the goal striving process till the desired future is realized. Furthermore, the integration of the impeding reality into the desired future by mental contrasting in light of high expectations turns also the impeding reality into an obstacle that stands in the way of the desired future. This perception of the impeding reality instigates planning processes which endow the cognitive representation with associations between the impeding reality and behavioral means to overcome it. These associations should activate behavior when the impeding reality is encountered.

Mental contrasting in light of low expectations of success should lead to a construction of the desired future as something that can't be achieved, leading to a disintegration of the desired future and the impeding reality. This disintegration is signified by the weak associations between the desired future and the impeding reality. These weak future-reality associations should prevent people from investing feelings, thoughts, and resources into the striving for an unlikely to achieve desired future. Furthermore, the decrease in the accessibility of future-reality associations indicates that the desired future is cleared from the cognitive system, potentially preventing people from ruminating about the disengage from desired future and activating the related higher-order goal which should then help to further the engagement in pursuing alternative desired futures.
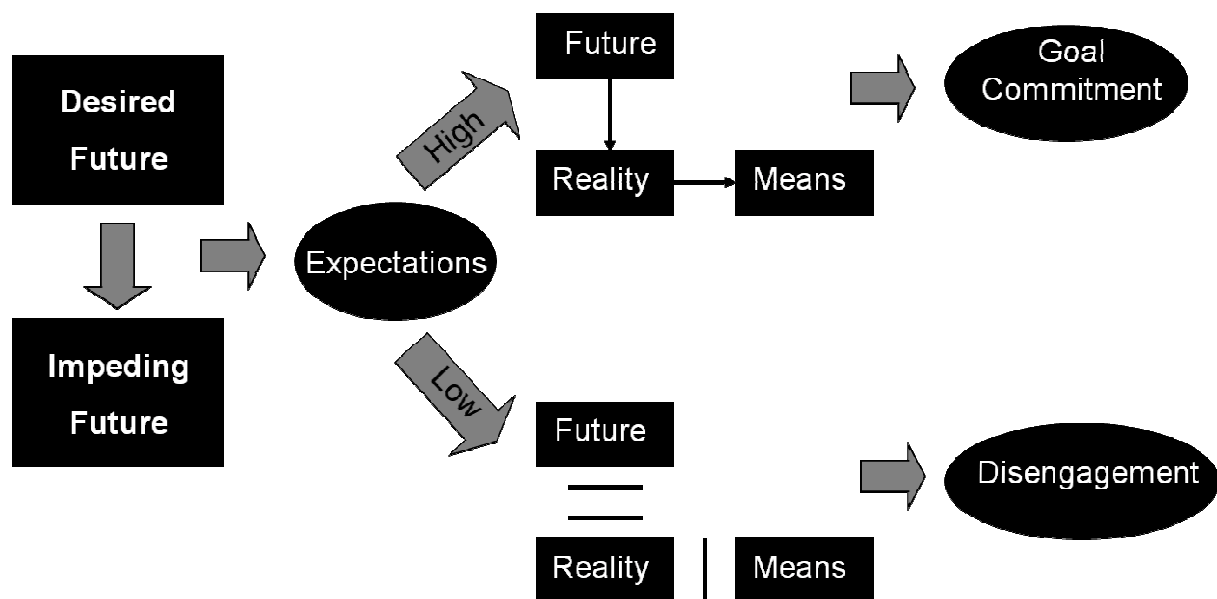
Figure 11. A schematic model of mental contrasting effects on goal commitment and disengagement which integrates the theoretical considerations and empirical findings of the present research

9. Implications for Research on Goal Representations

9.1 Implications for Research on the Accessibility of Goal Representations

There are two different findings in our studies that have implications for research on the flow of accessibility in goal representations during and after goal pursuit. First, in Study 3 we found that after the completion of a goal that does not provide a clear sense of fulfillment

(i.e., being more creative than the average) the decrease in the activation of the goal representation doesn't indicate post-fulfillment inhibition. Specifically, we found that after positive feedback mental contrasting effects in light of high expectations of success on future-reality associations as well as on the accessibility of the desired future and the impeding reality don't exhibit a significant decrease in the activation compared to the control condition. Hence, the strength of the future-reality associations in the mental contrasting condition with high expectations didn't differ from the strength of the future-reality associations in the control condition. This is the first study which examines goal completion effects on the accessibility of goals without clear standards for completion. One interesting future direction for research on the accessibility of goal representation would be to study the difference between the accessibility of such goal representations and the accessibility of representations of desired futures that people so far did not commit to strive for. For instance, in our study, we did not find a difference in the activation pattern after positive feedback between the mental contrasting condition with high expectations of success and the control condition. However, the findings of the presented research suggest that before the positive feedback participants in the mental contrasting condition with high expectations of success committed to strive for the realization of the desired future, whereas participants in the control condition did not. Given that the flow of accessibility in goal representations serves the fulfillment of the goal, the accessibility of representations of goals without clear standards for completion increase in the moment the situation offers another chance to strive for the goal, whereas the same situation should not have this effect on representations of desired futures people did not previously commit to strive for. For example, future-reality associations established by mental contrasting should be activated in the moment the situation provides another chance to strive for the desired future, whereas future-reality associations should not be activated in the same situation without previous mental contrasting about the desired future.

Second, the presented studies are the first who examine effects of disengagement on the accessibility of goal representations. Specifically, we found that after mental contrasting with low expectations of success, the accessibility of future-reality associations significantly decreases compared to the control condition. These findings mirror findings of the inhibition of goal representations after the fulfillment of the goal (Förster, Liberman, & Higgins, 2005). Following the functional view on goal representations, both inhibition after disengagement and inhibition after goal completion should help to clear the cognitive system from the goal-relevant stimuli, thereby preventing interference effects of these stimuli on subsequent actions. However, disengagement from a goal and the completion of a goal inflict different tasks on the individual. In the case of disengagement, the individual needs to identify an alternative goal to strive for, in the case of completion, the individual needs to identify a successive goal. The presented findings suggest that additional cognitive characteristics besides the accessibility of the goal representation are needed to describe the different cognitive orientations after disengagement and goal completion.

9.2 Implications for Research on the Construction of Goals

In the present research, we showed that the transition from a merely desired future to a goal people are committed to approach is marked by the integration of obstacles into the representation of the desired future. However, there are different routes to goal commitment and there are different types of goals (Gollwitzer & Moskowitz, 1996), hence there are probably different mental representations of goals. For example, one important distinction is between approach and avoidance goals (Elliot & Fryer, 2008). From our perspective, approach goals comprise a desired future, whereas avoidance goals comprise a feared future (Oettingen, Mayer, Thorpe, 2009). Examples of the latter category are smokers being afraid of getting lung cancer or obese people being afraid of getting diabetes. We would predict that for the transfer of these feared futures into avoidance goals, people need to contrast the feared future with a reality that needs to be preserved. For example, smokers might contrast their

fantasies about getting lung cancer with the reality of currently feeling healthy. This contrasting procedure should again activate the expectations of success, and in light of high expectations, people should see that they have to take action in order to prevent the feared future; a change in the mental representations that should be indicated by associations between the feared future and the preventing reality which then fuel the commitment to avoid the feared future (cf. Oettingen & Thorpe, 2006).

9.3 Self-Regulatory Strategies and the Cognitive Representation of Motivational Constructs

We integrated research on the self-regulatory strategy of mental contrasting and research on goal representations to answer the question of how mental contrasting engenders goal commitment and the question of what distinguishes a desired future from a binding goal. We think that future research would benefit from following this idea of integrating research on self-regulatory strategies and goal representations. For example, research on goal representations found that associations between goals and corresponding means might support goal commitment (Kuglanski et al., 2002), that inhibitory associations between a goal and competing goals foster goal attainment (Shah, Friedman, & Kruglanski, 2002), and that associations between temptations and long-term goals support self-control (Fishbach et al., 2003, Papies et al., 2008). These findings could help research on self-regulatory strategies to identify strategies that could affect the named associations and thereby promote goal commitment and goal striving. For example, how can a person strengthen associations between goals and means in order to foster goal commitment? Furthermore, research on goal representations could benefit from the integration of self-regulatory strategies, because these strategies would allow for more direct tests of the causal relationship between certain associations and goal commitment and goal striving. For example, is the fostering of goal commitment by a self-regulatory strategy mediated by the change in strength of the goal-

means associations? To summarize, research on self-regulatory strategies and goal representations could benefit from a stronger integration of both lines of research.

Conclusion

The present research is the first that provides insight into the structure of goal representations and additionally, the first that provides insight into how mental contrasting transfers a mere fantasy about a desired future into a binding goal. The crucial element for both the structure of goal representations and the transfer of a desired future into a binding goal by mental contrasting is the integration of potential obstacles into the representation of the desired future, indicated by the establishment of associations between future and reality. This integration process distinguishes mere desired future from binding goals and gives people the tools they need to turn those goals into success.

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