

Mental Contrasting Modulates Automatic Attitudes

Towards Obstacles of Reality

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Abstract

Mental Contrasting of a desired future with obstacles of reality is a self-regulation strategy that produces expectancy-based levels of energization, which in turn predicts goal pursuit. The higher the expectations of success, the more energized people feel and the more they engage in goal pursuit. The present research investigates automatic attitudes towards obstacles of reality as a potential mechanism of this effect. As people who actively pursue a goal display a negative automatic attitude towards objects that impede goal attainment (i.e., obstacles), we predict and find that participants who use mental contrasting (compared to control conditions) display a more negative automatic attitude towards their obstacles of reality the higher their expectations of success are. In three studies, automatic attitudes towards obstacles of reality have been measured via various implicit paradigms (i.e., a masked and an unmasked affective priming task, or an extrinsic affective Simon task), and within various domains (relationships, achievement, and health). Importantly, in Study 3, automatic attitudes towards obstacles of reality mediated mental contrasting effects on feelings of energization. This then translated into goal pursuit (i.e., self-reported commitment to eat more healthily and other-rated healthy eating measured via an online daily nutrition diary over two weeks). Results imply that mental contrasting by promoting negative automatic attitudes towards obstacles of reality in line with expectations of success may instigate feelings of energization, which then help to overcome such realities (e.g., to eat a hamburger) towards the attainment of one's desired future (e.g., improve eating habits).

Keywords: automatic attitudes, expectations, goal pursuit, mental contrasting, obstacles, self-regulation

Mental Contrasting Changes Automatic Attitudes Towards Obstacles of Reality

A high school student who would like to improve the relationship with their roommate might have to overcome a habit of messiness. Having an instantaneous negative reaction when thinking about the messiness might promote the necessary energy to act on terminating this behavior. A college student might have to overcome a feeling of nervousness in order to excel in an admissions test. Likewise, an instantaneous negative reaction linked to the nervousness might instigate an active search for ways to overcome one's nervous attacks. Lastly, in order to improve one's eating habits, a person from Hamburg, Germany (i.e., a Hamburger) might have to overcome the urge to eat unhealthy foods such as hamburgers for lunch. Again, an instantaneous negative reaction towards hamburgers might foster strong feelings of motivation to change one's daily lunch decisions. These examples should point out that an instantaneous negative reaction towards obstacles of reality might help to trigger feelings of energization and thereby promote successful goal pursuit in different domains (i.e., relationships, achievement, or health). Past research suggests that the self-regulation strategy of mental contrasting fosters the identification of crucial obstacles of reality with regard to desired futures. It may also activate necessary energization to attain such desired futures (Kappes, A., Wendt, Reinelt, & Oettingen, 2013; Oettingen et al., 2009; Sevincer & Oettingen, 2015). The present research has sought to investigate whether mental contrasting, by changing the instantaneous automatic reaction (i.e., automatic attitude) towards obstacles of reality (e.g., a habit of messiness, a feeling of nervousness, or a habit of eating a hamburger), would instigate feelings of energization, which in turn would help to promote successful goal pursuit.

During mental contrasting, people juxtapose a desired future with personal obstacles of reality that may impede successful realization of that future. Understanding the obstacle of reality in the context of the desired future will reveal whether action is necessary in order to

overcome one's obstacle. Previous studies suggest that mental contrasting brings people's levels of energization and goal pursuit in line with their expectations of success: the higher the expectations of success were, the more energized people felt and the more they engaged in goal pursuit. However, the lower the expectations of success were (as it would be futile to attain the future), the less energized people felt and the more they disengaged from goal pursuit, possibly saving energy and effort for more feasible enterprises (for an overview, see Oettingen, 2012). Further extending these findings, the present research investigates whether this energization might originate from automatic attitudes towards obstacles of reality, and thereby this energization promotes goal pursuit, as described in the initial examples. Hence, automatic attitudes towards obstacles of reality are hypothesized as a potential mechanism of mental contrasting effects on energization and goal pursuit.

Automatic attitudes may be described as instantaneous, unintentional, non-conscious, inflexible, and effortless evaluations of objects as positive or negative (e.g., Spielman, Pratto, & Bargh, 1988). Research into automatic attitudes in goal pursuit shows that people who actively pursued a goal and were skilled in the goal domain (i.e., high expectations of success) displayed negative automatic attitudes towards obstacles, that is to say objects that impeded goal pursuit (Ferguson, Hassin, & Bargh, 2008). As active goal pursuit paired with high expectations of success is associated with negative automatic attitudes towards obstacles, and as mental contrasting fosters feelings of energization and goal pursuit in line with expectations of success, we argue that mental contrasting should modulate the automatic attitudes towards obstacles of reality in line with expectations of success. The higher the expectations of success, the more negative the automatic attitudes towards the obstacle of reality should be. Conversely, the lower the expectations of success, the less negative the automatic attitude towards the obstacle of reality should be. Furthermore, we have hypothesized that after using mental contrasting, automatic attitudes towards obstacles of

reality should modulate levels of energization and then translate into goal pursuit.

Specifically, the more negative the automatic attitude towards the obstacle of reality, the more people should feel energized and engage in goal pursuit. In contrast, the less negative the automatic attitude towards the obstacle of reality, the less people should feel energized and the more people should disengage from goal pursuit.

Fantasy Realization Theory

Mental Contrasting About Desired Futures

The model of fantasy realization examines how different ways of thinking about desired futures can impact subsequent goal pursuit (Oettingen, 2000, 2012; Oettingen, Pak, & Schnetter, 2001). According to this research, mental contrasting of a desired future with obstacles of reality has been identified as a self-regulation strategy for smart and effective goal pursuit. During mental contrasting, people firstly identify a desired future, such as improving one's eating habits. Next, they identify and imagine the best outcome of realizing this future. For instance, they might imagine feeling healthy, beautiful, proud, and accomplished. Subsequently, people identify and imagine their personal obstacle of reality that stands in the way of attaining their desired future. Revisiting the initial example, an obstacle of reality might be a habit of eating a hamburger for lunch. Thereby, when thinking about this obstacle of reality in the context of the desired future (i.e., improve one's eating habits), people should become particularly aware of whether or not they feel able to realize this future (Oettingen et al., 2001). The stronger that people feel able to realize this future (i.e., high expectation of success), the more they will engage in tenacious goal pursuit. Yet, the lower their expectations of success, the more people will let go of their goal, thus not investing effort in an unfeasible future. In other words, after mental contrasting, subsequent goal pursuit is guided by expectations of success (for an overview, see Oettingen, 2012). In this way, mental contrasting promotes smart goal pursuit. It helps people to identify those

desired futures that are feasible and pursue them, while letting go of those that are unfeasible. Doing this leads to them not wasting energy and effort, thereby potentially freeing up resources for other, more feasible goals.

Mental Contrasting Affects Goal Pursuit

Numerous studies have previously demonstrated mental contrasting effects on goal pursuit, i.e., the intensity and persistence with which individuals act in the service of realizing their goals (for an overview, see Oettingen, 2012). People first commit to their goals before they pursue them (Klinger, 1975). Klinger (1975) conceptualized commitment as a distinct moment of starting a current concern. A current concern in Klinger's sense is what researchers later have described as goal commitment or attachment, determination, interest, or urgency to pursue a goal (Brunstein, 1993; Locke, Latham, & Erez, 1988). Similarly, the model of action phases proposes that it is only after people pass from a pre-commitment state to being committed (i.e., after they cross the Rubicon) that they will display features of goal commitment. Examples of these include preoccupation with the goal, goal-directed action, resumption of goal-directed behavior, and anticipated disappointment (Heckhausen & Gollwitzer, 1987). Furthermore, goal commitment has been described as willingness to invest effort towards and to persist in goal pursuit (Austin & Vancouver, 1996; Hollenbeck, Klein, O'Leary, & Wright, 1989), or feeling responsible for goal realization (Oettingen et al., 2001). Furthermore, as highly committed people experience frustration in the face of failure, the degree of disappointment one feels when anticipating failure in goal realization has also been utilized as another indicator for goal commitment (Gollwitzer & Kirchhoff, 1998; Oettingen et al., 2001).

Consequently, goal commitment may be assessed using various indicators. For instance, people may directly indicate the extent of their goal commitment (e.g., "I am strongly committed to pursuing this goal"; Hollenbeck et al., 1989). However, as people may

often not have insight into their own commitment (Brunstein & Gollwitzer, 1996; Klinger, 1975), researchers have assessed goal commitment indirectly (summaries by Klein, Wesson, Hollenbeck, Wright, & DeShon, 2001; Oettingen & Gollwitzer, 2001). For instance, people reported affective (e.g., “I am strongly interested in realizing this goal”), cognitive (e.g., “I frequently think about realizing this goal”), or behavioral (e.g., “I have acted toward realizing this goal”) indicators of goal pursuit.

Determinants of goal pursuit. Considering the relevance of goal commitment poses the question of how goal commitment emerges. Previous research suggests that people prefer to commit to goals that are desirable and feasible (e.g., Atkinson, 1957; Bandura, 1977; Gollwitzer, 1990). Desirability refers to the attractiveness of successful goal pursuit, while feasibility refers to expectations of successful goal pursuit (e.g., Bandura, 1977; Heckhausen, 1977; Heckhausen & Gollwitzer, 1987; Klinger, 1975). Different types of expectations of success have previously been described. For instance, self-efficacy expectations describe whether one feels able to perform a behavior in order to realize a specific outcome (Bandura, 1977). Furthermore, outcome expectations (Bandura, 1977) or instrumentality beliefs (Vroom, 1964) describe whether one believes that a certain behavior will lead to a specified outcome. Lastly, general expectations of success describe whether one judges the general probability of a certain outcome to be high (Heckhausen, 1991; Oettingen & Mayer, 2002). However, high desirability and feasibility judgments do not necessarily lead to forming strong goal commitments (summary by Oettingen & Gollwitzer, 2001). Fantasy realization theory (Oettingen, 2000; Oettingen, et al., 2001) may provide an answer to this phenomenon by proposing how desirability and feasibility can translate into goal commitments. According to fantasy realization theory (Oettingen, 2000; Oettingen, et al., 2001), mental contrasting of a desired future with the impeding reality strengthens commitment to a desirable and feasible goal. Specifically, mental contrasting fosters strong goal commitments when expectations of

success are high (i.e., high feasibility), and mental contrasting produces weak or no goal commitments when expectations of success are low (i.e., low feasibility; Oettingen et al., 2001). The effects of mental contrasting on goal pursuit have been replicated across various life domains and by employing a variety of methodologies. Goal pursuit was assessed via self-report as well as via observations. In addition, it was assessed directly after the manipulation and up to two years later (summary by Oettingen, 2012). For instance, in line with expectations of success, mental contrasting affected academic performance (Gollwitzer, A., Oettingen, Kirby, Duckworth, & Mayer, 2011), time management (Oettingen, Mayer, & Brinkmann, 2010), integrative bargaining (Kirk, Oettingen, & Gollwitzer, 2011), creative performance (Oettingen, Marquardt, & Gollwitzer, 2012), helping behaviors (Oettingen, Stephens, Mayer, & Brinkmann, 2010), cigarette consumption (Oettingen, Mayer, & Thorpe, 2010), healthy eating behavior, and physical exercise (Johannessen, Oettingen, & Mayer, 2012; Sheeran, Harris, Vaughan, Oettingen, & Gollwitzer, 2013).

Mental Contrasting Spurs Energization

The effects of mental contrasting on goal pursuit were mediated via mobilization of energy (Oettingen et al., 2009). Energization is a variable that has a long history in motivation psychology. Hull (1943) described behavior as a function of energy and direction. Direction describes whether an organism approaches or avoids a goal (Atkinson, 1957; Elliot, 2006; McClelland, 1985). Energization has been described as excitation, arousal, or activation (Cannon, 1915; Duffy, 1934). Indicators of energy mobilization may be, for instance, autonomic function (Duffy, 1934; Wright & Kirby, 2001; Wright, Murray, Storey, & Williams, 1997), or self-report measures, such as feelings of energy, invigoration, tension, activity incitement, and arousal (Brunstein & Gollwitzer, 1996; Klinger, 1975; Thayer, 1978). Importantly, it has been suggested that mobilization of energy would be critical for crossing from a pre-commitment state into a commitment state (Locke & Latham, 1990).

Building on these theories and findings, previous research has identified energization as a critical motivational mediator for the effects of mental contrasting on goal pursuit (Oettingen et al., 2009; Sevincer & Oettingen, 2015). Using mental contrasting produced expectancy-based levels of energization, which in turn predicted participants' goal pursuit (i.e., commitment to resolve interpersonal concerns), as well as self-rated and other-rated quality of performance when giving a presentation (Oettingen et al., 2009). This is to say that, when expectations of success were high, mental contrasting energized people so that they would consent to realizing their desired future. Levels of energization were assessed via self-report (i.e., feelings of energization) and systolic blood pressure (i.e., the maximum pressure exerted by the blood against the vessel walls). Systolic blood pressure can be interpreted as an indicator of energy mobilization (Wright, 1996; Wright & Kirby, 2001). Therefore, mental contrasting leads to energy mobilization and goal pursuit in line with expectations of success. If expectations of success were high, using mental contrasting provided people with the level of energy necessary to commit and effectively strive to realize their desired future. In contrast, when expectations of success were low, people instead safeguarded their energy and resources for more auspicious future ambitions.

It has been argued that mental contrasting mobilizes energy, which enables the transition to goal commitment, by strengthening the meaning of the reality as an obstacle to successful fantasy realization (Kappes, A., et al., 2013). Extending these findings, the present research aims to further investigate the role of the obstacle that may lead to such mobilization of energy. In particular, we examine the automatic attitude towards obstacles of reality as a potential cognitive mechanism of mental contrasting effects on subsequent levels of energization and goal pursuit.

Other Mechanisms of Mental Contrasting

Moreover, previous research suggests that cognitive mechanisms outside of people's awareness mediate the effects of mental contrasting on goal pursuit. In particular, mental contrasting modulated the perception of the reality as an obstacle (Kappes, A., et al., 2013) and formed a strong connection between desired futures and obstacles of reality (Kappes, A., & Oettingen, 2014), as well as these obstacles and instrumental means to overcome them (Kappes, A., Singmann, & Oettingen, 2012). These processes conjointly mediated changes in energization and goal pursuit after mental contrasting.

Meaning of reality as obstacle. Previous findings suggest that mental contrasting achieves its effects on goal pursuit by modulating the meaning of the reality as an obstacle in line with expectations of success. In light of high expectations of success, participants perceived the reality as an obstacle to their desired future. In contrast, in circumstances with low expectations of success, participants did not perceive the reality as an obstacle, as it was efforts to attain the desired future would be in vain (Kappes, A., et al., 2013). These results suggest that mental contrasting highlighted the question of whether these obstacles of reality can be overcome (i.e., high expectations of success) or not (i.e., low expectations of success). Thus, the more that people perceived the desired future to be feasible, the more they perceived the reality to be the critical obstacle to attaining their desired future. On the other hand, mental contrasting paired with low expectations weakened the meaning of reality aspects as obstacles.

Implicit mental associations. Another set of studies have investigated implicit future-reality and reality-means associations as underlying cognitive mechanisms of mental contrasting effects on energization and goal pursuit. These studies demonstrated that mental contrasting changed the strength of the implicit associations depending on expectations of success. Mental contrasting paired with high expectations of success created strong implicit

associations between the future and obstacles of reality (Kappes, A., & Oettingen, 2014), as well as between obstacles of reality and instrumental means to overcome these obstacles (Kappes, A., et al., 2012). Such strong associations imply that the desired future cannot be thought of without automatically bringing to mind the obstacles of reality. Similarly, the obstacles of reality cannot be thought of without bringing to mind the means to overcome them. From these results, it is assumed that the mental image or thought of the obstacles of reality motivates action to attain the desired future, such as by ensuring that effort was invested to use means in order to realize goal pursuit. In contrast, mental contrasting paired with low expectations of success led to weak future-reality and reality-means associations. Such weak future–reality associations may imply that, even when thinking about the desired future, the respective obstacles of reality will not be activated. Likewise, it is assumed that the obstacles of reality then fail to evoke effort allocation and activation of instrumental means for goal pursuit. Therefore, people may not be impelled to act.

Overall, research has previously identified motivational and cognitive mechanisms that help to explain how mental contrasting effects on goal pursuit are brought about. These findings suggest that, in cases of high expectations of success, a person will automatically be reminded of the reality every time they are reminded of or confronted with the idea of the desired future, this will automatically bring to mind the reality, which has come to be strongly defined as an obstacle. The idea of the obstacle of reality will in turn spur attention to incremental means of overcoming them and thus help to successfully realize the desired future. Together, these findings point out the critical role of the obstacle of reality in spurring energization and goal pursuit. Beyond this, the present research investigates the role of potential changes in automatic attitudes towards obstacles of reality in energization and goal pursuit.

Other Forms of Thinking About Desired Futures

Aside from mental contrasting of a desired future with obstacles of reality, people frequently engage in other forms of thinking about desired futures (Sevincer & Oettingen, 2013). People might, for example, exclusively imagine their desired future (i.e., indulging) or they might solely ponder about their obstacles of reality (i.e., dwelling). Research has repeatedly demonstrated that neither indulging nor dwelling affected goal pursuit in line with expectations of success (Oettingen, 2012, Oettingen et al. 2001). It has been argued that such one-sided types of future thought fail to induce the perception of the obstacles of reality as impeding the desired future, and thereby do trigger the consideration of one's expectations of success. Thus, expectations do not become activated and do not translate into goal pursuit. Lastly, imagining the obstacles of reality before the desired future (i.e., reverse contrasting) also fails to promote a perception of reality as standing in the way of the future. Accordingly, previous results also demonstrated that reverse contrasting neither spurred the perception of the obstacles of reality in the context of the desired future, nor activated expectations of success that translated into goal pursuit (e.g., Kappes, A., et al., 2013; Oettingen et al. 2001). As the future is not a reference point for the reality, it is not perceived as an obstacle that needs to be overcome in order to attain the desired future. One reason for this might be that people who use reverse contrasting might rather think about aspects of their obstacles of reality that may not be related to the desired future. For instance, without the context of the desired future of improving one's eating habits, a person might imagine the delicious taste of the hamburger and how tender and succulent the meat will be. Such mental imagery would not contribute to the perception of the hamburger as the pivotal obstacle to improving one's eating habits.

Based on these findings, we argue that only the process of mental contrasting can ensure that the obstacles of reality will be imagined in the context of the desired future.

Therefore, this process should highlight that the realization of the desired future depends on overcoming the obstacles of reality. Hence, the process should also activate expectations of success. In consequence, we propose that only mental contrasting should change automatic attitudes towards the obstacles of reality based on expectations of success. Following this reasoning, mental contrasting should establish a unique type of automatic attitude towards the obstacles of reality, as it depends on expectations of success and signals that the obstacle of reality impedes the realization of the desired future. In contrast, the automatic attitude towards obstacles of reality in the control conditions (e.g., reverse contrasting) should neither be in line with expectations of success, nor signal the impediment of the desired future, nor be relevant for subsequent goal pursuit.

Attitudes and Dual Process Theories

Attitude-Behavior Gap

The concept of attitude can be described as a positive or negative evaluative response to a specific stimulus, such as a person, social issue, object, event, and so on (e.g., Chaiken & Stangor, 1987; Fazio, 1986; McGuire, 1985; Spielman, Pratto, & Bargh, 1988). Assuming that people act in accordance with their attitude, this concept has generally been employed to predict behavior (e.g., theory of reasoned action and theory of planned behavior; Ajzen, 1991; Ajzen & Fishbein, 2005). However, more than 50 years ago, researchers detected a significant lack of congruence between people's stated attitude and their actual behavior. This phenomenon has been referred to as the attitude-behavior gap (e.g., Wicker, 1969). In consequence, a great deal of research has been concerned with understanding the conditions under which attitudes do or do not guide behavior (e.g., Fazio, 1990, 1995, 2007; Olson & Fazio, 2009; Wilson; Lindsey, & Schoolar 2000; Greenwald & Banaji, 1995).

Automatic Versus Controlled Processes

Dual-process theories may provide a potential answer to this question (e.g., Gawronski & Creighton, 2013; Petty & Cacioppo, 1986; Kahneman, 2003; Strack & Deutsch, 2004; Shiffrin & Schneider, 1977; Posner & Snyder, 1975). At heart, these theories differentiate between automatic and controlled processes that may influence behavior.

Automatic processes are characterized by high efficiency while lacking intention, control, and awareness (Bargh, 1994). Fazio (1995, 2007) has argued that attitudes are automatically activated upon encountering a physical object or a non-physical object such as a mental idea (i.e., automatic attitude). These attitudes subsequently guide behavior. On the other hand, controlled processes can be described as intentional, controlled, conscious, and limited by available processing capacity (Bargh, 1994). As controlled processes depend on a person's conscious insight, intention, and cognitive resources to engage in effortful processing, they may only impact behavior with sufficient motivation and cognitive capacity (Fazio, 1990). Hence, whenever motivation and cognitive capacity are not sufficient, automatic processes are assumed to guide behavior.

Automatic Attitudes as Predictors of Behavior

Indeed, various studies have found that automatic processes (typically assessed via implicit measurement) yielded particularly accurate predictions of subsequent behavior (e.g., Greenwald & Banaji, 1995; Roediger, 1990). For instance, automatic processes especially predicted behavior that was itself automatic, spontaneous, or unintended (Asendorpf, Banse, & Mücke, 2002; Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997; Perugini, 2005). Furthermore, they predicted behavior when it was difficult to control (e.g., Friese, Hofmann, & Wänke, 2008), or when normative pressure existed (demand for social desirable self-report was high). In contrast, controlled processes, as they are frequently assessed via self-report, may easily be biased or even manipulated. People may simply edit their answers to be in line

with perceived norms, leading such statements to not reflect actual behavior (e.g., Crowne & Marlowe, 1960; Dovidio et al., 1997; Fazio, Jackson, Dunton, & Williams, 1995).

Accordingly, it is not surprising that explicit and implicit attitude measures are not always (strongly) correlated. Correlations between implicit and explicit attitude measures varied widely from weakly to strongly positive, indicating that they are distinct but related constructs (Nosek, 2005, 2007).

In conclusion, the advantages of assessing automatic processes are threefold. Firstly, automatic processes do not depend on cognitive resources. Therefore, they are particularly predictive when behavior is difficult to control. Secondly, they do not rely on a person's ability to consciously assess the behavior. Therefore, they particularly predict spontaneous behavior. Lastly, they are not easily manipulated, ensuring that they are not influenced by social desirability. For these reasons, automatic processes often predict behavior more effectively than controlled processes. Thus, they may be of particular value in the prediction of behavior.

Measuring Automatic Attitudes

Automatic attitudes can be assessed through implicit measurements that have at least one of the following characteristics: high efficiency of processing, lack of intention, reduced controllability or awareness of the origins, meaning, and occurrence of a response (Bargh, 1994). As a result, implicit measurements cover a diverse set of methodologies. During explicit assessments (e.g., via self-report), people decide or deliberate about their feelings towards an object. In contrast, during implicit assessment, participants categorize items as quickly as possible, for example. Typically, analyses of reaction times or error rates serve as indicators of automatic affect. As implicit measures reduce the opportunity to engage in effortful processing, responses given concerning these measures are assumed to directly reflect people's automatic attitudes (Olson & Fazio, 2004).

Affective priming task. A frequently used paradigm in assessing automatic attitudes is the affective priming task (e.g., Klauer & Musch, 2003; Bargh, Chaiken, Govender, & Pratto, 1992; Fazio et al., 1995; Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Bargh, Chaiken, Raymond, & Hymes, 1996). During this task, the attitude towards a mental construct is inferred by the extent to which related concepts affect response times to positive or negative concepts in a sequential priming procedure. Participants are firstly presented with a prime that can be masked (i.e., subliminal) or unmasked (i.e., supraliminal). Directly after this, a target appears that participants categorize as either positive or negative. Research into affective priming demonstrates that less time is needed to categorize a target stimulus as positive or negative when a concept with the same valence precedes the stimulus (Fazio et al., 1995). Thus, automatic attitude towards concepts (such as obstacles of reality) can be assessed by observing the difference between the reaction times of individuals in categorizing positive and negative target words after their (subliminal) presentation. The affective priming paradigm has been studied intensively and is said to provide a valid means of obtaining an indirect estimate of a positive or negative automatic attitude (for an overview see, Klauer & Musch, 2003).

Extrinsic affective Simon task. Another paradigm that can be used in inferring automatic attitudes is the extrinsic affective Simon task (EAST; De Houwer, 2003). The EAST has been successfully used to assess automatic attitudes in different areas, such as those related to self-esteem (De Houwer, 2003), food (Roefs, Herman, MacLeod, Smulders, & Jansen, 2005), alcohol (De Houwer, Crombez, Koster, & De Beul, 2004), and anxiety (Ellwart, Becker, & Rinck, 2005; Huijding & de Jong, 2005). The EAST, a modified version of the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998), infers the attitude towards a mental construct by comparing responses to trials within a single task. Participants classify white words on the basis of stimulus valence and colored words on the

basis of color. For colored words with a positive valence (e.g., flowers), responses were faster when the correct response was matched to the response that was also assigned to positive white words. The reverse pattern was true for colored words carrying a negative valence (e.g., insect). Here, responses were faster when the correct response matched the response that was also assigned to negative white words.

Automatic Processes in Goal Pursuit

Experiencing an instantaneous positive or negative reaction (e.g., automatic attitude) towards objects in the environment allows a person to react instantly (Fazio, 1989; Ferguson & Zayas, 2009; Roskos-Ewoldsen & Fazio, 1992). Research into automatic attitudes demonstrates that people attended to and evaluated objects relevant to current goal pursuit with greater urgency (Dijksterhuis & Aarts, 2003; Bruner, 1957). Moreover, a positive automatic attitude towards a goal and its related objects, such as means and activities, seems to determine whether that goal is selected and pursued (e.g., Aarts & Dijksterhuis, 2003; Custers & Aarts, 2005, 2007; Ferguson, 2007; Ferguson, 2008; Ferguson & Bargh, 2004). For instance, students with a currently active academic goal displayed a more positive automatic attitude towards stimuli related to this goal (e.g., library; Ferguson, 2008). Furthermore, a positive automatic attitude towards a goal (e.g., thinness) in turn reflected a person's intention to pursue that goal. Importantly, it also predicted goal-consistent behavior (i.e., consumption of cookies; Ferguson, 2007).

Automatic attitudes towards obstacles in goal pursuit. Goal pursuit is typically comprised of deciding between behavior that offers greater long-term benefits and alternatives (i.e., obstacles) that offer short-term benefits (Loewenstein, 1996; Gollwitzer & Moskowitz, 1996; Metcalfe & Mischel, 1999). Research has shown that forming cool and abstract representations of obstacles might bolster successful goal pursuit by undermining the influence of these obstacles on behavior (Metcalfe & Mischel, 1999; Mischel & Ayduk,

2004; Mischel, Shoda, & Rodriguez, 1989). Furthermore, it has been argued that self-control processes, activated by the presence of obstacles, lead to a devaluation (i.e., a more negative attitude) of these obstacles (Myrseth, Fishbach, & Trope, 2009). Specifically, gym users displayed a more negative attitude towards chocolate bars compared to health bars when they had the choice between them. Moreover, students displayed a more negative attitude towards leisure activities before, as opposed to after, a deadline.

Furthermore, recent research suggests that many processes of goal pursuit are automatic thus operate outside of a person's conscious awareness (e.g., Bargh & Chartrand, 1999; Custers & Aarts, 2005; McCulloch, Ferguson, Kawada, & Bargh, 2008). For instance, when people in goal pursuit encountered cues for their goal, they displayed a more negative automatic attitude towards their obstacles (Fishbach, Zhang, & Trope, 2010). Specifically, increasing the accessibility of the achievement concept resulted in a negative automatic attitude towards leisure activities (i.e., obstacles). Furthermore, increasing the accessibility of weight watching among dieters resulted in a negative automatic attitude towards fattening foods (i.e., obstacles). In addition, previous research found that, in the achievement domain, participants an active goal and with high expectations of success (i.e., high GPA) displayed a more negative automatic attitude towards objects that impeded attainment of their goal (e.g., TV) compared to participants without an active goal and with low expectations of success (Ferguson, 2007).

Based on and extending findings that active goal pursuit paired with high expectations of success was associated with negative automatic attitudes towards obstacles (Ferguson, 2007), we hypothesize that mental contrasting should modulate the automatic attitudes towards obstacles of reality in line with expectations of success. This was because it fostered feelings of energization and goal pursuit in line with expectations of success. Furthermore, we investigate whether the automatic attitude would spur feelings of energization, which in

turn would translate into goal pursuit. Many processes of goal pursuit operate outside of a person's conscious awareness (Moskowitz, Li, & Kirk, 2004). In addition, automatic attitudes are said to be particularly predictive of such automatic behaviors (e.g., Perugini, 2005). We therefore have predicted that automatic attitudes towards obstacles of reality should predict subsequent goal pursuit. Specifically, the more negative the automatic attitude towards the obstacle of reality, the more people should feel energized and engage in goal pursuit. Conversely, the less negative the automatic attitude towards the obstacle of reality, the less people should feel energized and the more people should disengage from goal pursuit.

Revisiting the introductory example, after using mental contrasting, the person who desires to improve their eating habits (i.e., desired future) should experience a more negative automatic attitude towards eating a hamburger for lunch (i.e., obstacle of reality) the higher their expectations of success are. Yet, the lower the expectations of success, the less negative the automatic attitude they display towards eating a hamburger should be. Experiencing an instantaneous negative reaction (i.e., automatic attitude) towards the hamburger should spur feelings of energization, which should help a person to change their lunch decision and improve their eating habits.

The Present Research

The present research investigates automatic attitudes towards obstacles of reality as a potential process in the effects of mental contrasting on energization and goal pursuit. Specifically, we have tested whether mental contrasting of a desired future with obstacles of reality changes the automatic attitude towards these obstacles in line with expectations success. We have also investigated whether this automatic attitude functions as a mediator of mental contrasting effects on subsequent levels of energization and goal pursuit (i.e., goal commitment and attainment). We have tested our hypotheses in three studies. In Study 1, participants named an idiosyncratic desired future pertaining to their relationships with either

high or low expectations of realizing them. Participants in the mental contrasting condition (i.e., mentally elaborating a desired future followed by an impeding reality) were compared to a reverse contrasting control condition (i.e., imagining the same aspects in reverse order) and a valance control condition (i.e., elaborating firstly a positive and then a negative experience with a professor). Automatic attitude towards obstacles of reality was measured through a masked affective priming task (e.g., Klauer, Eder, Greenwald, & Abrams, 2007). Study 2 employed a desired future pertaining to the achievement domain. Here, participants indicated their expectations of successfully performing in a creativity test. Participants in the mental contrasting condition were again compared to a reverse contrasting control condition and additionally to a distraction control condition, solving arithmetic problems. The automatic attitude towards obstacles of reality was assessed via an extrinsic affective Simon task (e.g., De Houwer, 2003). In Study 3, participants indicated their expectations of successfully improving their eating habits (i.e., a desired future pertaining to the health domain). The control conditions were identical to Study 2. The automatic attitude towards obstacles of reality was measured via an unmasked affective priming task (e.g., Ferguson, 2007). In order to test automatic attitude as a potential mediator of mental contrasting effects on subsequent energization (Kappes & Oettingen, 2011) and goal pursuit, participants reported their feelings of energization with regard to eating more healthily, their commitment to eating more healthily (Oettingen et al., 2001), and their actual eating behavior. They did this via an online daily nutrition diary over the next two weeks.

Study 1: Relationships

Participants were recruited at the campus of a large German University. The study duration was approximately 20 minutes and participants received 5 Euros as compensation. In the beginning, all participants named an idiosyncratic desired future with regard to their

relationships. To manipulate high versus low expectations of success, participants either named a desired future that was very likely or very unlikely to be realized, respectively.

Thereafter, participants were randomly assigned to a mental contrasting condition, a reverse contrasting control condition, or a valence control condition. Participants in the mental contrasting condition firstly identified and elaborated their best outcome of successfully attaining their desired future. Next, they identified and elaborated their most critical personal obstacle of reality. Participants in the reverse contrasting control condition received identical instructions as in the mental contrasting condition, but in reversed order. Hence, participants in the reverse contrasting control condition were instructed to generate the same content as participants in the mental contrasting condition. However, they started with the elaboration of their obstacle of reality. This condition accounted for the alternative explanation that mental contrasting would change the automatic attitude simply due to the content of elaborating the obstacle of reality and the desired future. Participants in the valence control condition elaborated a positive, then a negative experience with a professor. As participants in the valence condition did not elaborate the content of the future or the reality, they thus provide a baseline comparison. Additionally, this condition excluded the alternative explanation that mental contrasting would change automatic attitude simply due to the order of elaborating firstly a positive (such as the desired future) and then a negative (such as the reality) aspect.

As a dependent variable, we assessed automatic attitude towards participants' idiosyncratic obstacles of reality via a masked affective priming task. We hypothesized that only participants in the mental contrasting condition (versus control conditions) would change their automatic attitude towards the idiosyncratic obstacles of reality, depending on their expectations of success. Specifically, we expected that only participants in the mental contrasting condition (versus control conditions) would subsequently show a more negative

automatic attitude towards their idiosyncratic obstacles of reality if they were in the high (versus low) expectations of success condition. Finally, participants were thanked for their participation and received a debriefing about the study's purpose.

Method

Participants

There were 140 participants (92 women, 48 men, $M_{\text{age}} = 25.5$ years, $SD_{\text{age}} = 6.9$ years, age range: 18–62 years). All participants identified their first language as German. The study consisted of a 2 x 3 between-subjects design, with manipulations of expectations of success (high, low) and self-regulation strategy (mental contrasting, reverse contrasting control, valence content control). Accordingly, participants were randomly assigned to one of six conditions: mental contrasting and high expectations of success ($n = 17$), mental contrasting and low expectations of success ($n = 22$), reverse contrasting control and high expectations of success ($n = 22$), reverse contrasting control and low expectations of success ($n = 28$), valence content control and high expectations of success ($n = 22$), and valence content control and low expectations success ($n = 29$).

Procedure and Measures

Participants learned that the study was designed to determine how people think about and deal with their desired futures, as well as how this relates to their verbal skills. They would firstly write about their thoughts on a desired future with regard to their relationships. Subsequently, they would participate in a short test of their verbal skills. . All participants were asked to name a desired future that was important to them and that pertained to their interpersonal relationships.

Manipulation of expectations of success. To manipulate *high* expectations of success, one group of participants named a desired future that they felt was *very likely* to be achieved. Participants named these desired futures, such as “to find a best friend”. In contrast,

to manipulate *low* expectations of success, the other group participants named a desired future that they felt was *rather unlikely* to be achieved. Participants also named these desired futures, such as “improving my relationship with my brother”.

Manipulation check: Expectations and importance of success. To confirm whether participants in fact named desired futures with high versus low expectations of success, they were asked to give their own indication of their expectations of success: “How likely do you think it is that you will successfully realize your desired future?” Furthermore, to verify whether participants in fact named desired futures, they answered another manipulation check question about the desirability of their future: “How important is it to you that you will realize your desired future?” Participants answered both manipulation check questions on a 7-point scale ranging from 1 (*not at all*) to 7 (*extremely*).

Obtaining words for the masked affective priming task. To obtain words for use in the masked affective priming task, participants named their most important and critical personal obstacle of reality that could prevent the realization of their desired future. Thereafter, participants specified one word to summarize their personal obstacle of reality, such as “shy” or “egoistic”. In addition, participants named the most wonderful outcome that they associated with realizing their desired future. They again specified one word to summarize this outcome, such as “fun” or “happiness”. Outcome words were used along with reality words during the masked affective priming task to demonstrate that automatic attitudes were modulated specifically towards personal obstacles of reality, and not any idiosyncratic word.

Manipulation of self-regulation strategy. In order to manipulate participants’ self-regulation strategy, they received varying instructions to spur different mental elaborations, depending on the condition. Therefore, participants were randomly assigned to either the

mental contrasting condition, the reverse contrasting control condition, or the valence control condition.

Mental contrasting condition. Participants in the mental contrasting condition mentally elaborated and wrote about the most wonderful outcome they associated with realizing their desired future, before mentally elaborating and writing about the most critical personal obstacle of reality that could prevent them from realizing it.

Reverse contrasting control condition. Participants in the reverse contrasting control conditions mentally elaborated and wrote about the same aspects but in reverse order. Thus, they started with mentally elaborating and writing about their most critical personal obstacle of reality, before mentally elaborating and writing about the most wonderful outcome they associated with realizing their desired future.

Valence control condition. Participants in the valence control condition mentally elaborated and wrote about a positive and a negative experience with a professor, beginning with the positive experience.

Dependent variable: Automatic attitude towards obstacles of reality. To assess automatic attitudes towards personal obstacles of reality, participants completed a masked affective priming task (see Olson & Fazio, 2002). Each trial consisted of a mask (e.g., ASPOIJFDSAEQWRJFADSW) for 300 milliseconds, a prime word for 43 milliseconds, another mask for 14 milliseconds, and a target word. The target word remained on the screen until participants indicated whether each target was positive or negative. Participants pressed the right key (i.e., '/'-key) for negative and the left key (i.e., 'z'-key) for positive target words. Figure 1 depicts an exemplary trial for the masked affective priming task. Primes were the words, which participants had generated in the beginning of the study to summarize their personal obstacle of reality (i.e., reality prime), their personal most wonderful outcome (i.e., outcome prime), one positive prime (i.e., birthday), one negative prime (i.e., crime), and

four neutral primes (e.g., table). The target words included twelve strongly positively valenced words (e.g., friend) and twelve strongly negatively valenced words (e.g., trash). In a previous study, these prime and target words had been found to carry a strong negative or positive valence, respectively (see Klauer & Musch, 1999). For a complete list of prime words, target words, and masks see Appendix A. Participants completed a total of two blocks, with four practice trials and 48 main trials each. Within one block, each prime appeared three times with a positive target and three times with a negative target. Sampling with replacement was used to select the masks. The experiment was run on a standard PC using MediaLab and DirectRT software. Stimuli were presented on a 19-inch CRT monitor, viewed at a distance of ~50 cm. Prime words, target words and masks were displayed in white color (#FFFFFF) in the center of the screen. The font was Arial, bold, 24pt. The rest of the screen showed a black background (#000000). The inter-trial interval was 100 milliseconds.

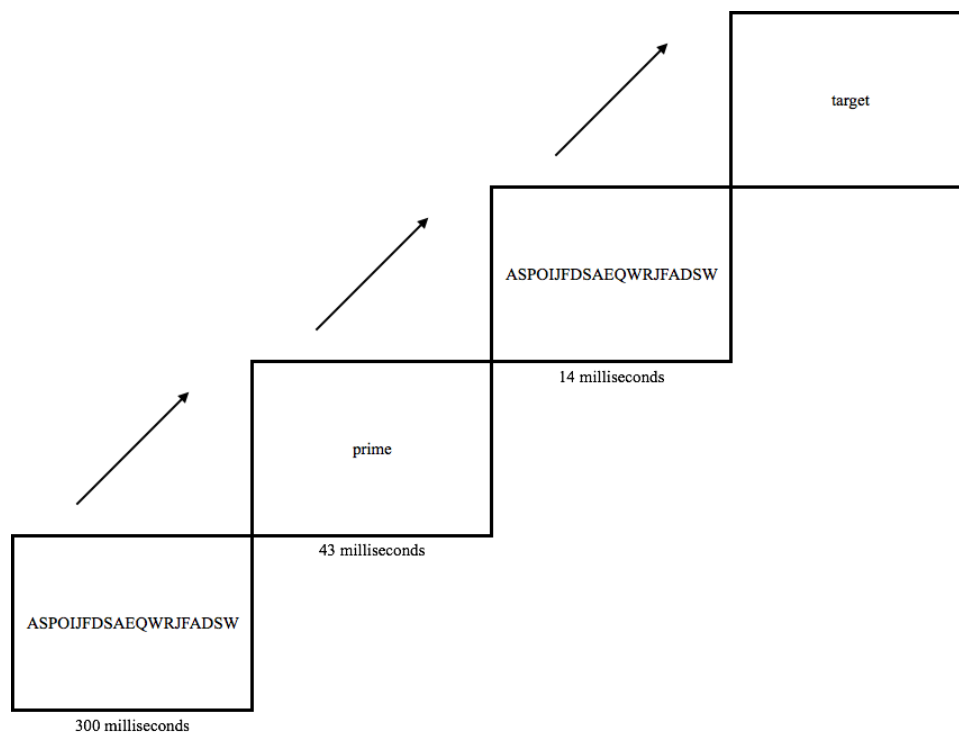


Figure 1. Study 1: Depiction of an exemplary trial used in the masked affective priming task.

Reality attitude index (RAI). We computed a score to reflect participants' automatic attitude towards reality primes, as well as towards neutral primes (Ferguson, 2008). We subtracted the median reaction times in trials using reality primes and positive targets from the median reaction times in trials using reality primes and negative targets (i.e., [reality prime & negative target] - [reality prime & positive target]). The same computation was done for respective trials with neutral primes (i.e., [neutral prime & negative target] - [neutral prime & positive target]). We received a reality attitude score and a neutral attitude score, with lower scores indicating more negative automatic attitude towards the respective primes. In order to create an index that reflected relative automatic attitude towards the reality prime while adjusting for potential baseline attitude toward the neutral primes, we subtracted the neutral attitude scores from the reality attitude scores (i.e., [reality attitude score] - [neutral attitude score]). This final reality attitude index (RAI) indicated the automatic attitude towards reality primes above and beyond any baseline automatic attitude towards neutral primes. Therefore, lower scores indicated a more negative automatic attitude towards the personal obstacles of reality.

Outcome attitude index (OAI). To demonstrate that automatic attitude was modulated solely towards personal obstacles of reality (and not idiosyncratic words per se), we computed an automatic attitude index using the corresponding computation for respective trials with outcome primes. We firstly computed an outcome attitude score by subtracting the median reaction times in trials using outcome primes and positive targets from the median reaction times in trials using outcome primes and negative targets (i.e., [reality prime & negative target] - [reality prime & positive target]). After this, we subtracted the neutral attitude scores (see above) from the outcome attitude scores (i.e., [outcome attitude score] - [neutral attitude score]). This outcome attitude index (OAI) indicated the automatic attitude towards outcome primes above and beyond any baseline automatic attitude towards neutral

primes. Lower scores indicated a more negative automatic attitude towards the personal best outcome.

Positive and negative attitude indexes. In order to perform a manipulation check in order to demonstrate that the paradigm was able to distinguish between positive and negative primes, we computed attitude indexes for those trials with a negative prime (i.e., crime) and for those with a positive prime (i.e., birthday). Similarly, we subtracted the median reaction times in trials using positive primes and positive targets from the median reaction times in trials using positive primes and negative targets (i.e., [positive prime & negative target] - [positive prime & positive target]). The same computation was performed for respective trials with negative primes (i.e., [negative prime & negative target] - [negative prime & positive target]). We received a positive attitude score and a negative attitude score, with lower scores indicating a more negative automatic attitude towards the respective primes. Again, in the next step, we created an index that reflected relative automatic attitude towards the positive prime and the negative prime, adjusting for potential baseline attitude toward the neutral primes. We subtracted the neutral attitude scores from the positive attitude scores (i.e., [positive attitude score] - [neutral attitude score]). Likewise, we subtracted the neutral attitude scores from the negative attitude scores (i.e., [negative attitude score] - [neutral attitude score]). In this way, we received two more indexes. One was a final positive attitude index (PAI) that indicated automatic attitude towards positive primes above and beyond any baseline automatic attitude towards neutral primes. The other was a final negative attitude index (NAI) that indicated automatic attitude towards negative primes above and beyond any baseline automatic attitude towards neutral primes. Again, lower scores on the PAI and NAI indicated a more negative automatic attitude towards the positive prime (i.e., birthday) and the negative prime (i.e., crime) respectively. Subsequently, participants indicated their

gender, age, and first language.¹ Finally, participants were fully debriefed about the purpose of the study.

Results

Data Preparation

To lessen the influence of outliers, we excluded five participants (3.50%) with extreme error rates (i.e., $\geq 20\%$) (Wentura & Degner, 2010). Thus, the data of 138 out of 143 (96.50%) participants were included in the data analyses. The frequency of exclusion did not differ by manipulation of expectations of success, $\chi^2(1, N = 143) = .04, p = .85$, or strategy, $\chi^2(2, N = 143) = 3.49, p = .17$. For reaction time analyses, we only used correct responses on the masked affective priming task. The error rate was 6.51%.

Descriptive Analyses

Randomization. Indicating that randomization was successful, an ANOVA with expectations of success (high, low) and strategy (mental contrasting condition, reverse contrasting control condition, valence control condition) as between-subject factors, and age as dependent variable, showed no main effect of manipulation of expectations of success, $F(1,132) = .43, p = .52$, no main effect of strategy, $F(2,132) = .53, p = .59$, and no interaction effect between expectations of success and strategy, $F(2,132) = 1.36, p = .26$. Furthermore, there was no difference in gender (female, male) for manipulation of expectations of success (high, low), $\chi^2(1, N = 138) = 1.87, p = .17$, or for manipulation of strategy (mental contrasting condition, reverse contrasting control condition, valence control condition), $\chi^2(2, N = 138) = .26, p = .88$.

Effects of gender and age. Gender did not have a significant effect on the reality attitude index, the outcome attitude index, the negative attitude index, or the positive attitude index, $F_{\text{Univariate}}(1,133) = .008$ to $.58, ps > .44, \eta_p^2s < .005$. Age was not correlated with the reality attitude index, $r = .06, p = .51$, the outcome attitude index, $r = .03, p = .70$, or the

negative attitude index, $r = -.10$, $p = .24$. In contrast, age was correlated with the positive attitude index, $r = .21$, $p = .01$. Therefore, age was added as a covariate when testing the effect on the positive attitude index.

Descriptive statistics. Expectations of success ranged from 1 to 7 with $M = 3.80$ ($SD = 1.64$), and the importance of success ranged from 1 to 7 with $M = 5.88$ ($SD = 1.05$). Mean reaction times were -1.30 milliseconds ($SD = 84.44$ milliseconds) for the reality attitude index, $.26$ milliseconds ($SD = 61.85$ milliseconds) for the outcome attitude index, -7.30 milliseconds ($SD = 73.31$ milliseconds) for the negative attitude index, and -2.03 milliseconds ($SD = 71.77$ milliseconds) for the positive attitude index.

Expectations of success were positively correlated with importance of success, $r = .43$, $p < .001$, indicating that participants who reported concerns of high importance of success also reported higher expectation of success. There was no correlation between expectations of success and the reality attitude index, $r = -.15$, $p = .09$, or the outcome attitude index, $r = -.07$, $p = .43$. Importance of success was not correlated with the reality attitude index, $r = -.08$, $p = .37$, or the outcome attitude index, $r = .09$, $p = .66$. Therefore, automatic attitude towards the personal obstacle of reality or the outcome was not related to participants' expectations of success or importance they placed in successfully realizing their desired future. Finally, the reality attitude index was not correlated with the outcome attitude index, $r = -.05$, $p = .60$. See Table 1 for a detailed overview of the mean, standard deviations, and correlations for key study measures.

Table 1

Study 1: Means, Standard Deviations, and Correlations for Key Study Measures

Measure	<i>M (SD)</i>	1	2	3	4	5	6
1. Age	25.2 (6.2)	-					
2. Expectations of success	3.80 (1.64)	-.04	-				
3. Importance of success	5.88 (1.05)	-.17*	-.43*	-			
4. Reality attitude index	-1.30 (84.44)	.06	-.15	-.08	-		
5. Outcome attitude index	.26 (61.85)	.03*	-.07	-.04	-.05	-	
6. Negative attitude index	-7.30 (73.31)	-.10*	-.04	.14	-.03	.18*	-
7. Positive attitude index	-2.03 (71.77)	.21*	-.16	-.08	.06	.27*	-.16

Notes. $N = 138$.

* $p < .05$.

Manipulation Check: Expectations of Success

To test our manipulation of expectations of success, we specified an ANOVA with expectations of success (high, low), and strategy (mental contrasting condition, reverse contrasting control condition, valence control condition) as between subject factors, and expectations of success as a dependent variable. We found the predicted main effect of manipulation of expectations, indicating that participants who received the high expectations manipulation reported higher expectations of success ($M = 5.08$, $SD = .99$) than participants who received the low expectations manipulation ($M = 2.79$, $SD = 1.32$), $F(1,132) = 125.77$, $p < .001$, $\eta_p^2 = .49$. There was no main effect of strategy, $F(2,132) = 2.19$, $p = .12$, and no interaction effect between expectations of success and strategy, $F(2,132) = .64$, $p = .53$.

Manipulation Check: Relationships as Desired Futures

Confirming that participants named desired futures, 127 participants (92.03%) indicated an importance of success higher than the midpoint of the scale (i.e., 4 on a scale from 1 to 7; $M = 5.88$, $SD = 1.05$). Only 1 participant (0.72%) indicated that realizing the desired future was not at all important to them.

Interestingly, an ANOVA with expectations of success (high, low) and strategy (mental contrasting condition, reverse contrasting control condition, valence control condition) as between subject factors, and importance of success as dependent variable, showed a significant main effect of manipulation of expectations, $F(1,132) = 15.12$, $p < .001$, $\eta_p^2 = .10$. Participants who received the high expectations manipulation reported higher importance of success ($M = 6.26$, $SD = .75$) than those who received the low expectations manipulation ($M = 5.58$, $SD = 1.16$). There was no main effect of manipulation of strategy, $F(2,132) = 1.80$, $p = .17$, and no interaction effect between expectations of success and strategy, $F(2,132) = .09$, $p = .91$. As a result, for the main analyses we report both the results with and those without adjustment for importance of success.

Manipulation Check: Masked Affective Priming Task

In order to examine whether the masked affective priming task was able to distinguish between negative and positive primes, we used a one-way repeated measure ANOVA to test the effect of Valence of Prime (negative attitude index, positive attitude index) on reaction times. As age showed a significant effect on positive attitude index, this variable was added as a covariate to this model. Results indicated a significant effect of Valence, $F(1,136) = 6.95, p = .009, \eta_p^2 = .05$. The negative attitude index was lower ($M = -7.30$ milliseconds, $SD = 73.31$ milliseconds), indicating greater negativity, than the positive attitude index ($M = -2.03$ milliseconds, $SD = 71.77$ milliseconds). However, results of separate one sample t-tests indicated that neither the negative attitude index, $t(1,137) = 1.58, p = .12$, nor the positive attitude index were different from 0, $t(1,137) = .33, p = .74$.

Dependent Variable: Mental Contrasting Promoted Expectancy-Dependent Automatic Attitudes Towards Obstacles of Reality

We predicted that mental contrasting (versus control conditions) should change the automatic attitude towards obstacles of reality depending on participants' expectations success. Specifically, we predicted that only participants in the mental contrasting condition with high expectations of success would show more negative automatic attitudes towards their idiosyncratic obstacle of reality (i.e., lower RAI), as opposed to respective participants in the mental contrasting condition with low expectations of success.

To test our prediction, we specified an ANOVA with expectations of success (high, low) and strategy (mental contrasting condition, reverse contrasting control condition, valence control condition) as between subject factors, as well as RAI as a dependent variable. Results indicated no main effect of manipulation of expectations of success, $F(1,132) = 3.90, p = .05$, and no main effect of strategy, $F(2,132) = 1.18, p = .31$. However, they importantly

indicated the predicted interaction effect between expectations of success and strategy, $F(2,132) = 4.14, p = .02, \eta_p^2 = .06$. A planned contrast (high expectations of success = -1; low expectations of success = 1) revealed that using mental contrasting with high expectations of success resulted in a lower (indicating more negative) RAI ($M = -57.53$ milliseconds, $SD = 117.13$ milliseconds) than when using mental contrasting condition with low expectations of success ($M = 26.09$ milliseconds, $SD = 61.69$ milliseconds), $t(1,37) = 2.88, p = .007$. In contrast, there was no difference between high expectations of success ($M = 19.82$ milliseconds, $SD = 75.83$ milliseconds) and low expectations of success ($M = 1.80$ milliseconds, $SD = 79.75$ milliseconds) in the reverse contrasting control condition, $t(1,47) = .80, p = .43$, or between high expectations of success ($M = -15.48$ milliseconds, $SD = 60.70$ milliseconds) and low expectations of success ($M = 2.89$ milliseconds, $SD = 92.03$ milliseconds) in the valence control condition, $t(1,48) = .81, p = .42$ (see Figure 2). Furthermore, planned comparisons (mental contrasting condition = 1; reverse contrasting control condition = -.5; valence control condition = -.5) revealed that participants in the mental contrasting condition with high expectations of success showed a lower (indicating more negative) RAI than participants in the control conditions with high expectations of success, $t(1,58) = 2.46, p = .02$. Participants in the mental contrasting condition with low expectations of success did not differ significantly from participants in the control conditions with low expectations of success, $t(1,74) = 1.18, p = .24$.

As we found that our manipulation of expectation of success also had an effect on reported importance of successfully realizing the desired futures, we specified another ANOVA with expectations of success (high, low) and strategy (mental contrasting condition, reverse contrasting control condition, valence control condition) as between subject factors, RAI as a dependent variable, and the importance of success as a covariate. Results indicated a

no main effect of manipulation of expectations of success, $F(1,131) = 2.89, p = .09$, and no main effect of strategy, $F(2,131) = 1.17, p = .31$. However, importantly, the predicted interaction effect between expectations of success and strategy remained significant, $F(2,131) = 4.16, p = .02, \eta_p^2 = .06$.

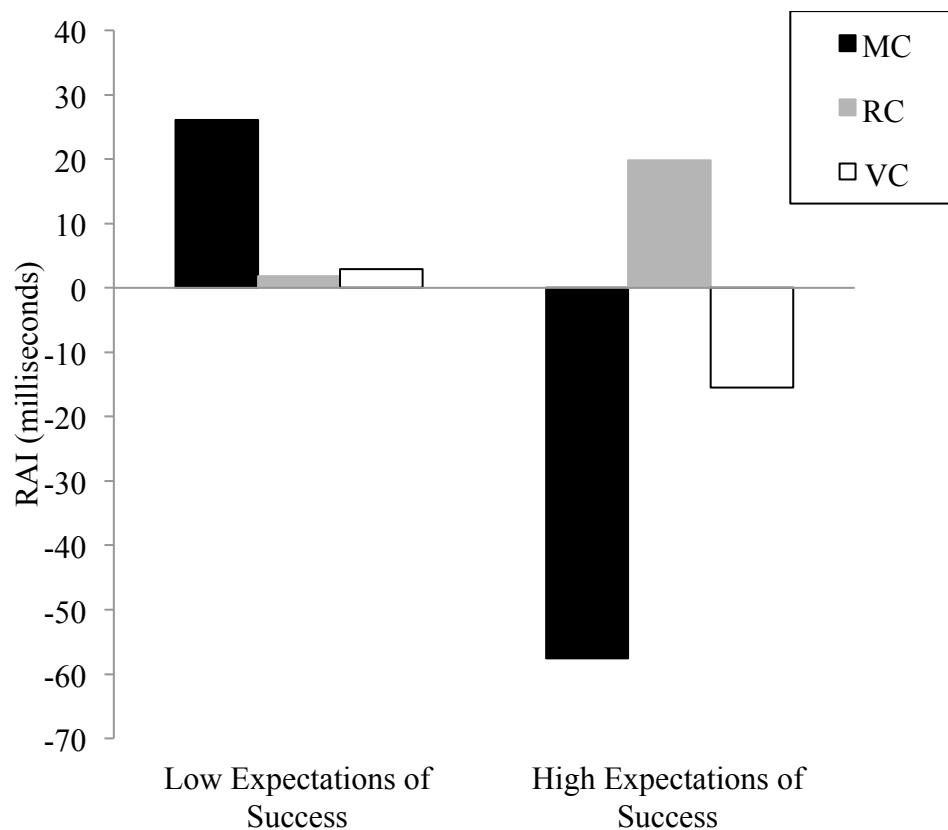


Figure 2. Study 1: Reality attitude index (RAI) as a function of expectations of success and self-regulation strategy (MC = mental contrasting condition; RC = reverse contrasting control condition; VC = valence control condition). Lower values indicate faster responses to negative targets compared with positive targets following the obstacle of reality prime; higher values reflect greater negativity towards idiosyncratic obstacles of reality.

Dependent Variable: Automatic Attitude Towards Best Outcome

To show that automatic attitude was modulated solely towards personal obstacles of reality (rather than idiosyncratic words per se), we specified another ANOVA with expectations of success (high, low) and strategy (mental contrasting condition, reverse contrasting control condition, valence control condition) as between subject factors, with OAI as a dependent variable. Results indicated no main effect of manipulation of expectations of success, $F(1,132) = .001, p = .97$, no main effect of strategy, $F(2,132) = .05, p = .95$, and a no interaction effect between expectations of success and strategy, $F(2,132) = 2.66, p = .07, \eta_p^2 = .04$.

Discussion

The results confirm our prediction that using mental contrasting (versus control conditions) would modulate automatic attitude towards obstacles of reality, depending on expectations of success. Only participants who used mental contrasting and were in the high versus low expectations of success condition displayed a more negative automatic attitude towards their obstacles of reality. In contrast, there was no significant difference in automatic attitudes towards obstacles of reality in the reverse contrasting control condition or the valence control condition, depending on expectations of success.

As elaborating the reality first and then the future (i.e., reverse contrasting control condition) did not change the automatic attitude towards the obstacle of reality, we can dismiss the alternative explanation that the mere elaboration of the obstacle of reality and the future would elicit a change in automatic attitude. Moreover, as the valence control condition also did not change the automatic attitude towards the obstacle of reality, we may reject the alternative explanations that the automatic attitude may have been due to the mere elaboration of a positive and then negative aspect, and that the automatic attitude towards obstacles of reality was dependent on expectations of success per se, and reverse contrasting

might have erased this dependency. Results demonstrated that solely when elaborating the best outcome before the obstacle of reality (i.e., mental contrasting condition), this process subsequently modulated the automatic attitude towards the obstacle of reality depending on expectations of success. Thus, we may assume that mental contrasting was responsible for this effect.

As we did not observe a change in the automatic attitude towards participants' personal best outcome, this suggests that mental contrasting specifically changed the automatic attitude towards the obstacle of reality and not towards any idiosyncratic aspect. Furthermore, these findings point out that obstacles of reality may play a crucial role in goal pursuit. Participants in the mental contrasting condition (i.e., who first mentally elaborated their best outcome of realizing their interpersonal desired future, and then mentally elaborated their personal obstacle of reality) subsequently displayed a more negative automatic attitude towards their obstacles (e.g., shyness) the higher their expectations were of successfully solving their idiosyncratic desired future. Together, these results can be interpreted as a first support for our initial proposal that mental contrasting modulates automatic attitude towards obstacles of reality depending on expectations of success.

A limitation of Study 1 was that our manipulation of expectations of success potentially influenced the type of desired futures participants named. We observed, for example, that participants in the high expectations manipulations named desired futures of higher importance than those named by participants in the low expectations condition. Hence, in Study 2, participants elaborated the same desired future (i.e., to be successful in a creativity test) and expectations of success were measured instead of manipulated. Another potential drawback of Study 1 concerns the valence control condition. The elaboration of a positive and a negative experience with a professor may have been too unrelated to the topic of study. Hence, this cover story may have prompted participants to (rightly) assume that

they were in the control condition. Therefore, in Study 2, the valence control condition was replaced by a distraction control condition. Finally, to replicate our findings with a different implicit paradigm, we employed an extrinsic affective Simon task (De Houwer, 2003) to measure implicit evaluations in Study 2.

Study 2: Creativity

Students were invited to participate in a study about creativity. The study took place at a large university in the United States of America. The study duration was approximately 30 minutes. As compensation, participants received partial course credit. Instead of elaborating an idiosyncratic desired future (as in Study 1), all participants answered questions concerning the same desired future (i.e., to successfully solve a creativity task). Secondly, instead of manipulating expectations of success (as in Study 1), participants directly indicated their expectations of success.

Participants were randomly assigned to either a mental contrasting condition, a reverse contrasting control condition, or a distraction control condition. The mental contrasting condition and the reverse contrasting control condition were identical to Study 1. Participants in the distraction control condition solved arithmetic problems. This task required intensive concentration and therefore should have prevented participants from spontaneously using self-regulation strategies. In addition, as participants in the distraction control condition did not elaborate the content of the future or the reality, they thus provide another baseline comparison.

As a dependent variable, we again assessed automatic attitudes towards participants' idiosyncratic obstacles of reality. Here, we employed an extrinsic affective Simon task. As in Study 2, we hypothesized that only participants in the mental contrasting condition (as opposed to control conditions) would show a change in automatic attitude towards the idiosyncratic obstacles of reality, depending on their expectations of success. Specifically, we

expected that only participants in the mental contrasting condition (as opposed to control conditions) would subsequently show more negative automatic attitude towards their idiosyncratic obstacles of reality as their expectations of success increased. Finally, participants were thanked for their participation and received a debriefing about the study's purpose.

Method

Participants

The participants were comprised of 146 students (110 women, 36 men, $M_{\text{age}} = 20.2$ years, $SD_{\text{age}} = 1.2$ years, age range: 19–25 years). All participants identified their first language as English. Participants were randomly assigned to either a mental contrasting condition ($n = 50$), a reverse contrasting control condition ($n = 57$), or a distraction control condition ($n = 39$).

Procedure and Measures

Participants learned that the study was designed to better understand how people think about creativity and how this relates to creative abilities. They would answer questions about themselves and how they thought about creativity. To establish the desired future of being successful in the creativity test, participants read a short paragraph about creativity (i.e., creating something new with value) and how being more creative than average leads to success in various areas of life.

Expectations of success and baseline measures. Participants indicated their expectations of success by indicating how likely they thought it would be for them to successfully solve a creativity task. Furthermore, to see if being successful in creativity tasks was in fact a desired future for participants, they answered a manipulation check question about the desirability of being creative by indicating how important it was to them that they

would be successful in creativity tasks. Participants answered both questions on a 7-point scale ranging from 1 (*not at all*) to 7 (*very*).

To ensure that participants in the different experimental groups did not differ in creative potential, they completed the Creative Personality Scale (CPS; Gough, 1979). The CPS is considered a reliable and valid measure of creative potential (Domino, 1994). Participants rated how well various adjectives described them. The scale consisted of 18 adjectives that reflect higher creativity (e.g., insightful) and 12 adjectives that reflect lower creativity (e.g., conventional). Participants received 1 point if they indicated that a high creativity adjective described them very well, and they received -1 point if they indicated that a low creativity adjective described them very well. Therefore, the total sum score ranged from -12 to 18, with higher scores indicating higher creative potential.

Obtaining words for the extrinsic affective Simon task (EAST). To obtain words for use in the EAST, participants named their most important and critical personal obstacle of reality that could prevent them from successfully solving a creativity test. They specified one word to summarize their idiosyncratic obstacle of reality. Examples included “close-mindedness” and “laziness”.

Manipulation of self-regulation strategy. Participants first read a short introduction, informing them that we wanted to learn more about their thoughts about being creative in order to gain a better understanding of creativity. Therefore, they should take their time and feel free to express every thought that came to their mind. In order to manipulate participants' self-regulation strategy, they then received varying instructions to spur different mental elaborations, depending on the condition. Consequently, participants were randomly assigned to either the mental contrasting condition, the reverse contrasting control condition, or a distraction control condition.

Mental contrasting condition. Participants in the mental contrasting condition mentally elaborated and wrote about the most wonderful outcome they associated with successfully solving a creativity test, followed by mentally elaborating and writing about their most critical personal obstacle of reality that could prevent them from successfully solving creativity tasks.

Reverse contrasting control condition. Participants in the reverse contrasting control conditions mentally elaborated and wrote about the same aspects, but in the reverse order. Thus, they started by mentally elaborating and writing about their most critical personal obstacle of reality, before mentally elaborating and writing about the most wonderful outcome they associated with successfully solving a creativity test.

Distraction control condition. Participants in the distraction control condition worked on arithmetic problems modified from Düker's (1953) "Concentration Achievement Test" (*Konzentrations-Leistungs-Test, KLT*). In total, they completed nine arithmetic problems. Each of these consisted of two mathematical operations that could either be an addition or a subtraction of two single digit numbers (i.e., less than 10). Participants had to solve the two operations, remember the result, and then subtract the smaller number from the larger number and fill in the final result in a box. This process, although simple, is very tedious and requires intensive concentration.

Dependent variable: Automatic attitude towards obstacles of reality. To assess automatic attitudes towards personal obstacles of reality, participants completed an extrinsic affective Simon task (EAST), which can be employed to assess single and multiple attitudes (De Houwer, 2003). The EAST consisted of two tasks that alternated randomly from trial to trial. Participants classified words based on their valence (i.e., valence task) or on their color (i.e., color task). Participants classified white words on the basis of their valence (i.e., positive or negative) and colored words on the basis of their color (i.e., blue or yellow).

When the presented word was white, participants pressed a left key (i.e., 'z'-key) for positive words and a right key (i.e., '/'-key) for negative words. When the presented word was in color, participants pressed the left key (i.e., 'z'-key) for yellow words and a right key (i.e., '/'-key) for blue words. Figure 3 depicts an exemplary sequence of trials for the EAST.

During the color task, we presented the word that participants had generated in the beginning of the study to summarize their personal obstacle of reality (i.e., reality word) along with two positive words (i.e., joy and glorious), two negative words (i.e., grief and painful), and one neutral word (i.e., impression). The white words were three strongly positively valenced words (i.e., fantastic, excellent, and magnificent) and three strongly negatively valenced words (i.e., horrible, dreadful, and gruesome). For a complete list of words, see Appendix D. Participants completed one practice block with 40 trials and 10 main blocks with 48 trials each. Within every block, each white word appeared 4 times and each colored word appeared 4 times (twice in yellow and twice in blue). The type of task (i.e., valence task versus color task) was chosen randomly on each trial. The experiment was run on a standard PC using MediaLab and DirectRT software. Stimuli were presented on a 19-inch CRT monitor, viewed at a distance of ~50 cm. Words were displayed in the center of the screen in white color (#FFFFFF), yellow color (#FFFF00), or blue color (#4755FE), respectively. The font was Arial, bold, 24pt. The rest of the screen showed a black background (#000000). The inter-trial interval was 0 milliseconds.

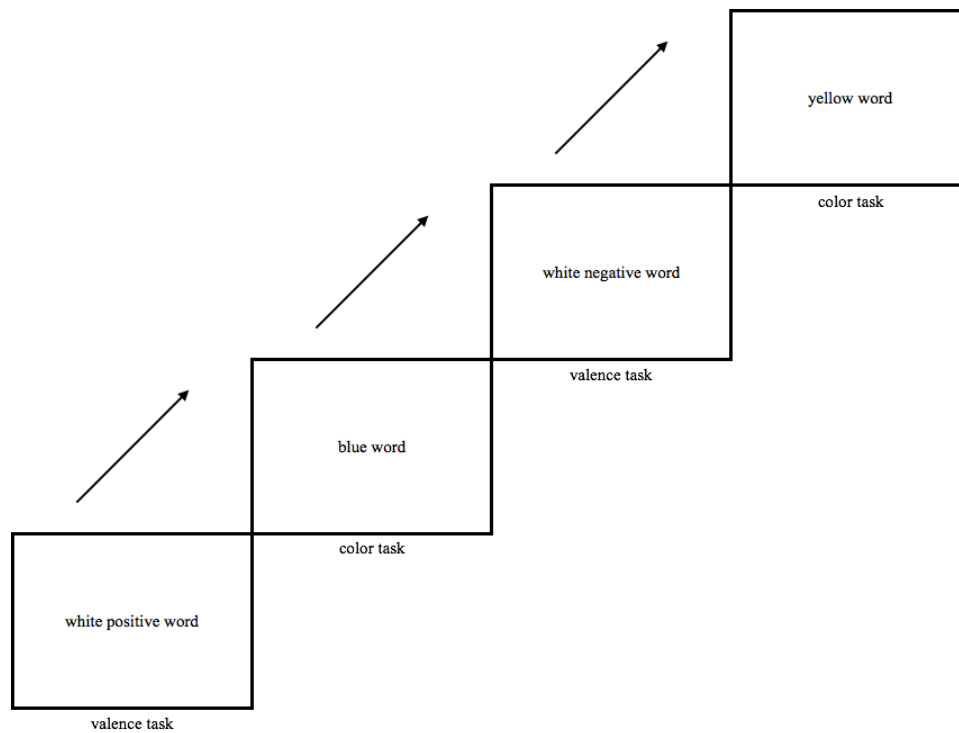


Figure 3. Study 2: Depiction of an exemplary sequence of trials used in the EAST.

Reality attitude index (RAI). We computed a score to reflect participants' automatic attitude towards reality words, as well as towards the neutral word (i.e., impression) (Ferguson, 2008). We used only switch trials (i.e., all color trials that were preceded by at least one valence trial) because those trials should show larger compatibility effects and should therefore be most appropriate for measuring the automatic attitudes (e.g., Kiesel et al., 2010; Meiran, 2005, Voss & Klauer, 2007). We subtracted the median reaction times in trials using reality words displayed in yellow (i.e., same response key as positive white words) from the medians of reaction times in trials using reality words printed in blue (i.e., same response key as negative white words). This can be phrased as ([reality word in yellow] - [reality word in blue]). The same computation was done for respective trials with the neutral colored word (i.e., [neutral word in yellow] - [neutral word in blue]). We received a reality attitude score and a neutral attitude score, with lower scores indicating more negative automatic attitude towards the respective colored words. In order to create an index that

reflected relative automatic attitude towards the colored reality word (adjusting for potential baseline attitude toward the neutral colored words), we subtracted the neutral attitude scores from the reality attitude scores (i.e., [reality attitude score] - [neutral attitude score]). This final reality attitude index (RAI) indicated any automatic attitude towards colored reality words above and beyond any baseline automatic attitude towards neutral colored words. Therefore, lower scores indicated a more negative automatic attitude towards the personal obstacles of reality.

Positive and negative attitude indexes. As in Study 1, in order to perform a manipulation check to demonstrate that the paradigm was able to distinguish between positive and negative colored words, we also computed attitude indexes for those trials with negative colored words, as well as for trials positive colored words. Therefore, we subtracted the median reaction times in trials using positive words displayed in yellow (i.e., same response key as positive white words) from the medians of reaction times in trials using positive words printed in blue (i.e., same response key as negative white words). This can be phrased as ([positive word in yellow] - [positive word in blue]). The same computation was done for respective trials with the negative colored word (i.e., [negative word in yellow] - [negative word in blue]). We received a positive attitude score and a negative attitude score, with lower scores indicating a more negative automatic attitude towards the respective colored words. Again, in the next step, we created an index that reflected relative automatic attitude towards positive colored words and negative colored words (adjusting for potential baseline attitude towards neutral colored words). Again, we subtracted the neutral attitude scores from the positive attitude scores (i.e., [positive attitude score] - [neutral attitude score]). Likewise, we subtracted the neutral attitude scores from the negative attitude scores (i.e., [negative attitude score] - [neutral attitude score]). In this way, we received two more indexes. One of these was a final positive attitude index (PAI) that indicated automatic

attitudes towards positive colored words above and beyond any baseline automatic attitude towards neutral colored words. The second of these was a final negative attitude index (NAI) that indicated automatic attitudes towards negative colored words above and beyond any baseline automatic attitude towards neutral colored words. Again, lower scores on the PAI and NAI indicated a more negative automatic attitude towards positive colored words and the negative colored words, respectively. Finally, participants indicated their gender, age, year in school, and first language.³ In the end participants were fully debriefed about the purpose of the study.

Results

Data Preparation

To lessen the influence of outliers, we excluded six participants (3.95%) with extreme error rates (i.e., $\geq 20\%$) (Wentura & Degner, 2010). Thus, the data of 146 out of 152 (96.05%) participants were included in the data analyses. Frequency of exclusion did not differ by manipulation of strategy, $\chi^2(2, N = 152) = 1.89, p = .39$. For reaction time analyses, we only used correct responses on the masked affective priming task. The error rate was 4.64%.

Descriptive Analyses

Randomization. Indicating that randomization was successful, there were no significant effects of condition on age, expectations of success, importance of success, or creative potential, $F_{\text{univariate}}(2,138) = .18$ to $1.31, ps > .27, \eta_p^2 < .02$, or gender, $\chi^2(2, N = 146) = .96, p = .62$.

Effects of gender and age. Interestingly, gender had a significant effect on the reality attitude index, $F(1,144) = 4.12, p = .04, \eta_p^2 = .03$. Female participants displayed significantly lower reality attitude indexes were ($M = -96.18, SD = 131.60$), indicating greater negativity than male participants ($M = 22.58, SD = 149.64$), $F(1,144) = 56.49, p < .001, \eta_p^2 = .28$.

Therefore, gender was added as a covariate when testing the effect of manipulation on the dependent variable. Furthermore, gender did not have a significant effect on the positive attitude index, $F(1,134) = .004, p = .95$, and no effect on the negative attitude index, $F(1,134) = 3.23, p = .07$. Age was not significantly correlated with the reality attitude index, $r = -.14, p = .09$, the positive attitude index, $r = -.13, p = .12$, or the negative attitude index, $r = -.007, p = .95$, and thus will not be further discussed.

Descriptive Statistics. Expectations of success ($M = 4.66, SD = 1.09$) and importance of success ($M = 3.89, SD = 1.48$) ranged from 1 to 7. Participants' CP scores (i.e., creative potential) ranged from -6 to 15 points ($M = 7.06, SD = 3.85$), out of a possible range of -12 to 28. The mean reaction times were -35.47 milliseconds ($SD = 142.81$ milliseconds) for the reality attitude index, -96.18 milliseconds ($SD = 131.60$ milliseconds) for the negative attitude index, and 22.58 milliseconds ($SD = 149.64$ milliseconds) for the positive attitude index.

Expectations of success significantly correlated with importance of success, $r = .25, p = .002$, and with creative potential, $r = .47, p < .001$. Hence, participants who reported higher expectations of successfully solving creativity tasks also reported that it was of high importance for them to do so. Furthermore, participants who reported higher expectations of success also had a higher creative potential. Interestingly, the importance of success was unrelated to participants' creative potential, $r = -.03, p = .73$. Finally, the reality attitude index was not correlated with expectations of success, $r = -.02, p = .82$, importance of success, $r = .05, p = .53$, or creative potential, $r = -.04, p = .60$. Therefore, the automatic attitude towards the personal obstacle of reality was not related to participants' expectations of success, how important they found it to perform successfully in creativity tasks, or their creative potential. See Table 2 for a detailed overview of mean, standard deviations, and correlations for key study measures.

Table 2

Study 2: Means, Standard Deviations, and Correlations for Key Study Measures

Measure	<i>M</i> (<i>SD</i>)	1	2	3	4	5	6
1. Age	20.2 (1.2)	-					
2. Expectations of success	4.65 (1.14)	.14	-				
3. Importance of success	3.81 (1.49)	-.13	-.25*	-			
4. CPS	7.06 (3.85)	.12	-.47*	-.03	-		
5. Reality attitude index	-35.47 (142.81)	-.14	-.02	.05	-.04	-	
6. Negative attitude index	-96.18 (131.60)	-.01	-.10	-.05	-.12	.41*	-
7. Positive attitude index	22.58 (149.64)	-.13	-.08	.12	-.10	.43*	.53*

Notes. *N*'s range from 143 to 144 due to occasional missing data. CPS = Creative Personality Scale.

* $p < .05$

Manipulation Check: Creativity as Desired Future

Only 50 participants (34.25%) indicated a high importance of being successful on creativity tasks, meaning that they indicated an importance of success higher than the midpoint of the scale (i.e., 4 on a scale from 1 to 7). Furthermore, 14 participants (9.59%) indicated that being successful on creativity tasks was not at all important to them.

Manipulation Check: Extrinsic Affective Simon Task (EAST)

In order to demonstrate that the EAST was able to distinguish between negative and positive colored words, we conducted a one-way repeated measure ANOVA to test the effect of Valence (negative attitude index, positive attitude index) on reaction times. Results confirmed that negative attitude indexes were significantly lower ($M = -96.18$ milliseconds, $SD = 131.60$ milliseconds), indicating greater negativity, compared to positive attitude indexes ($M = 22.58$ milliseconds, $SD = 149.64$ milliseconds), $F(1,145) = 110.34, p < .001, \eta_p^2 = .43$. Moreover, results of one sample t-test indicated that the negative attitude index significantly differed from 0, $t(1,135) = 8.83, p < .001$, while the positive attitude index was not significantly different from 0, $t(1,134) = 1.82, p = .07$.

Dependent Variable: Mental Contrasting Promoted Expectancy-Dependent Automatic Attitude Towards Obstacles of Reality

As in Study 1, we predicted that mental contrasting (versus control conditions) should change automatic attitude towards obstacles of reality in line with expectations of success. Specifically, we predicted that only participants in the mental contrasting condition would subsequently show a more negative automatic attitude towards their idiosyncratic obstacles of reality (i.e., lower RAI) as their expectations of success increased, when compared to participants in the control conditions.

To test our prediction, we specified hierarchical multiple regression analyses using model 1 of the SPSS PROCESS macro provided by Hayes (2013). We entered reality attitude

indexes (*y*) as a dependent variable, expectations of success (*x*) as an independent continuous variable, and condition as a multicategorical moderator (*m*). This option created two dummy-coded variables, with Dummy 1 coding reverse contrasting control condition as 1, and Dummy 2 coding distraction control condition as 1. As gender had a significant effect on the reality attitude index (see descriptive analyses above), it was entered as covariate. As predicted, adding the two interaction terms significantly improved the model, $R^2_{\text{change}} = 5.39\%$, $F_{\text{change}}(2,139) = 4.17$, $p = .01$. Only after using mental contrasting were reality attitude indexes conditional on expectations of success, $\beta = -46.56$, $t(139) = 2.63$, $p = .01$. A bias-corrected bootstrap confidence interval for the conditional effect based on 5,000 bootstrap samples was entirely below zero (-81.570 to -11.546). Replicating results from Study 1, higher expectations of success again predicted lower, indicating more negative, reality attitude indexes. Once more, we did not find a conditional effect of expectations of success on reality attitude indexes in the reverse contrasting control condition, $\beta = 4.38$, $t(139) = .26$, $p = .79$, or in the distraction control condition, $\beta = 23.36$, $t(139) = 1.24$, $p = .22$. The link between expectations of success and the reality attitude index was stronger in the mental contrasting condition than in the reverse contrasting control condition, $t(139) = 2.09$, $p = .04$, and stronger than in the distraction control condition, $t(139) = 2.76$, $p = .007$ (see Figure 4).

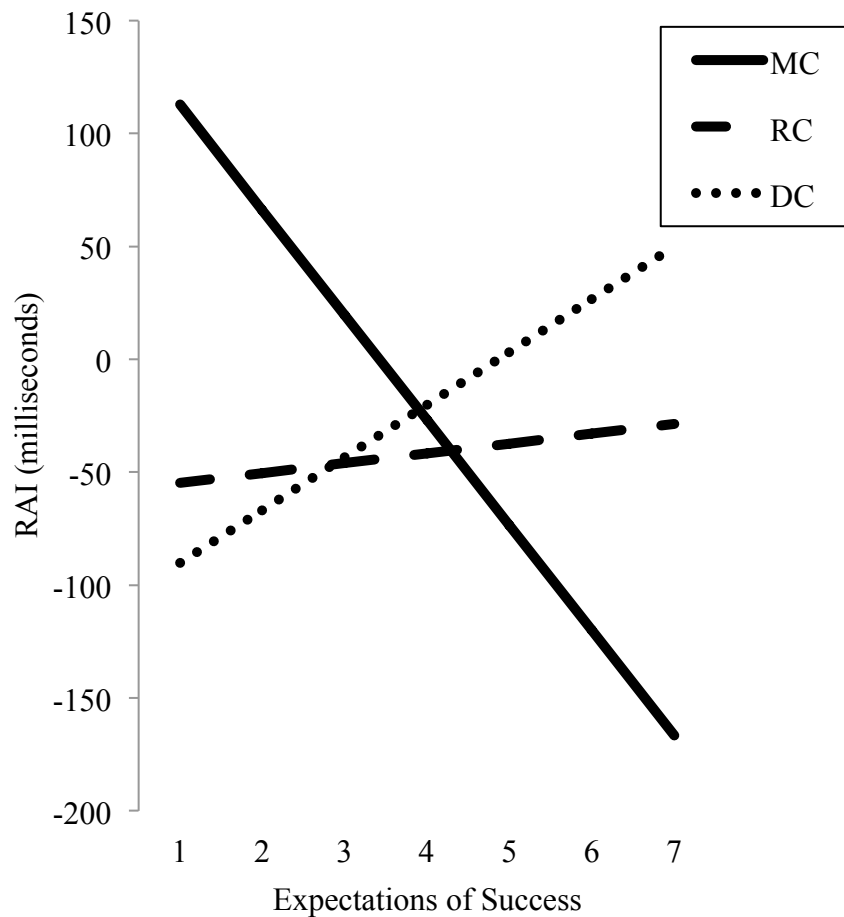


Figure 4. Study 2: Regression lines depict the relation between expectations of success and the reality attitude index (RAI) as a function of self-regulation strategy (MC = mental contrasting condition; RC = reverse contrasting control condition; DC = distraction control condition). Lower values indicate faster responses to obstacle of reality targets in blue (i.e., same response location as negative white words) compared with responses to obstacle of reality targets in yellow (i.e., same response location as positive white words); higher values reflect greater negativity towards idiosyncratic obstacles of reality.

Discussion

Study 2 replicated the results of Study 1. Again, it is only in the mental contrasting condition and not in the control conditions that we find a significant effect on the automatic attitude towards the obstacles of reality depending on expectations of success. Only participants in the mental contrasting condition subsequently displayed a more negative automatic attitude towards their idiosyncratic obstacles of reality (i.e., lower RAI) as their expectations of success increased. In contrast, there was no significant effect on automatic attitude towards obstacles of reality depending on expectations of success in the reverse contrasting control condition or in the distraction control condition.

Whereas participants elaborated an idiosyncratic desired future in the relationship domain and expectations of success were manipulated in Study 1, in Study 2 all participants elaborated the same desired future in the achievement domain (i.e., to successfully solve creativity tasks) and expectations of success were measured. Importantly, we replicated our findings by employing another implicit paradigm to measure automatic attitude (i.e., the extrinsic affective Simon task) and recruiting a participant sample with a different cultural background (i.e., United States of America). Participants in the mental contrasting condition (i.e., who first mentally elaborated their best outcome of being successful at creativity tasks, and then mentally elaborated their personal obstacle of reality) subsequently displayed a more negative automatic attitude towards their obstacles (e.g., nervousness) the higher their expectations of successfully solving creativity tasks were. Taken together, the first two studies thus support the idea that mental contrasting modulates automatic attitude towards obstacles of reality depending on expectations of success. In order to further examine whether mental contrasting may achieve its beneficial effects on energization and goal pursuit through this change in automatic attitude towards obstacles of reality, we conducted a third study.

A limitation of Study 2 was that successfully solving a creativity task was not a highly-desired future for participants. Only 34.25% of participants indicated a high importance of being successful on creativity tasks (i.e., higher than 4 on a scale from 1 to 7). In Study 3, we therefore sought to replicate our findings utilizing a potentially more desirable future (i.e., to improve one's eating habits). Furthermore, in order to restrict the type of obstacles of reality, in Study 3, participants named their biggest food temptation. In contrast to Studies 1 and 2, this obstacle of reality should per se carry a more positive automatic attitude. We again measured participants' expectations of success, and we established the same conditions as in Study 2 (i.e., a mental contrasting condition, a reverse contrasting control condition, and a distraction control condition). Finally, to replicate our findings with another implicit paradigm, we employed an affective priming task to measure implicit evaluations in Study 3. Importantly, we investigated automatic attitude as a potential mediator of mental contrasting effects on subsequent feelings of energization and goal pursuit.

Study 3: Eating Habits

Students were invited to participate in a study about healthy eating. The study took place at a large university in the United States of America. The study duration was approximately 20 minutes for the first session. Completing the daily diary took approximately 5 minutes per day, adding up to approximately 70 minutes overall. Participants received partial course credit as compensation. Similarly to Study 2, all participants directly indicated their expectations of success and elaborated the same desired future (i.e., improving of one's eating habits). Contrary to Studies 1 and 2, participants named obstacles of reality that should per se carry a positive valence (i.e., their biggest food temptations).

Participants were randomly assigned to either a mental contrasting condition, a reverse contrasting control condition, or a distraction control condition. All conditions were identical to Study 2. As dependent variables, we assessed automatic attitude towards participants' idiosyncratic obstacles of reality. Here, we employed an affective priming task similar to that used in Study 1. However, as no mask was employed in this version, participants were able to consciously perceive the primes. As dependent variables, we assessed feelings energization (Kappes & Oettingen, 2011), commitment to eat more healthily (i.e., via feelings of anticipated disappointment) (Oettingen et al., 2001), and the attainment of the desired future (i.e., via other-rated healthy eating). Eating behavior was assessed via an online daily nutrition diary over two weeks.

To replicate the results of Studies 1 and 2, we again hypothesized that only participants in the mental contrasting condition (versus control conditions) would change the automatic attitude towards the idiosyncratic obstacles of reality depending on expectations of success. Again, we expected that only participants in the mental contrasting condition (versus control conditions) would subsequently show a more negative automatic attitude towards their idiosyncratic obstacles of reality as their expectations of success increased. Importantly, in this study, we further predicted that, after using mental contrasting (versus control condition), the automatic attitude should spur feelings of energization and translate into goal pursuit (i.e., commitment to eat more healthily and other-rated healthy eating).

Method

Participants

The participants were comprised of 160 students (136 women, 24 men, $M_{\text{age}} = 20.4$ years, $SD_{\text{age}} = 1.2$ years, age range: 17–23 years). All participants identified their first language as English. Participants were randomly assigned to either a mental contrasting

condition ($n = 47$), a reverse contrasting control condition ($n = 51$), or a distraction control condition ($n = 62$).

Procedure and Measures

Participants learned that this study was about changing one's eating habits. They read that they would answer questions about their thoughts on eating habits, as well as that they would complete a nutrition diary over the course of the upcoming two weeks. In the beginning, participants provided their email addresses, which were needed for follow-up invitations to the nutrition diaries and stored separately to ensure the anonymity of participants' answers. Furthermore, participants created an anonymous personal code to enable the matching of data from the experimental lab session with data from the nutrition diary. The code consisted of the first letter of the name of the participant's mother, the first letter of the name of the participant's father, and the day of the participant's birthdate.

Expectations of success and baseline measures. Participants indicated how likely they thought it was that they would successfully improve their eating habits (i.e., expectations of success) on a 7-point scale from 1 (*not at all*) to 7 (*very*). Furthermore, to see if improvement of eating habits was in fact a desired future for participants, they indicated how important it was to them that they would successfully improve their eating habits (i.e., importance of success) on a 7-point scale from 1 (*not at all*) to 7 (*very*). They also indicated how much they would like to improve their eating habits (i.e., extent of wanting to eat more healthily) on a 7-point scale from 1 (*not at all: They are fine the way they are*) to 7 (*very much: I would like to improve them drastically*).

To ensure that participants in the experimental groups did not differ in relevant variables, we included the following measures. Participants indicated how confident they were that they could successfully improve their eating habits (i.e., self-efficacy expectations) on a 7-point scale from 1 (*not at all*) to 7 (*very*). Furthermore, participants completed the

restraint eating subscale from the Dutch Eating Behavior Questionnaire (Van Strien, Frijters, Bergers, & Defares, 1986). The restraint eating subscale consisted of ten questions (e.g., Do you deliberately eat less in order to not become heavier?; Cronbach's $\alpha = .91$). All questions were answered on a 5-point scale with the following options: 1 (*never*), 2 (*seldom*), 3 (*sometimes*), 4 (*often*), and 5 (*very often*). Furthermore, participants also answered the question "Do you eat when you are stressed, angry, or bored?" (i.e., emotional eating), on a 7-point scale from 1 (*not at all*) to 7 (*very*). Finally, general self-control was assessed using the Brief Self-Control Scale (BSCS; Tangney, Baumeister, & Boone, 2004). The scale consisted of thirteen questions (e.g., I refuse things that are bad for me; Cronbach's $\alpha = .82$). All questions were answered on a 5-point scale, ranging from 1 (*not at all*) to 5 (*very much*).

In order to test whether our manipulation affected healthy eating beyond baseline healthy eating behavior, participants described what they ate on a typical day of the past two weeks. This procedure was modified from the daily drinking questionnaire (Collins, Parks, & Marlatt, 1985). Participants described in detail (including the amount in cups, grams, ounces, etc.) what they ate for breakfast, as a snack after breakfast, lunch, as a snack after lunch, dinner, and as a snack after dinner.⁴ To receive an objective indicator of healthy eating behavior, two independent raters that were blind to hypotheses and conditions evaluated the healthiness of eating (i.e., baseline healthy eating). The average measure ICC was .61, with a 95% confidence interval from .47 to .72, $F(155,155) = 2.56, p < .001$. Raters assigned an overall grade for the healthiness of eating on a 6-point scale, ranging from 1 (*very unhealthy*) to 6 (*very healthy*). They considered the consumption of fatty and sugary food, of fruit and vegetables, and of alcohol. Finally, as stress might have an impact on eating behavior, participants indicated how stressful their past two weeks were (i.e., baseline perceived stress), on a 7-point scale ranging from 1 (*The past two weeks were a lot less stressful than usual*), to

4 (*The past two weeks were regularly stressful*), to 7 (*The past two weeks were a lot more stressful than usual*).

Obtaining words for the affective priming task. To obtain words for use in the affective priming task, participants named their most important and critical obstacle of reality (e.g., personal food temptation) that could prevent them from successfully improving their eating habits within the next two weeks. Thereafter, they specified one word to summarize their idiosyncratic obstacle of reality (i.e., personal food temptation). Examples included “fries” and “chocolate”.

Manipulation of self-regulation strategy. As an introduction, participants read that the study was designed to learn more about their thoughts about improving their eating habits. Therefore, they should take their time and feel free to express their thoughts as they come to mind. As in Studies 1 and 2, to manipulate participants’ self-regulation strategy, they received varying instructions depending on the condition. Hence, participants were randomly assigned to either a mental contrasting condition, a reverse contrasting control condition, or a distraction control condition.

Mental contrasting condition. Participants in the mental contrasting condition elaborated and wrote about the most wonderful outcome they associated with successfully improving their eating habits, before elaborating how their personal food temptation (obstacle of reality) could prevent them from successfully improving their eating habits.

Reverse contrasting control condition. Participants in the reverse contrasting control condition elaborated the same aspects, but in reverse order. Thus, they started with mentally elaborating and writing about how their personal food temptation (obstacle of reality) could prevent them from successfully improving their eating habits, followed by mentally elaborating and writing about the most wonderful outcome they associated with successfully improving their eating habits.

Distraction control condition. Participants in the distraction control condition worked on arithmetic problems modified from Düker's (1953) "Concentration Achievement Test" (*Konzentrations-Leistungs-Test, KLT*). For further details, see Study 2.

Dependent variable: Automatic attitude towards obstacles of reality. To assess automatic attitude towards idiosyncratic food temptations, participants completed an affective priming task (Ferguson & Bargh, 2004). Each trial consisted of a prime word for 150 milliseconds, a blank screen for 150 milliseconds, and a target word. The target word lasted on the screen until participants indicated whether each target seemed positive or negative. It should be noted that, in contrast to Study 1, we did not use forward or backward masking. Therefore, participants could perceive the primes. Participants should ignore the prime word and indicate as quickly and accurately as possible whether each target word was positive or negative. Participants pressed the right key (i.e., '/'-key) for negative and the left key (i.e., 'z'-key) for positive target words. Figure 5 depicts an exemplary trial for the unmasked affective priming task. As primes, we presented the words that participants had generated in the beginning of the study to summarize their idiosyncratic food temptation (i.e., reality prime), along with neutral primes (e.g., area, aspect, or board). Target words were strongly positively valenced words (e.g., appealing, attractive, or beautiful) and strongly negatively valenced words (e.g., awful, disgusting, or despicable). For a complete list of prime words and target words, see Appendix I. Participants completed 2 blocks with 40 trials each. Within every block, each prime appeared twice with a positive target and twice with a negative target. Sampling without replacement was used to select the neutral primes, positive targets and negative targets. The experiment was run on a standard PC using MediaLab and DirectRT software. Stimuli were presented on a 19-inch CRT monitor, viewed at a distance of ~50 cm. Prime words and target words were displayed in white color (#FFFFFF) in the

center of the screen. The font was Arial, bold, 24pt. The rest of the screen showed a black background (#000000). The inter-trial interval was 1000 milliseconds.

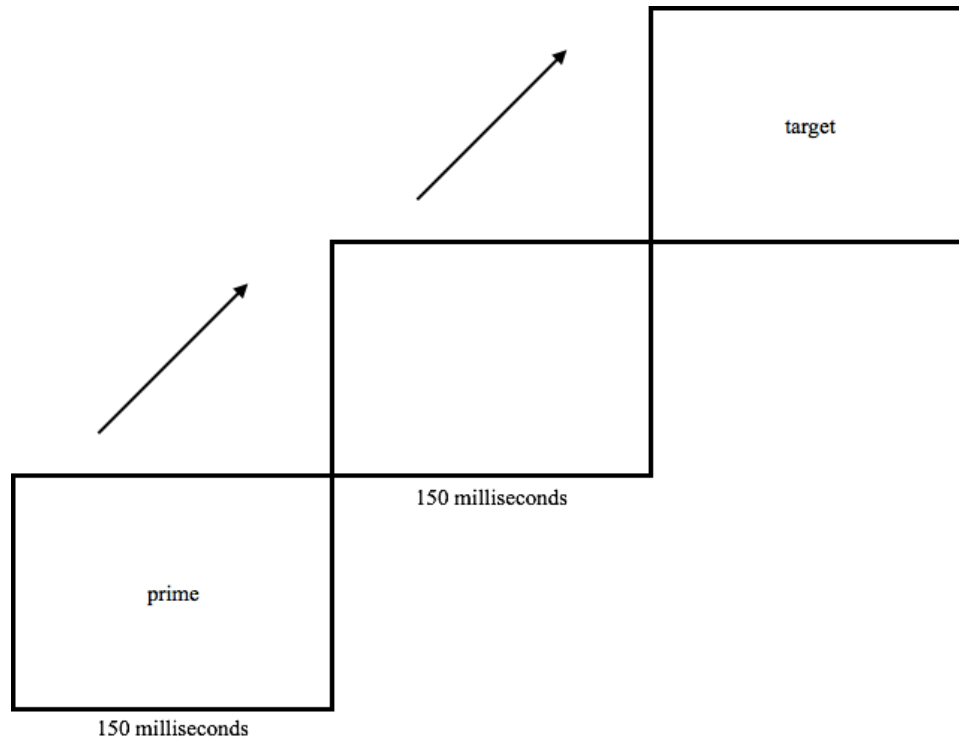


Figure 5. Study 3: Depiction of an exemplary trial used in the unmasked affective priming task.

Reality attitude index (RAI). To obtain a measure of automatic attitude towards the idiosyncratic food temptation, we computed the same reality attitude index (RAI) as in Study 1 (Ferguson, 2008). We subtracted median reaction times in trials using idiosyncratic food temptation primes and positive targets from median reaction times in trials using idiosyncratic food temptation primes and negative targets (i.e., [reality prime & negative target] - [reality prime & positive target]). The same computation was done for respective trials with neutral primes (i.e., [neutral prime & negative target] - [neutral prime & positive target]). Again, in order to create an index that reflected relative automatic attitude towards the food temptation prime adjusting for potential baseline attitude towards neutral primes, we

subtracted neutral attitude scores from reality attitude scores (i.e., [reality attitude score] - [neutral attitude score]). This final reality attitude index (RAI) indicated automatic attitude towards reality primes above and beyond any baseline automatic attitude towards neutral primes. Hence, lower scores indicated a more negative automatic attitude towards idiosyncratic food temptation. As this measure has been used and validated using the same procedure (e.g., number of trials, stimuli, etc.) (Ferguson & Bargh, 2004), we did not need to include a manipulation check to demonstrate that the paradigm was able to distinguish between positive and negative primes.

Dependent variable: Feelings of energization. Participants reported their feelings of energization by indicating how active, motivated, and enthusiastic they felt with respect to improving their eating habits over the next two weeks (Cronbach's $\alpha = .92$) (Kappes & Oettingen, 2011).⁵ Questions were answered on a 7-point scale from 1 (*not at all*) to 7 (*very*).

Dependent variable: Commitment to eat more healthily. As an indicator of goal pursuit, participants answered three questions about their anticipated disappointment (Cronbach's $\alpha = .93$). They indicated how disappointed, frustrated, and upset they would be if they did not improve their eating habits over the next two weeks. Questions were answered on a 7-point scale from 1 (*not at all*) to 7 (*very*). At the end of the first part, participants indicated their gender, age, year in school, and first language.

Dependent variable: Healthy eating over two weeks. As another indicator of goal pursuit, participants completed a nutrition diary over two weeks. Participants received a link to an online questionnaire via email every day in the late afternoon, which they were instructed to complete after having their last meal of the day. Questions were the same as for the assessment of baseline eating behavior. Participants wrote down everything they ate that day for breakfast, for between breakfast and lunch, lunch, between lunch and dinner as well as dinner and nighttime.⁶ Importantly, as an objective indicator of eating behavior, two

independent raters blind to hypotheses and conditions again evaluated the healthiness of eating (i.e., healthy eating over two weeks). The average measure ICC was .80 with a 95% confidence interval from .73 to .86, $F(157,157) = 5.13, p < .001$. For each day, raters assigned an overall grade for the healthiness of eating on a 6-point scale ranging from 1 (*very unhealthy*) to 6 (*very healthy*). They considered the consumption of fatty and sugary food, of fruit and vegetables, and of alcohol. We calculated mean eating grades across the 14 days of the two weeks, such that higher values indicated healthier eating behavior. On the last day of these two weeks, participants indicated again how stressful their past two weeks had been (i.e., follow-up perceived stress), on a 7-point scale ranging from 1 (*The past two weeks were a lot less stressful than usual*), to 4 (*The past two weeks were regularly stressful*), to 7 (*The past two weeks were a lot more stressful than usual*). Lastly, participants were debriefed and thanked.

Results

Data Preparation

To lessen the influence of outliers, we excluded 13 participants (7.51%) with extreme error rates (i.e., $\geq 20\%$) (Wentura & Degner, 2010). Thus, the data of 160 out of 173 (92.49%) participants were included in the data analyses. Frequency of exclusion did not differ by manipulation of strategy, $\chi^2(2, N = 173) = 1.11, p = .57$. For reaction time analyses, we only used correct responses on the masked affective priming task. The error rate was 4.77%.

Descriptive Analyses

Randomization. Indicating that randomization was successful, there were no significant effects of condition on gender, $\chi^2(2, N = 160) = 1.25, p = .54$, age, expectations of success, importance of success, extent of wanting to eat more healthily, self-efficacy

expectations, restraint eating, emotional eating, self-control, baseline healthy eating, or baseline perceived stress, $F_{\text{univariate}}(2, 150) = .17$ to 2.10 , $p_s > .13$, $\eta_p^2 < .03$.

Effects of gender and age. Gender had a significant effect on commitment, $F(1, 153) = 5.15$, $p = .03$, $\eta_p^2 = .03$, and healthy eating over two weeks, $F(1, 153) = 6.04$, $p = .02$, $\eta_p^2 = .04$. Female participants reported higher commitment ($M = 3.98$; $SD = 1.54$) than male participants ($M = 3.17$; $SD = 1.70$), and healthier eating over two weeks ($M = 4.07$; $SD = .70$) than male participants ($M = 3.70$; $SD = .48$). Therefore, gender was added as a covariate when testing the effects of manipulation on the respective dependent variables. In contrast, gender did not have a significant effect on the reality attitude index, $F(1, 153) = .79$, $p = .38$, $\eta_p^2 = .005$, or feelings of energization, $F(1, 153) = .65$, $p = .42$, $\eta_p^2 = .004$. Furthermore, age was not significantly correlated with the reality attitude index, $r = -.07$, $p = .41$, feelings of energization, $r = -.04$, $p = .66$, commitment to eat more healthily, $r = .08$, $p = .35$, or healthy eating over two weeks, $r = .11$, $p = .16$, and therefore will not be further discussed.

Descriptive statistics. Participants' expectations of success ($M = 4.54$; $SD = 1.33$), importance of success ($M = 5.05$; $SD = 1.61$), and the extent of wanting to eat more healthily ($M = 4.78$; $SD = 1.59$) all ranged from 1 to 7. Mean reaction times were -2.38 milliseconds ($SD = 99.36$ milliseconds) for the reality attitude index.

Expectations of success significantly correlated with importance of success, $r = .36$, $p < .001$, but not with the extent of wanting to eat more healthily, $r = .02$, $p = .82$. Hence, participants who reported higher expectations of successfully improving their eating habits also reported that it was of high importance for them to do so. Interestingly, participants' expectations of success were unrelated to the extent of wanting to eat more healthily. In contrast, importance of success was positively correlated with the extent of wanting eat more healthily, $r = .58$, $p < .001$, indicating that participants who reported high importance of success also reported to wanting to improve their eating habits to a greater extent. Finally, the

reality attitude index was not correlated with expectations of success, $r = -.01$, $p = .95$, importance of success, $r = -.04$, $p = .65$, or the extent of wanting to eat more healthily, $r = -.14$, $p = .08$. Therefore, automatic attitude towards the personal obstacle of reality was not related to participants' expectations of success, importance to success, or the extent of wanting to eat more healthily. See Table 3 for a detailed overview of mean, standard deviations, and correlations for key study measures.

Table 3

Study 3: Means, Standard Deviations, and Correlations for Key Measures

Measure	<i>M (SD)</i>	1	2	3	4	5	6	7	8	9	10	11
1. Age	20.39 (1.17)	-										
2. Expectations of success	4.54 (1.33)	-.02	-									
3. Importance of success	5.05 (1.61)	-.11	.36*	-								
4. Extent	4.78 (1.59)	-.19*	.02	.58*	-							
5. Self-efficacy	4.78 (1.37)	.001	.68*	.27*	-.07	-						
6. RES	2.83 (.86)	.02	.24*	.35*	.18*	.18*	-					
7. BSCS	3.00 (.63)	.14	.29*	-.10	-.38*	.30*	.08	-				
8. Healthy eating baseline	3.62 (1.00)	.03	.03	-.06	-.22*	.16*	.33*	.21*	-			
9. Reality affect index	-2.38 (99.36)	.08	-.01	-.04	-.14	-.004	.004	-.02	.03	-		
10. Feelings of energization	4.35 (1.24)	-.07	.47*	.44*	.16*	.42*	.26*	.30*	.13	-.12	-	
11. Commitment	3.83 (1.61)	-.04	.15	.63*	.56*	.06	.33*	-.25*	-.10	-.03	.28*	-
12. Healthy eating over 2 weeks	4.02 (.69)	.11	.11	.03	-.06	.15	.30*	.18*	.32*	.14	.15	-.05

Notes. *N*'s range from 160 to 156 due to occasional missing data. Extent = How much would you like to improve your eating habits? RES =

Restraint Eating Scale. BSCS = Brief Self-control Scale.

* $p < .05$

Manipulation Check: Healthy Eating as a Desired Future

Out of 160 participants, 104 participants (65.00%) indicated a high importance of successfully improving their eating habits, meaning that they indicated an importance of success higher than the midpoint of the scale (i.e., 4 on a scale from 1 to 7). Only two participants (1.25%) indicated that improving their eating habits was not at all important to them. Furthermore, 105 participants (65.63%) indicated that they wanted to improve their eating habits to a high extent, meaning they indicated an extent higher than the midpoint of the scale (i.e., 4 on a scale from 1 to 7). Similarly, only 4 participants (2.50%) indicated they did not want to improve their eating habits at all.

Dependent Variable: Mental Contrasting Promoted Expectancy-Dependent Automatic Attitude Towards Obstacles of Reality

As in Studies 1 and 2, we predicted that mental contrasting (versus control conditions) should change automatic attitudes towards obstacles of reality in line with expectations of success. Specifically, we predicted that only participants in the mental contrasting condition would subsequently show a more negative automatic attitude towards their idiosyncratic obstacles of reality (i.e., lower RAI) as their expectations of success increased, compared to participants in the control conditions.

To test our prediction, we specified hierarchical multiple regression analyses using Model 1 of the SPSS PROCESS macro provided by Hayes (2013). We entered reality attitude indexes (y) as a dependent variable, expectations of success (x) as an independent continuous variable, and condition as a multicategorical moderator (m). This option created two dummy-coded variables, with Dummy 1 coding reverse contrasting control condition as 1, and Dummy 2 coding distraction control condition as 1. As predicted, adding the two interaction terms significantly improved the model, $R^2_{\text{change}} = 4.13\%$, $F_{\text{change}}(2,152) = 3.28$, $p = .04$. Only after using mental contrasting were reality attitude indexes conditional on expectations of

success, $\beta = -22.43$, $t(152) = 2.13$, $p = .04$. A bias-corrected bootstrap confidence interval for the conditional effect, based on 5,000 bootstrap samples, was entirely below zero (-43.239 to -1.599). Replicating results from Studies 1 and 2, higher expectations of success again predicted lower, indicating more negative, reality attitude indexes. Once more, we did not find a conditional effect of expectations of success on reality attitude indexes in the reverse contrasting control condition, $\beta = 11.81$, $t(152) = 1.21$, $p = .23$, or in the distraction control condition, $\beta = 8.24$, $t(152) = .75$, $p = .45$. The link between expectations of success and the reality attitude index was stronger in the mental contrasting condition than in the reverse contrasting control condition, $t(152) = 2.39$, $p = .02$, and stronger than in the distraction control condition, $t(152) = 2.02$, $p = .04$ (see Figure 6).

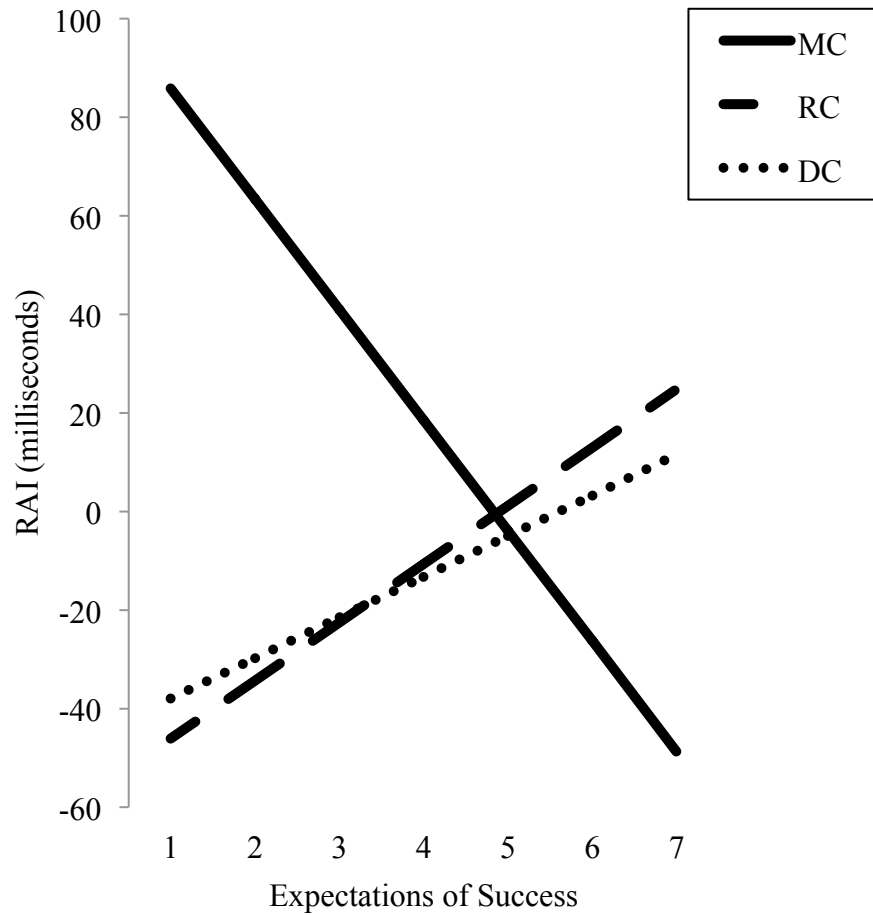


Figure 6. Study 3: Regression lines depict the relation between expectations of success and the reality attitude index (RAI) as a function of self-regulation strategy (MC = mental contrasting condition; RC = reverse contrasting control condition; DC = distraction control condition). Lower values indicate faster responses to negative targets compared with positive targets following the obstacle of reality prime; higher values reflect greater negativity towards idiosyncratic obstacles of reality.

Mental Contrasting: Expectancy-Dependent Automatic Attitude Towards Obstacles of Reality Spurs Feelings of Energization and Translates into Goal Pursuit

Next, we tested our prediction that automatic attitude towards obstacles of reality would mediate mental contrasting effects on energization and then goal pursuit (i.e., goal commitment and attainment). Specifically, we predicted that only after using mental contrasting (but not in the control conditions) should expectations of success indirectly influence commitment to eat more healthily and healthy eating over two weeks through its effect on reality attitude index and feelings of energization. As commitment to eat more healthily and healthy eating over two weeks differed across gender, gender was added as a covariate in the respective analyses.

Serial multiple mediator analyses: Commitment to eat more healthily. As predicted, serial multiple mediator analyses using ordinary least squares path analyses (Model 6 in the PROCESS macro; Hayes, 2013) revealed a significant indirect effect of expectations of success on commitment to eat more healthily ($adb = .038$) through reality attitude index and feeling of energization (see Figure 7a). A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples did not include zero (.001 to .167).

In line with our hypothesis, for participants in the reverse contrasting control condition, there was no indirect effect of expectations of success on commitment to eat more healthily ($adb = -.004$) via reality attitude index and feelings of energization (see Figure 7b). A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples included zero (-.053 to .006). Similarly, for participants in the distraction control condition, there was also no indirect effect of expectations of success on commitment to eat more healthily ($adb = -.003$) via reality attitude index and feelings of energization (see

Figure 7c). A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples included zero (-.041 to .003).

In sum, in line with our prediction, we solely observed a significant indirect effect of expectations of success on commitment to eat more healthily through the reality attitude index and feelings of energization in the mental contrasting condition. Conversely, this was not observed in the control conditions.

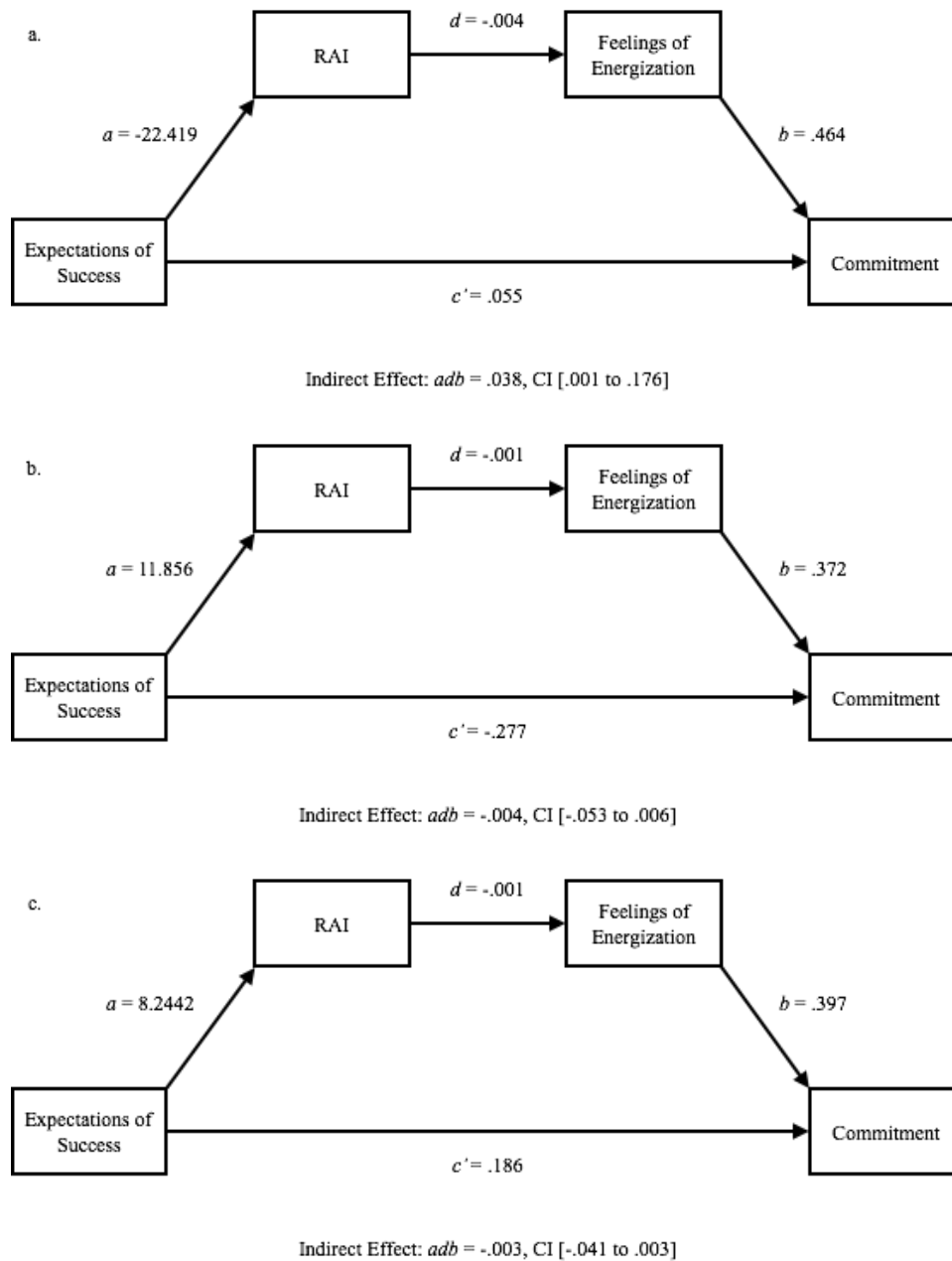


Figure 7. Serial multiple mediator model (Model 6 in the PROCESS macro; see Hayes, 2013) for expectation of success via reality attitude index (RAI) and feelings of energization on commitment to eat more healthily: a) mental contrasting condition; b) reverse contrasting control condition; c) distraction control condition. Numbers represent unstandardized *b*-values.

Serial multiple mediator analyses: Healthy eating over two weeks. As predicted, serial multiple mediator analyses using ordinary least squares path analyses (Model 6 in the PROCESS macro; Hayes, 2013) revealed a significant indirect effect of expectations of success on healthy eating over two weeks ($adb = .020$) through the reality attitude index and feeling of energization (see Figure 8a). A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples did not include zero (.001 to .082).

In line with our hypothesis, for participants in the reverse contrasting control condition, there was no indirect effect of expectations of success on healthy eating over two weeks ($adb = .001$) via reality attitude index and feelings of energization (see Figure 8b). A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples included zero (-.006 to .007). Similarly, for participants in the distraction control condition, there was also no indirect effect of expectations of success on healthy eating over two weeks ($adb = .001$) via the reality attitude index and feelings of energization (see Figure 8c). A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples included zero (-.001 to .019).

In sum, we solely observed a significant indirect effect of expectations of success on healthy eating over two weeks through the reality attitude index and feelings of energization in the mental contrasting condition. Conversely, this was not observed in the control conditions. To further explore the difference of these indirect effects, we employed moderated mediation analyses.

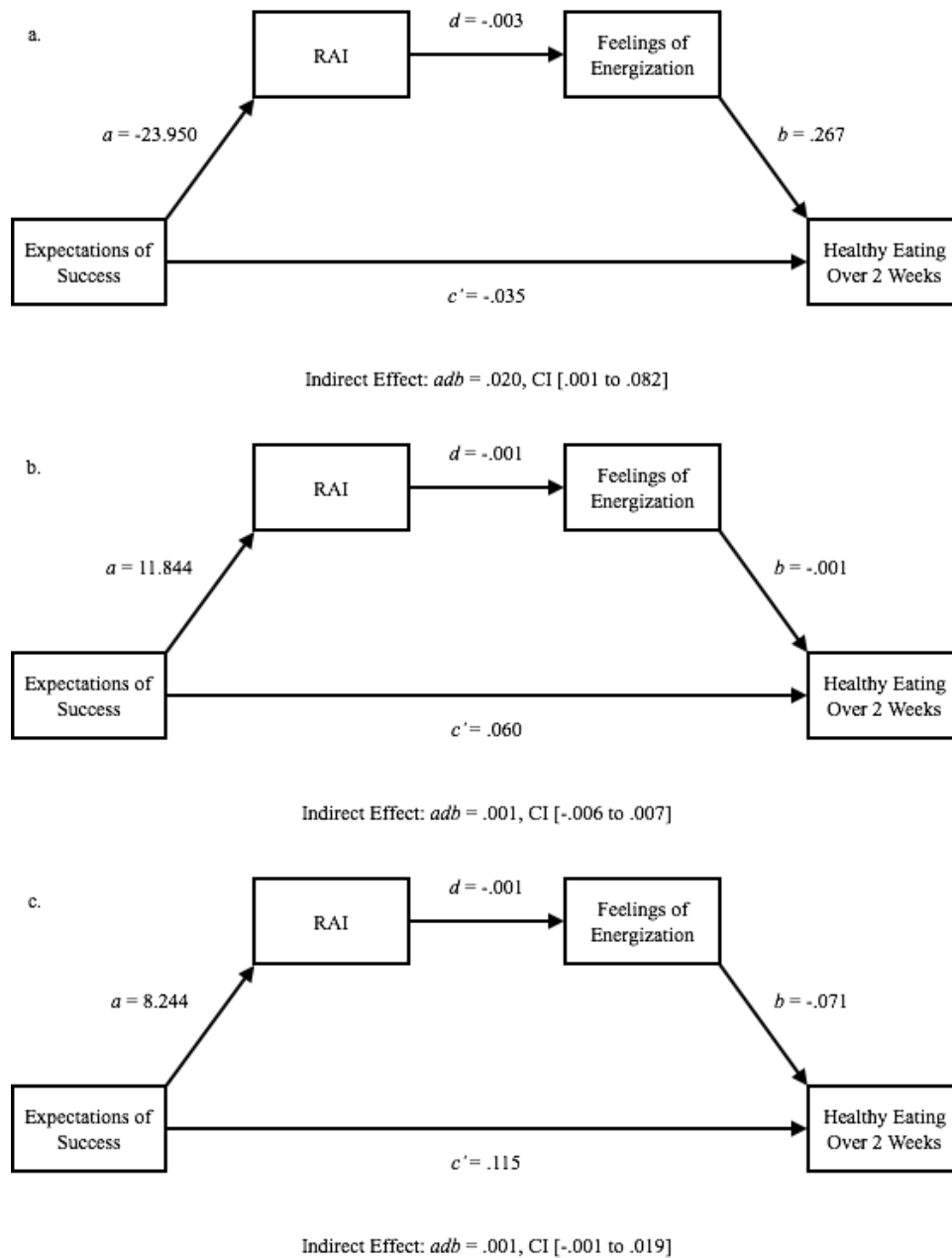


Figure 8. Serial multiple mediator model (Model 6 in the PROCESS macro; see Hayes, 2013) for expectation of success via reality attitude index (RAI) and feelings of energization on healthy eating over two weeks: a) mental contrasting; b) reverse contrasting control condition; c) distraction control condition. Numbers represent unstandardized b-values.

Moderated mediation analyses: Feelings of energization, commitment to eat more healthily, and healthy eating over two weeks. To further explore whether the indirect effect was moderated by condition (that is, whether the indirect effect significantly varied across conditions), we employed three separate analyses of moderated mediation. Firstly, we tested the difference of the indirect effect (mental contrasting versus control conditions combined) of expectations of success on feelings of energization via the reality attitude index. Next, we tested the difference of the indirect effect (mental contrasting versus control conditions combined) of the reality attitude index on commitment to eat more healthily via feelings of energization. Lastly, we tested the difference of the indirect effect (mental contrasting versus control conditions combined) of the reality attitude index on healthy eating over two weeks via feelings of energization.

Feelings of energization. In the first model, we explored whether the indirect effect of expectations of success on feelings of energization via the reality attitude index was different by condition. Accordingly, following a bootstrapping procedure (Model 59 in the PROCESS macro; Hayes, 2013), we entered feelings of energization (y) as a dependent variable, expectations of success (x) as an independent variable, the reality attitude index as a mediator (m), and condition (mental contrasting vs. control conditions combined) as a moderator (w). Figure 9 depicts the conceptual model of the moderated mediation model. In the mental contrasting condition, there was a significant indirect effect of expectations of success on feelings of energization through the reality attitude index ($ab = .081$). A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples did not include zero (.008 to .229). Furthermore, as predicted, in the combined control conditions, there was no significant indirect effect of expectations of success on energization through the reality attitude index ($ab = -.010$). A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples included zero

(-.062 to .010). Importantly, results showed a significant index of moderated mediation = $-.091$, indicating that the indirect effect in the mental contrasting condition was significantly different to the indirect effect in the control conditions combined. A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples did not include zero ($-.246$ to $-.011$).

These results indicate that it was only for participants who used mental contrasting (compared to control conditions) that the reality attitude index (indicating greater negativity) lowered as expectations increased, which was then translated into higher feelings of energization.

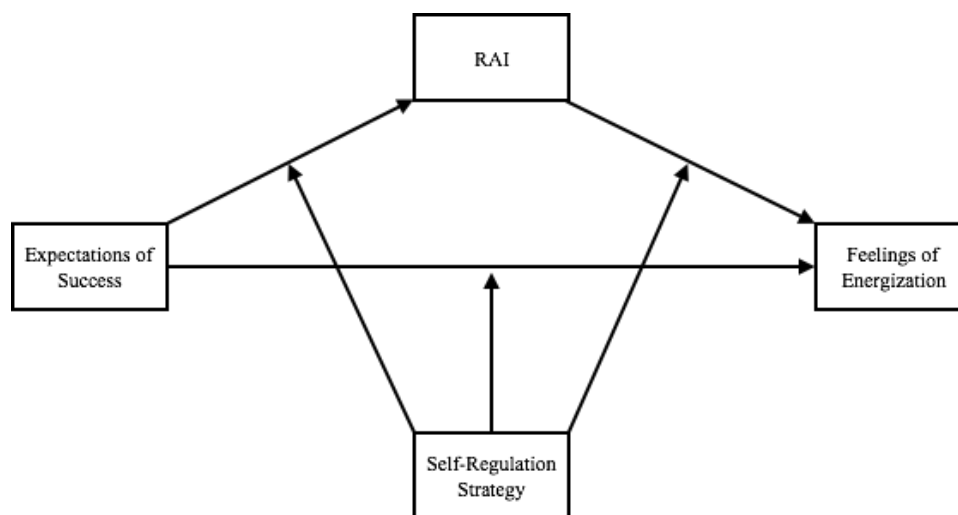


Figure 9. Conceptual model of the moderated mediation model (Model 59 in the PROCESS macro; Hayes, 2013) to test whether the indirect effect of expectations of success on feelings of energization via reality attitude index differ for types of self-regulation strategy (0 = mental contrasting condition; 1 = control conditions combined).

Commitment to eat more healthily. In the second model, we explored whether the indirect effect of the reality attitude index on commitment to eat more healthily via feelings of energization differed by condition. Accordingly, we entered commitment to eat more healthily (y) as a dependent variable, reality attitude indexes (x) as an independent variable, feelings of energization as a mediator (m), and condition (mental contrasting vs. the other two conditions combined) as a moderator (w). Figure 10 depicts the conceptual model of the moderated mediation model. In the mental contrasting condition, there was a significant indirect effect of the reality attitude index on commitment to eat more healthily through feelings of energization ($ab = .0002$). A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples did not include zero (-.004 to -.001). Furthermore, in the combined control conditions, there was again no significant indirect effect of the reality attitude index on commitment to eat more healthily through feelings of energization ($ab = .0002$). A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples included zero (-.001 to .001). Importantly, results again showed a significant index of moderated mediation = .002, indicating that the indirect effect in the mental contrasting condition was significantly different to the indirect effect in the combined control conditions. A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples did not include zero (.001 to .004).

These results indicate that it was only for participants who used mental contrasting (compared to control conditions) that the reality attitude index lowered (indicating more negativity) as feelings of energization increased, which was then translated into stronger commitment to eat more healthily.

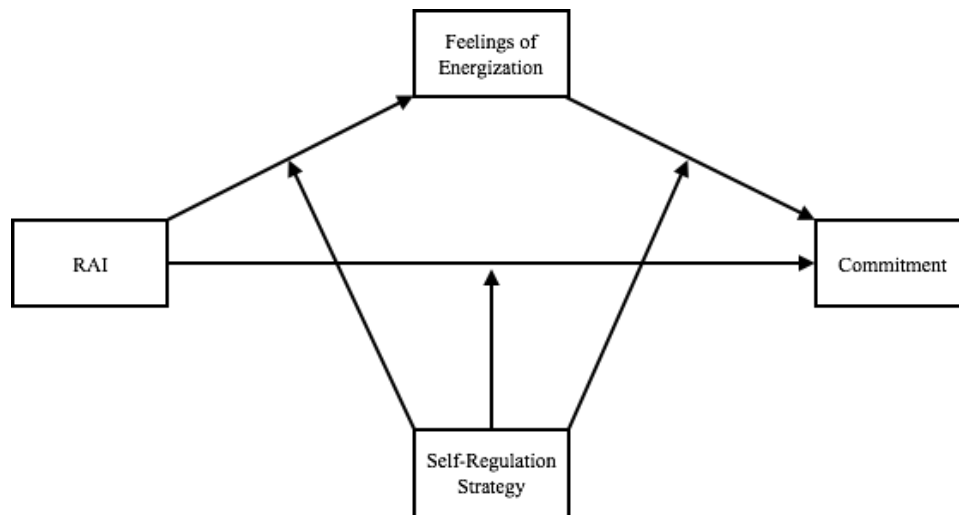


Figure 10. Conceptual model of the moderated mediation model (Model 59 in the PROCESS macro; Hayes, 2013) to test whether the indirect effect of the reality attitude index on commitment to eat more healthily via feelings of energization differ for type of self-regulation strategy (0 = mental contrasting condition; 1 = control conditions combined).

Healthy eating over two weeks. Lastly, in the third model, we explored whether the indirect effect of the reality attitude index on healthy eating over two weeks via feelings of energization differed by condition. Accordingly, we entered healthy eating over two weeks (y) as a dependent variable, reality attitude indexes (x) as an independent variable, feelings of energization as a mediator (m), and condition (mental contrasting vs. the other two conditions combined) as a moderator (w). Figure 11 depicts the conceptual model of the moderated mediation model. In the mental contrasting condition, there was a significant indirect effect of the reality attitude index on healthy eating over two weeks through feelings of energization ($ab = -.001$). A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples did not include zero (-.003 to .0001). Furthermore, in the combined control conditions, there was again no significant indirect effect of the reality attitude index on healthy eating over two weeks through feelings of energization ($ab = .0001$). A bias-corrected bootstrap 95% confidence interval for the indirect effect based

on 5,000 bootstrap samples included zero (-.0002 to .0002). Importantly, results again showed a significant index of moderated mediation = .001, indicating that the indirect effect in the mental contrasting condition was significantly different to the indirect effect in the control conditions combined. A bias-corrected bootstrap 95% confidence interval for the indirect effect based on 5,000 bootstrap samples included zero (-.0001 to .003).

These results indicate that it was only for participants who used mental contrasting (compared to control conditions) that feelings of energization increased as the reality attitude index decreased (indicating greater negativity), which was then translated into healthy eating over two weeks.

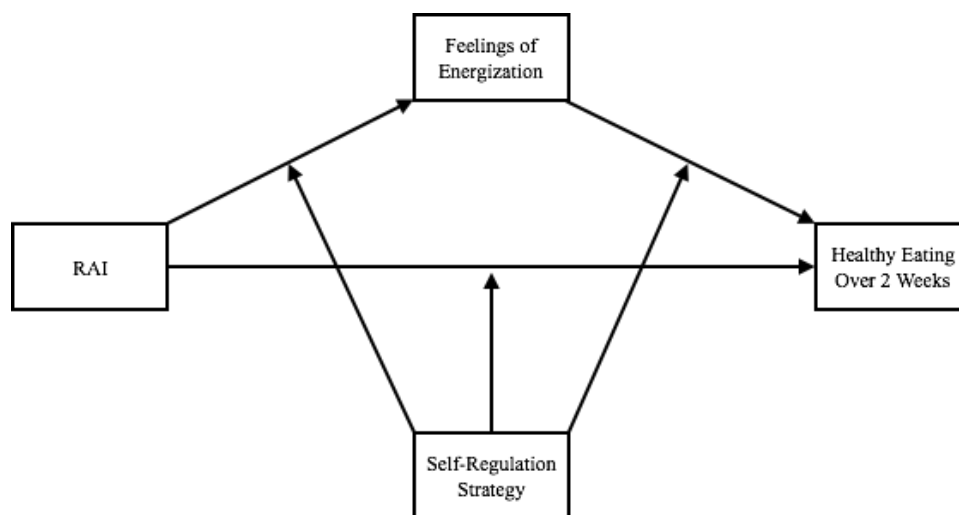


Figure 11. Conceptual model of the moderated mediation model (Model 59 in the PROCESS macro; Hayes, 2013) to test whether the indirect effect of the reality attitude index on healthy eating over two weeks via feelings of energization differed for type of self-regulation strategy (0 = mental contrasting condition; 1 = control conditions combined).

Discussion

Study 3 replicated the results of Studies 1 and 2. Again, only in the mental contrasting condition and not in the control conditions, we found a significant effect on the automatic attitude towards the obstacles of reality depending on expectations of success. Again, only participants in the mental contrasting condition subsequently showed a more negative automatic attitude towards their idiosyncratic obstacles of reality (i.e., lower RAI) as their expectations of success increased. In contrast, there was again no significant effect on automatic attitude towards obstacles of reality depending on expectations of success in the reverse contrasting control condition, or the distraction control condition. Importantly, in Study 3, results showed that automatic attitudes mediated the effect of expectations of success on feelings of energization, and goal pursuit in the mental contrasting condition. After using mental contrasting, a more negative automatic attitude towards obstacles of reality further translated into higher levels of feelings of energization, which then predicted goal pursuit (i.e., commitment to eat more healthily and healthy eating over two weeks).

We replicated our findings in a third domain (i.e., healthy eating), employing another implicit paradigm to measure automatic attitude (i.e., affective priming task) and using a different type of obstacle of reality that presumably carried a positive automatic attitude per se (i.e., personal food temptation). Participants in the mental contrasting condition (i.e., who first mentally elaborated their best outcome of successfully improving their eating habits, and then mentally elaborated their personal obstacle biggest food temptation) subsequently displayed a more negative automatic attitude towards their obstacles (e.g., hamburger) as their expectations of successfully eating more healthily increased. Importantly, participants in the mental contrasting condition, then felt more energized to eat more healthily the more negative the automatic attitude towards their obstacle of reality. Furthermore, this energization then translated into heightened commitment to eat more healthily and healthy

eating over two weeks. Taken together, these findings further support our notion that mental contrasting modulates automatic attitude towards obstacles of reality depending on expectations of success. Moreover, Study 3 provides evidence for the mediating role of automatic attitude towards obstacles of reality for mental contrasting effects on feelings of energization, and goal pursuit.

General Discussion

The present research investigates automatic attitudes towards obstacles of reality as a potential mechanism of mental contrasting effects on energization and goal pursuit. Results of three studies demonstrate that mental contrasting modulated the automatic attitude towards personal obstacles of reality in line with expectations of success. Using mental contrasting (versus relevant control conditions) resulted in a more negative automatic attitude towards personal obstacles of reality as expectations of success increased. These results applied to desired futures in the relationship domain (Study 1), the achievement domain (Study 2), and the health domain (Study 3). Expectations of success were manipulated (Study 1) and measured (Study 2, Study 3). Furthermore, the results were replicated employing a masked (Study 1) and an unmasked affective priming task (Study 3), as well as an extrinsic affective Simon task (Study 2). Moreover, the results were replicated in the German language (Study 1) and the English language (Study 2, Study 3). Importantly, Study 3 provides evidence for the mediating role of automatic attitudes towards obstacles of reality in the effects of mental contrasting on feelings of energization and goal pursuit (i.e., commitment to eat more healthily and healthy eating over two weeks). Specifically, results indicate that, in the mental contrasting condition automatic attitudes towards obstacles of reality mediated the effect of expectations of success on energization, and then goal pursuit. The higher the expectations of success were, the more negative the automatic attitude towards the personal obstacles of reality was. Furthermore, the more negative the automatic attitudes towards the personal

obstacles of reality were, the stronger the feelings of energization were. This in turn predicted effective goal pursuit (i.e., commitment to eating more healthily and healthy eating over two weeks).

Alternative Explanations

Across all three studies, neither in the valence control condition, the distraction control condition, nor the reverse contrasting control condition did expectations of success predict automatic attitudes towards personal obstacles of reality. Comparing the results of the control conditions excludes several alternative explanations. For instance, one might argue that any elaboration of a positive followed by a negative content would modulate automatic affect towards the obstacle or reality in line with one's expectations of success. However, the results of the valence control condition do not support this prediction. The valence control condition controlled for the order of valence. Accordingly, the order of mental elaboration considering the valence was the same as that in the mental contrasting condition. Participants firstly elaborated a positive and then a negative experience with a professor. Thus, the content was varied and did not relate to the desired future.

Furthermore, one might argue that any elaboration of both the desired future and the reality would modulate automatic affect towards the obstacle or reality in line with one's expectations of success. However, the results of the reverse contrasting control condition do not support this prediction. Therefore, we may assume that the order of mental elaboration plays a crucial role. These results imply that the elaboration of the obstacles of reality before the best outcome did not emphasize that the obstacles of reality impeded the realization of the desired future. Furthermore, the reverse contrasting control condition controlled for the content, as instructions were identical and only the order of presentation was switched. In addition, one might argue that the reverse contrasting control condition diminished the relationship between expectations of success and automatic attitude towards the personal

obstacles of reality, rather than mental contrasting establishing this relationship. However, the results of the valence control condition and the distraction control condition, in which no manipulation was carried out, displayed the same pattern as the reverse contrasting control condition.

Finally, one may argue that merely ending one's mental elaborations with the obstacles of reality would modulate subsequent automatic attitudes towards these obstacles. However, previous research has found that dwelling on the obstacles of reality also did not lead to expectancy-dependent behavior (Oettingen et al., 2001; Oettingen, Mayer, Brinkman, 2010, Oettingen, Mayer, Torpe, 2010). In conclusion, it can be assumed that dwelling on the obstacles of reality would also not modulate automatic attitudes towards these obstacles.

Taken together, the relationships between expectations of success and the dependent variables in the mental contrasting condition in our studies are unlikely to reflect preexisting associations between the variables. This is because they only emerged in the mental contrasting condition, and not in the control conditions. Only mental contrasting modulated automatic attitude towards personal obstacles of reality in line with expectations of success. Moreover, only in the mental contrasting condition did automatic attitude towards obstacles of reality predict feelings of energization, and then goal pursuit. Therefore, the effects of automatic attitude towards obstacles of reality on goal pursuit were specific to the mental contrasting condition. The automatic attitude towards obstacles of reality only spurred energization and goal pursuit after the use of mental contrasting. Automatic attitudes towards obstacles of reality, therefore, may be a mechanism specific to mental contrasting effects on energization and goal pursuit. Consequently, the present findings support our initial idea that mental contrasting establishes a negative instantaneous reaction (i.e., automatic attitude) towards personal obstacles of reality (such as one's messiness, nervousness, or eating a hamburger). This automatic attitude may in turn help people to understand how the reality

prevents them from realizing their desired future, thereby energizing people to commit to and strive for this future.

Limitations

One concern might relate to the use of idiosyncratic words. In all three studies, we measured automatic attitudes towards reality words that participants had previously named. Hence, systematic differences in the idiosyncratic reality words between the conditions might explain the reported findings. However, we argue that potential differences in these idiosyncratic reality words cannot explain our results, as participants were randomly assigned to the different conditions after they named these reality words.

Implications for Research on Fantasy Realization Theory

Our findings expand prior research on fantasy realization theory (Oettingen, 2000), which have alluded to the critical role of obstacles of reality in the effects of mental contrasting on energization and goal pursuit. For instance, in line with expectations of success, mental contrasting strengthened the meaning of the reality as an obstacle (Kappes, A. et al., 2013). Specifically, paired with high versus low expectations of success, using mental contrasting strengthened the meaning of the reality as an obstacle. These changes then mediated mental contrasting effects on subsequent goal pursuit (e.g., exam preparation, and feelings of responsibility). Furthermore, mental contrasting paired with high versus low expectations of success established strong mental associations between the obstacle of reality and behaviors instrumental in overcoming the impeding reality (Kappes, A., et al., 2012). These obstacle–behavior associations created by mental contrasting in turn predicted respective goal pursuit. For instance, students in the mental contrasting condition with high versus low expectations of success showed strong mental associations between their obstacle (i.e., elevator) and instrumental behavior (i.e., stairs). Furthermore, those participants were more likely to use the stairs when encountering the obstacle in the form of the elevator.

Extending these previous findings, the present research further underscores the notion that obstacles of reality play a pivotal role in the effects of mental contrasting. Our results shows that it only after using mental contrasting that people carried a more negative automatic attitude towards their personal obstacles of reality the higher their expectations of success were. Importantly, the results of Study 3 imply that this automatic attitude subsequently spurred levels of energization, which then translated into goal pursuit.

Taken together, these results imply that in circumstances of high expectations of success, using mental contrasting helped people to understand the reality as an obstacle, which was associated with a negative instantaneous reaction (i.e., automatic attitude) that spurred levels of energization. Therefore, the obstacle of reality, by carrying a negative automatic attitude, provided the necessary energy that helped people to commit, potentially look for, and recognize behaviors instrumental to overcoming their obstacle, thereby promoting the realization of the desired future. In contrast, in circumstances of low expectations of success, as the reality was understood as unlikely to be overcome, it was no longer understood as an obstacle. As the reality was not associated with a negative automatic attitude, people no longer felt energized or invested effort to realize their desired future.

Implications for Research on Automatic Goal Pursuit

Our findings are in line with and extend previous research on automatic goal pursuit (Moskowitz et al., 2004). Not only the activation of a goal (e.g., Aarts & Dijksterhuis, 2000; Aarts, Gollwitzer, & Hassin, 2004; Bargh, Gollwitzer, Lee-Chai, Barndollar, & Troetschel, 2001; Chartrand & Bargh, 1996, Shah & Kruglanski, 2002), but also goal pursuit itself may occur automatically (e.g., Custers & Aarts, 2005; McCulloch et al., 2008). For instance, changes in automatic processes may shield goal pursuit by solving behavioral conflict in favor of the goal, and may also counteract the offset of obstacles (Fishbach & Trope, 2005, 2007; Myrseth et al., 2009; Oettingen, 1996; Shah, Friedman, & Kruglanski, 2002, Trope &

Fishbach, 2000). For instance, self-regulation processes may increase the strength of the goal while decreasing the strength of the obstacle (Fishbach, Friedman, & Kruglanski, 2003; Fishbach & Shah, 2006; Gollwitzer, Bayer, & McCulloch, 2005; Moskowitz, Gollwitzer, Wasel, & Schaal, 1999). In particular, the presence of obstacles (e.g., chocolate) automatically activated higher-order goals (e.g., diet), which in turn inhibited obstacles (Fishbach et al., 2003). Specifically, for people who are skilled in a domain (e.g., school), the perception of an obstacle that undermined that goal (e.g., TV) automatically activated the longer-term goal. Therefore, people seem to solve self-regulation conflict by heightening the accessibility of the higher-order goals when obstacles to this goal are encountered.

Moreover, pointing to the relevance of automatic goal pursuit, a meta-analysis found that self-control was more strongly associated to automatic behaviors such as forming habits than to consciously controlled behavior (de Ridder et al., 2012). For instance, research has shown that people who exhibited high levels of trait self-control were more likely to choose to work in a distraction-free environment than in a distracting, yet appealing one (Ent, Baumeister, & Tice, 2015). Hence, these findings suggest that successful self-regulation and goal pursuit might be linked to automatic behaviors (e.g., building habits) to avoid obstacles (e.g., distractions or temptations), rather than relying on controlled and effortful processes to actively battle obstacles, thereby saving the energy and effort that would be necessary to resist them.

Contributing to this previous research on automatic goal pursuit, our findings demonstrate that self-regulation processes established by mental contrasting also operate in an automatic fashion (i.e., effortless and non-conscious). Hence, mental contrasting enables people to self-regulate without conscious awareness and possibly without depleting their processing and motivational resources (Muraven & Baumeister, 2000).

Implications for Research on Automatic Attitudes

Finally, our findings also contribute to previous research on automatic attitudes. Research suggests that stimuli or objects of the environment automatically activate positive or negative attitudes that people may hold towards them (Custers & Arts, 2005; Ferguson, 2007; Ferguson & Bargh, 2004). It is argued that appraising stimuli automatically (i.e., without effort and awareness) enables people to quickly detect signs of threat or reward and act accordingly (e.g., Fazio, 1989; Roskos-Ewoldsen & Fazio, 1992). Moreover, automatic attitudes have been demonstrated to be relevant to goal pursuit (Ferguson & Bargh, 2004). For instance, the presentation of goal-related cues leads to a more negative automatic attitude towards obstacles (i.e., alternative short-term goals) (Fishbach et al., 2010). Specifically, raising accessibility of achievement resulted in negative automatic attitudes towards leisure activities, while increasing the accessibility of weight watching among dieters resulted in negative automatic attitudes towards fattening foods. Our findings are consistent with prior research, as they demonstrate that the self-regulation strategy of mental contrasting achieved its effects on goal pursuit by modulating automatic attitudes towards obstacles of reality.

Future Research

Automatic attitudes towards goal-relevant concepts. Previous research has suggested that goal-pursuit is also associated with specific automatic attitudes towards goal-relevant concepts (Custers & Aarts, 2005; Ferguson, 2008; Ferguson, 2007; Ferguson & Bargh, 2004). For instance, people with the goal to drink versus not (i.e., thirsty versus not thirsty individuals) displayed a more positive automatic attitude towards words relevant to drinking (e.g., water or juice) than goal-irrelevant words (Ferguson & Bargh, 2004). In addition, the activation of a goal led to increased positive automatic attitudes towards stimuli that could facilitate goal pursuit (Ferguson, 2008). Moreover, a positive automatic affect towards a goal (e.g., thinness) in turn predicted goal relevant behavior, such as the reported

tendency to regulate intake of tempting foods or the consumption of cookies (Ferguson, 2007). In addition, a positive automatic attitude (compared to no positive attitude) was associated with increased efforts towards goal completion, such as selecting objects to satisfy one's goals (Custers & Aarts, 2007). Based on these findings, future research should investigate whether mental contrasting also modulates automatic attitudes towards concepts related to the goal, such as instrumental means. Specifically, mental contrasting should establish a more positive automatic attitude towards goal-relevant concepts, such as instrumental means, in line with expectations of success.

Automatic approach and avoidance dispositions. Previous research has suggested that people approach stimuli associated with positive automatic attitudes and avoid stimuli with negative automatic attitudes (Aarts, Custers, & Holland, 2007; Custers & Aarts, 2005; Fishbach & Shah, 2006). In line with this argument, previous research has demonstrated that successful goal pursuit was associated with automatic approach disposition towards goal-related stimuli (Fishbach & Shah, 2006). For instance, dieters versus non-dieters automatically approached fitness-related cues and avoided fatty-food-related cues. More specifically, dieters were faster to pulling a lever (indicating an approach movement) on trials using goal-related concepts (versus control or obstacle-related concepts). Conversely, they were faster to push a lever (indicating an avoidance movement) on trials using obstacle-related concepts (versus control and goal-related concepts). Based on this research, future research should investigate whether mental contrasting would also modulate respective changes in approach and avoidance dispositions towards obstacles of reality and goal-related concepts such as instrumental means in line with expectations of success. Specifically, mental contrasting paired with high versus low expectations of success should establish a disposition to avoid obstacles of reality and approach goal-related concepts such as instrumental means.

Inducing automatic attitudes. Previous research has suggested that automatic attitudes may also be induced (Custers & Aarts, 2005), for instance by evaluative conditioning (De Houwer, Thomas, & Baeyens, 2001, for a review). For example, inducing a positive attitude towards a goal compared to obstacles increased the likelihood of adhering to goals (as cited in Fishbach et al., 2010). In particular, after receiving a positive automatic attitudes induction for health-related stimuli (e.g., diet, thin, and fitness), as well as a negative automatic attitude induction for unhealthy primes (e.g., chocolate, cake, and chips), people were subsequently more likely to select a health promoting hotel for a vacation and reported greater commitment to exercise than participants who had not received this manipulation. Based on this research, future research should investigate whether mental contrasting paired with an induced (rather than measured) automatic attitude would also predict changes in energization and goal pursuit.

Longevity of effects. Previous research has demonstrated that changes in automatic processes prevail until the goal is realized and end after the goal is completed (e.g., Ferguson & Bargh, 2004; Fishbach et al., 2010; Förster, Liberman, & Higgins, 2005). Similarly, research has demonstrated that mental contrasting does not only affect behaviors immediately, but also up to three months later (e.g., Oettingen, Hönig, & Gollwitzer, 2000) or until the desired future is achieved. Based on these findings, future studies should investigate whether mental contrasting affects automatic attitudes until the realization of the desired future.

Conclusion

The present research illustrates one mechanism by which mental contrasting achieves its beneficial effects on energization and goal pursuit. Paired with high versus low expectations of success, mental contrasting establishes a negative automatic affect towards obstacles of reality. Our results suggest that this automatic attitude subsequently mobilized

energy that enables people to commit to their desired future and successfully realize it.

Examples of this include improving the relationship with their roommate, excelling in an admission test, or improving one's eating habits.

Footnotes

¹Additional measures that are not discussed here were collected in Study 1. A complete list of measures is available in the Appendix.

²For a discussion of the use median reaction times see Ratcliff (1993) for a recommendation, and see Miller (1988) for a warning given some specified conditions.

³Additional measures that are not discussed here were collected in Study 2. A complete list of measures is available in the Appendix.

⁴Participants assigned each of the meals and snacks a grade regarding its healthiness, following the common US grading system: 1 (*A*), 2 (*B*), 3 (*C*), 4 (*D*), and 5 (*F*). Participants chose N/A if they did not eat anything. Self-rated healthiness correlated moderately positively with other-rated healthiness at baseline, $r = .41, p < .001$.

⁵The item “energized” was dropped. Due to an error in the html code, the program failed to record data if participants selected the button “6”.

⁶Participants assigned each of the meals and snacks a grade regarding its healthiness, following the common US grading system: 1 (*A*), 2 (*B*), 3 (*C*), 4 (*D*), and 5 (*F*). Participants chose N/A if they did not eat anything. Self-rated healthiness correlated moderately positively with other-rated healthiness over two weeks, $r = .46, p < .001$.

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Appendix A

List of Words Used in the Masked Affective Priming Task

Positive target words: Baby (baby), Blumen (flowers), Essen (food), Freund (friend), Geschenk (gift), Hawaii (Hawaii), Kino (cinema), Musik (music), Pizza (pizza), Sommer, (summer), Tanz (dance), Urlaub (vacation)

Negative target words: Abfall (trash), Bomben (bombs), Hitler (Hitler), Hölle (hell), Krankheit (desease), Krebs (cancer), Krieg (war), Müll (garbage), Scheidung (divorce), Tod (death), Virus (virus), Hass (hate)

Positive prime word: Geburtstag (birthday)

Negative prime word: Verbrechen (crime)

Neutral primes word: Wetter (weather), Stuhl (chair), Tisch (table), Fenster (window)

Masks: ACBTOPXDETKLMUFGOEIT, HEKRFLEIGNREKJKSOPGK,

JSAOLSJAHPETRNGELKAZ, XCIREHKSNPWVNHDIKLAF,

LREBJSAHORBTNUSAKSQB, FLITFBJSFHUUMFNLCDDH,

LSDMDMATHCXTCTNTBVBB, KGFZRSXVBXFJHKFSADTB,

XRNHZIUJBNESOTLSYRTQ, YAVBNRMUGHGPEASOPERT,

FTRES DORFNUGNHGRIEMS, ERDNHTRDIOWPRLSANTE,

IZRLLKHREBVEEGFHUWMD, NMWOETFGJNSAEQOIPCVN,

MRDSDFFGUEMIDSRBVOKR, DBOTVTPENPASDFUENMAS,

LAJGWERFIBVDDOPWEIOE, ASPOIJFDSAEQWRJFADSW,

WRR TUZUIOPLKJMN BV CXY, BWESFGGRUSWEIRPWVOMY

Appendix B

Additional Measure Study 1: Picture Task

This task was adapted from Markman and Gentner (1993) and designed to measure perceptual similarity mapping or relational similarity mapping. For every picture, participants read the following instructions: “Bitte schauen Sie sich dieses Bild für einen Moment an. Beurteilen Sie jetzt, wie ähnlich sich die beiden Bilder sind. The English translation is: “Please look at these pictures for a moment. Please rate how similar the pictures are.” Participants indicated their answer on a scale from 1 (*gar nicht ähnlich/ not at all similar*) to 9 (*extrem ähnlich/ extremely similar*). Following, participants answered a second question: “Welches Objekt passt im unterem Bild zum rotmarkierten Objekt im oberen Bild?” The English translation is: “Which object in the lower picture is similar to the red object in the upper picture?”

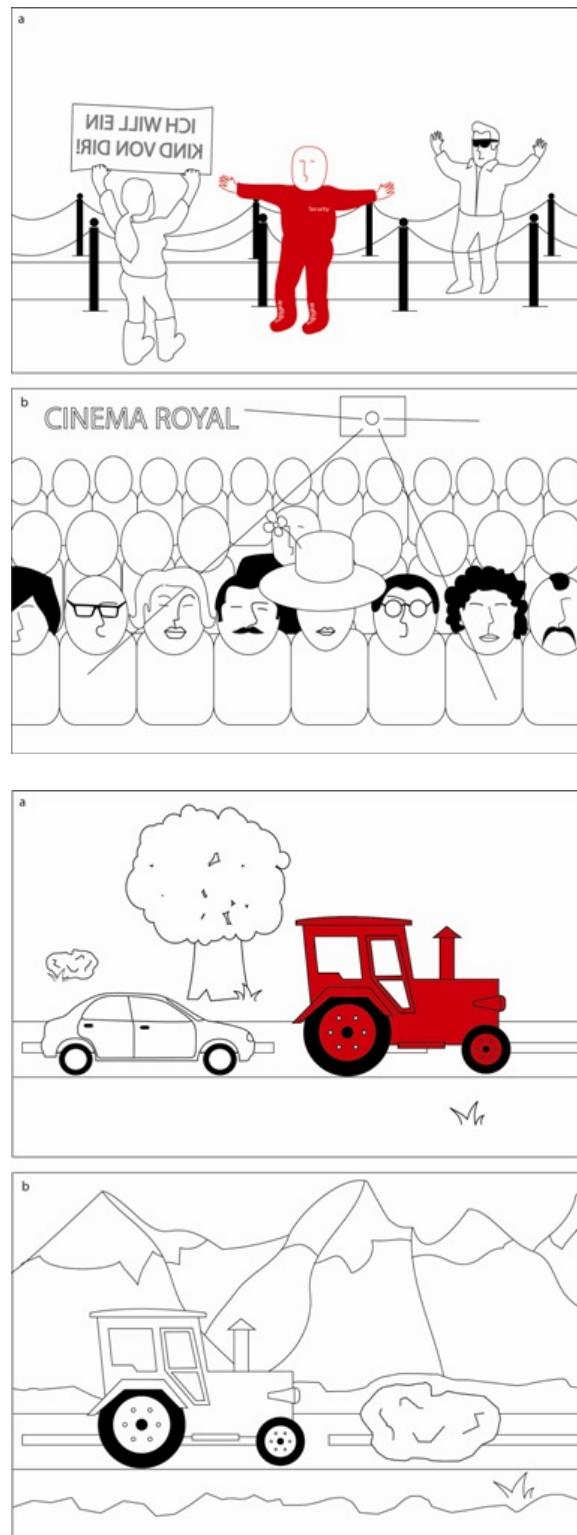


Figure B1. Stimuli used in the picture task adapted from Markman and Gentner (1993).



Figure B2. Stimuli used in the picture task adapted from Markman and Gentner (1993).



Figure B3. Stimuli used in the picture task adapted from Markman and Gentner (1993).

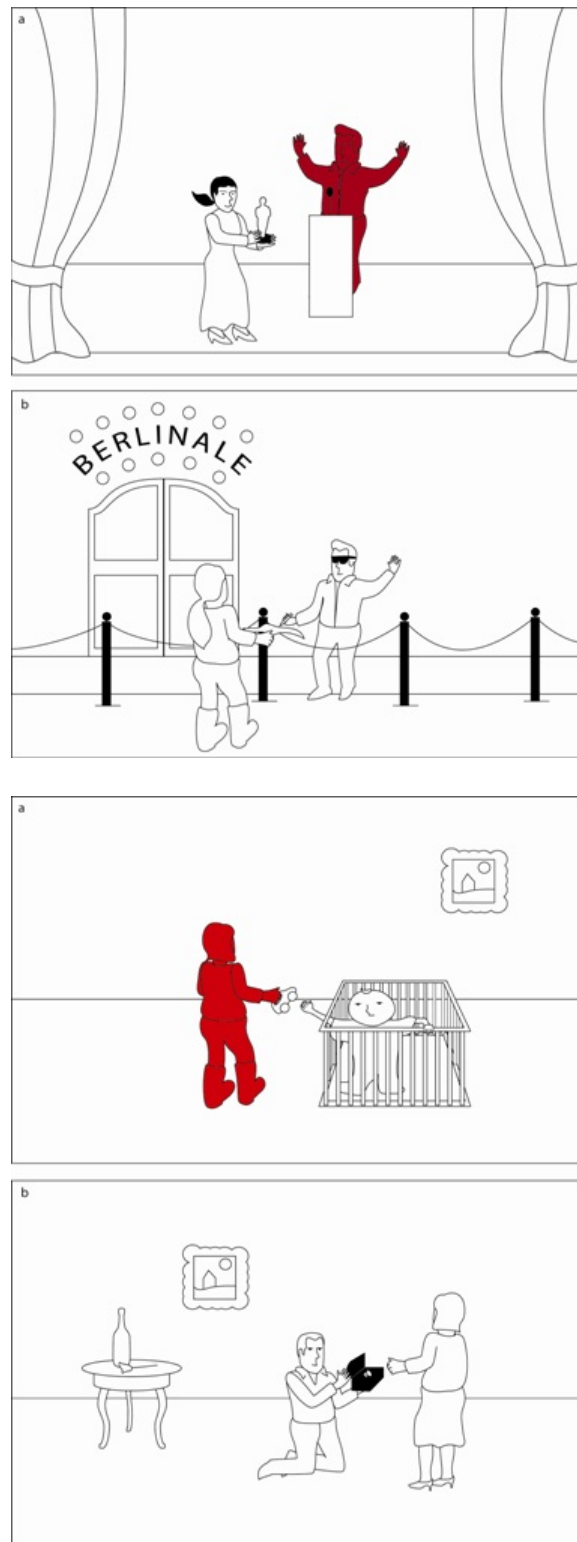


Figure B4. Stimuli used in the picture task adapted from Markman and Gentner (1993).

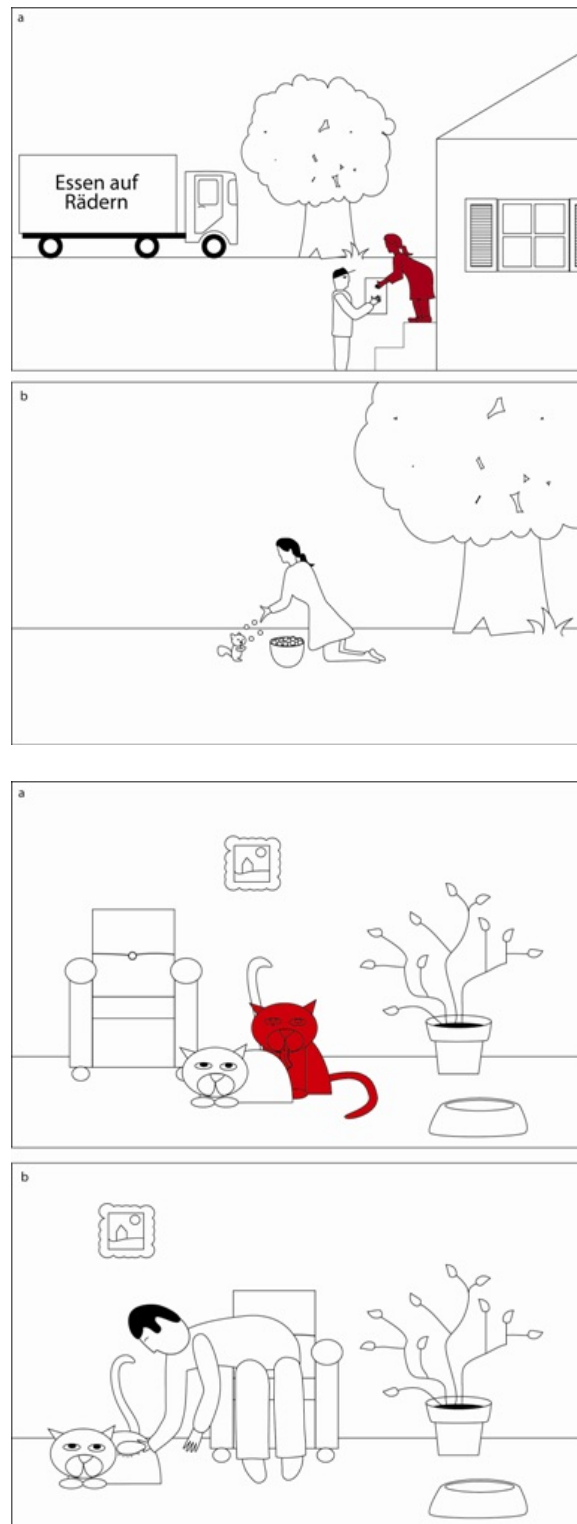


Figure B5. Stimuli used in the picture task adapted from Markman and Gentner (1993).

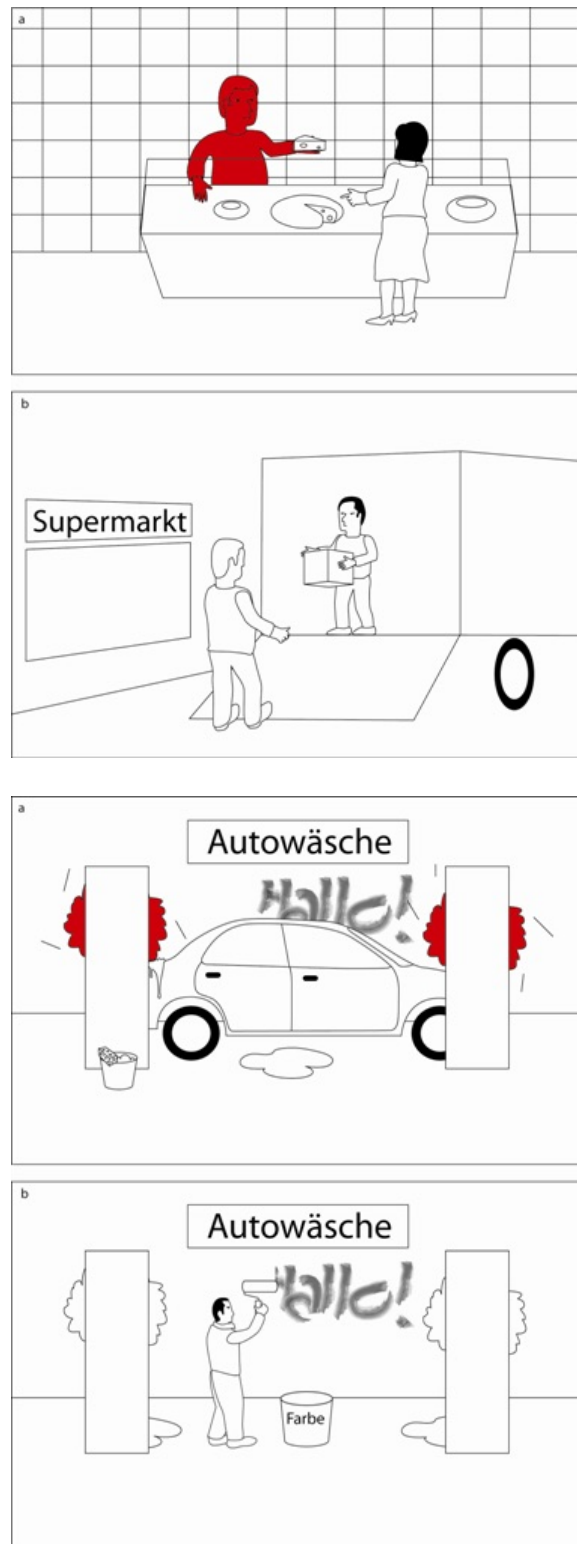


Figure B6. Stimuli used in the picture task adapted from Markman and Gentner (1993).

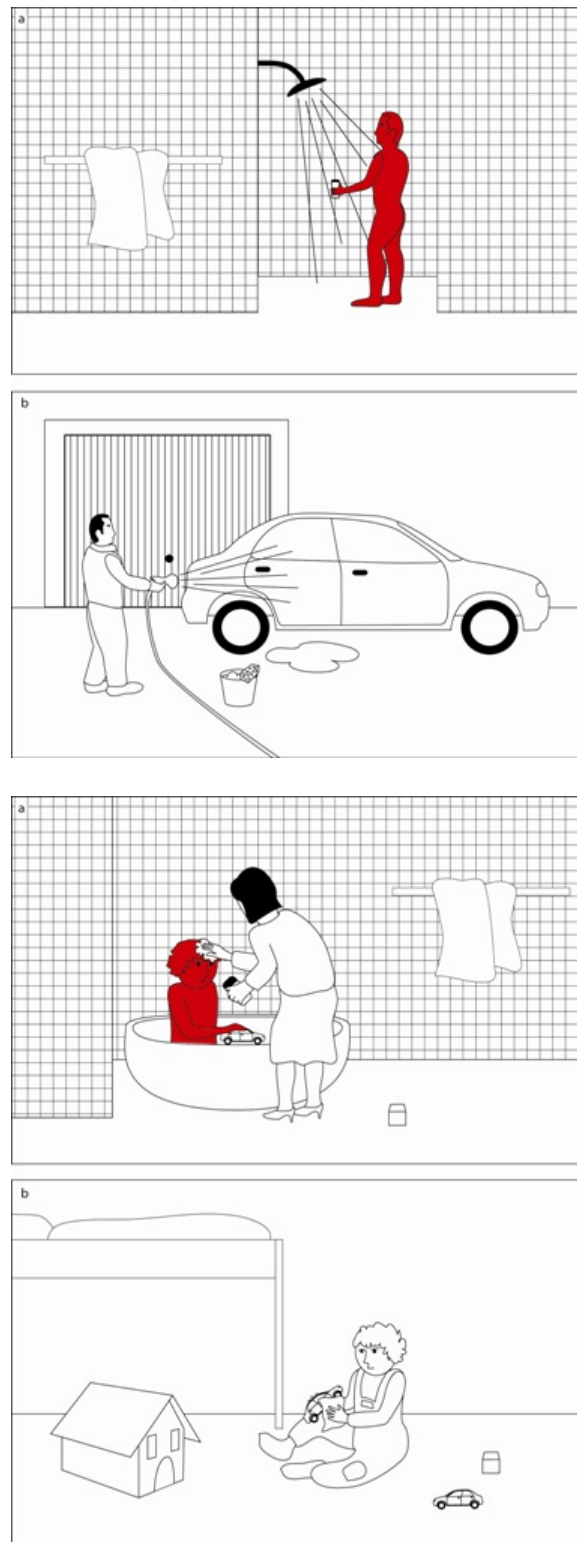


Figure B7. Stimuli used in the picture task adapted from Markman and Gentner (1993).

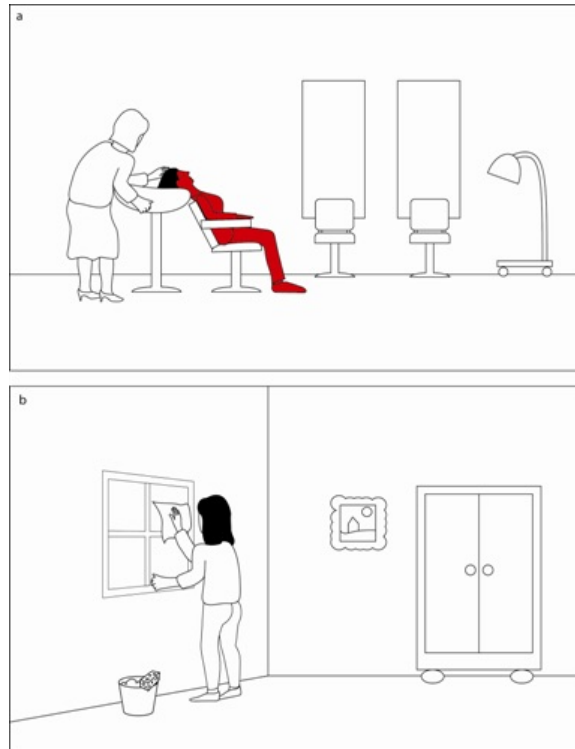


Figure B8. Stimuli used in the picture task adapted from Markman and Gentner (1993).

Appendix C

Additional Measure Study 1: Explicit Attitude Towards Reality and Future

To measure the explicit attitude towards the reality aspect, participants answered the following questions: “Bitte bewerten Sie Ihren Realitätsaspekt auf den folgenden Skalen.“

The English translation is: “Please rate your reality aspect on the following dimensions.”

Scales ranged from 1 (*unangenehm/unpleasant*) to 7 (*angenehm/pleasant*), from 1 (*negativ/negative*) to 7 (*positiv/positive*), and from 1 (*schlecht/bad*) to 7 (*gut/good*).

Similarly, to measure the explicit attitude towards the future aspect, participants answered the following questions: “Bitte bewerten Sie Ihren Zukunftsaspekt auf den folgenden Skalen.“ The English translation is: “Please rate your future aspect on the following dimensions.” Scales ranged from 1 (*unangenehm/unpleasant*) to 7 (*angenehm/pleasant*), from 1 (*negativ/negative*) to 7 (*positiv/positive*), and from 1 (*schlecht/bad*) to 7 (*gut/good*).

Appendix D

Study 2: List of Words for the Extrinsic Affective Simon Task

Positive white words: fantastic, excellent, magnificent

Negative white words: horrible, dreadful, gruesome

Positive colored words: joy, glorious

Negative colored words: grief, painful

Neutral colored word: impression

Appendix E

Additional Measure Study 2: Feelings of Energization

To measure feelings of energization, participants answered the questions: “When you think about the upcoming creativity test, how energized do you feel?”, “When you think about the upcoming creativity test, how active do you feel?”, “When you think about the upcoming creativity test, how motivated do you feel?”, and “When you think about the upcoming creativity test, how enthusiastic do you feel?”. Each question was answered on a scale from 1 (*not at all*) to 7 (*very*).

Appendix F

Additional Measure Study 2: Commitment to be Successful in a Creativity Test

To measure commitment to be successful in a creativity test, participants answered the questions: “When you think about the upcoming creativity test, how determined are you to be successful?”, “When you think about the upcoming creativity test, how hard will you try to be successful?”, “When you think about the upcoming creativity test, how eager are you to be successful?”, “When you think about the upcoming creativity test, how much initiative will you take to be successful?”, “When you think about the upcoming creativity test, how much does being successful depend on external circumstances?”, “When you think about the upcoming creativity test, how responsible do you feel to be successful?”, “If you did not solve the upcoming creativity tasks, how disappointed would you be?”, “If you did not solve the upcoming creativity tasks, how frustrated would you be?”, and “If you did not solve the upcoming creativity tasks, how upsetting would it be?” Each question was answered on a scale from 1 (*not at all*) to 7 (*very*).

Appendix G

Additional Measure Study 2: Creativity Test

This creativity test was adapted from Förster, Friedman, and Liberman (2004). Instructions were: "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. 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). You will have TWO MINUTES for each task. When you click on continue, the first task will start."

Instructions for Task 1 were: "Ms. Miller likes her plants. Please help her to find as many creative ways as you can regarding how she can water her plants. You have TWO MINUTES for that task. Please note down only ways that are realistically possible and unusual."

Instructions for Task 2 were: "In the next TWO MINUTES, please note down as many as possible novel, creative uses of a brick. Please try to think of uses that are unusual and useful."

Instructions for Task 3 were: "Now, we want you to think of creative ways of greeting someone. You have again TWO MINUTES for that task. Please note down only ways that are realistically possible. Try to find as many unusual ways as possible."

Finally, instructions for Task 4 were: "Finally, we want you to note down as many as possible novel, creative uses of a mug. Please try to think of uses that are unusual and useful as well as realistically possible. Again you have TWO MINUTES for this last task."

Appendix H

Additional Measure Study 2: Explicit Attitude Towards Reality Aspect

To measure the explicit attitude towards the reality aspect, participants answered the following question: “Please rate your reality aspect on the following dimensions.” Scales ranged from 1 (*unpleasant*) to 7 (*pleasant*), from 1 (*negative*) to 7 (*positive*), and from 1 (*bad*) to 7 (*good*).

Appendix I

Study 3: List of Words in the Affective Priming Task

Positive target words: fantastic, terrific, enjoyable, glorious, attractive, outstanding, beautiful, excellent, magnificent, marvelous, appealing

Negative target words: horrible, miserable, hideous, dreadful, painful, repulsive, awful, terrible, disgusting, revolting, despicable, gruesome, sickening, offensive

Neutral primes words: protection, economy, substance, year, paper, transformation, translation, area, impression, aspect, crush, color, phase, place, tongue, scale, entrance, room, pepper, salt, water, screen, heaven, board