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Future thought and behaviour change

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Future thought and behaviour change

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While there is a growing body of research on free thoughts such as fantasies and daydreams, the question of whether and how fantasies lead to effortful action and successful performance has hardly been investigated. The present article will show that, counter to what the popular self-help literature proposes, positive thinking can be detrimental to effort and success if it comes in the form of fantasies (free thoughts and images about the desired future) rather than beliefs (expectations). The article will then discuss fantasy realisation theory (FRT), which specifies how fantasies can be used to wisely self-regulate goal pursuit. The theory argues that the strategy of mental contrasting future and reality will produce both active goal pursuit and active goal disengagement, depending on a person's high versus low expectations of success, respectively. Research supporting these ideas across life domains points to non-conscious cognitive and motivational processes responsible for the effects of mental contrasting, and it depicts context variables (e.g., sad mood) that influence the rise and usage of mental contrasting. Intervention studies attest to mental contrasting as a content-free, time- and cost-effective metacognitive strategy that people can use to regulate their own goal pursuits in an autonomous way, thus helping people to become masters of their everyday life and long-term development.

Keywords: Self-regulation; Behaviour change; Future thought; Intervention; Implicit cognition; Fantasies.

Research on thinking about the future investigates people's capacity to anticipate future events and scenarios. Anticipation of future events may come in a variety of forms with different structural attributes, contents, and functions. Such future thought may refer to the immediate future or to the extended or distant future; it may be specific or vague, concrete or abstract, and it may pertain to learning or performance, to movements of approach,

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freezing, or avoidance (e.g., Bandura, 1997; Dweck & Leggett, 1988; Elliot, 1997; Klinger, 1977; Gollwitzer, 1999; Gray & McNaughton, 2000; Locke & Latham, 2002; Oettingen & Mayer, 2002; Taylor, Pham, Rivkin, & Armor, 1998). Importantly, future thought may come in the form of beliefs or judgements about the likelihood of certain events, or it may come in the form of free thoughts about future events regardless of their likelihood (Oettingen & Mayer, 2002).

Emerging from neo-behaviourist theory (e.g., Tolman, 1938; see also Rescorla, 1985; Seligman, 1972), there is extensive literature on people's beliefs or judgements of whether certain anticipated events may happen or not. Until the present day this literature has been very influential in social psychology and other areas of psychology as well, because expectancy judgements, which reflect a person's experience and performance in the past, have relatively high predictive value of specified intentions and actual behaviour (Bandura, 1977; Fishbein & Ajzen, 1975; Maddux, 1999; Mischel, 1973; Oettingen & Mayer, 2002; Scheier & Carver, 1992; Seligman, 1972; Taylor, 1989; Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000). However, future thought may not necessarily refer to beliefs or judgements about the likelihood that future events and behaviours will occur. It may also appear as free thoughts about such events and behaviours, as daydreams or fantasies, as images or mental simulations, as mind-wandering, task-unrelated thoughts, or as counterfactual thinking.

FREE THOUGHTS VERSUS BELIEFS

William James (1890) extensively described the phenomenon of free thoughts and images and convincingly differentiated them from beliefs. He states: "Everyone knows the difference between imagining a thing and believing in its existence, between supposing a proposition and acquiescing in its truth" (James, 1890, p. 283). Thus a thing may appear in the stream of thought regardless of whether it is believed to be true or false; it may appear as the sheer thought or image per se or as a consenting or disagreeing judgement regarding its degree of truth. William James refers to I. Brentano: "But we must insist that, so soon as the object of a thought becomes the object of an assenting or rejecting judgement, our consciousness steps into an entirely new relation towards it. It is then twice present in consciousness, as thought of, and as held for real or denied" (Brentano cited according to James, 1890, p. 286).

William James focused on images as opposed to beliefs regarding events in the present or past. One may more or less embellish present or past events in one's thoughts, or one may arrive at a judgement about whether the events actually take or took place in the way one has thought about them. While imagery keeps events in fluctuation, beliefs imply a cognitive determination about the event's degree of truth, which is a relief to the

prior "theoretic agitation" (James, 1890). It is the cognitive determination regarding the degree of truth of present and past events that distinguishes the sheer image or thought about the present and past from the respective belief or judgement.

In this chapter, rather than focusing on thoughts about the present or past, I will focus on thoughts about the future: specifically, on free thoughts or images about the future. So far, research on future thought has predominantly investigated beliefs in the form of expectancy judgements. Such expectancy judgements refer to the likelihood that anticipated events or behaviours will or will not occur (Ajzen & Fishbein, 1980; Bandura, 1977, 1997; Bandura & Locke, 2003; Carver & Scheier, 2009; Fishbein & Ajzen, 2010; Mischel, 1973; Seligman, 1991; Taylor et al., 2000). As the cognitive determination derived from expectancy judgements reflects past performance, it comes as no surprise that these judgements are one of the pivotal predictors of intention formation and behaviour change.

Contrary to expectancy judgements, in free thoughts or images future events are not tested for their degree of truth, nor do they necessarily reflect a person's performance history. Fantasies about the future are not constrained by the cognitive mechanisms that make people appraise factual information (Klinger, 1971, 1990; Singer, 1966). Future events do not need to be depicted in their wholeness, logical consistency, and in their real consequences. A person may thus embellish future events in the mind's eye without considering their potentially low feasibility (i.e., low expectations of success) and without considering the cumbersome steps necessary to realise these successes. In short, when fantasising about the future, one needs not consider one's expectations of successfully realising these fantasies nor the present reality that stands in the way of fantasy realisation.

Some free thoughts and fantasies may come in the form of *Zauberdenken* (i.e., thoughts depicting actions and events that violate natural laws or social norms; Lewin, 1926; Mahler, 1933). However, people most frequently fantasise about not yet realised but principally possible futures. Such fantasies will, in particular, unfold their effects on motivation and action (Oettingen & Mayer, 2002). For example, adolescents may fantasise about becoming brilliant college students, middle-aged adults may see themselves reaching financial security, or the elderly may imagine improving their family relationships. In this sense, free thoughts and fantasies resemble daydreams (i.e., thoughts pertaining to immediate or delayed desires that include instrumental activities to attain the desired outcomes; Klinger, 1971, 1990). However, even though free thoughts in the form of fantasies depict events obeying natural and social laws, they still may be disconnected from the perceived probabilities of successfully realising them. People can

experience future blessings in their fantasies without considering the probabilities that these blessings will actually come true.

According to William James, thoughts and images about the past refer to what has happened and what could have happened. Thus they resemble what has more recently been termed rumination (Martin & Tesser, 1989; Moberly & Watkins, 2008; Nolen-Hoeksema, 2000; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008) and counterfactual thinking (Epstude & Roese, 2008; Kahneman & Miller, 1986; Markman & McMullen, 2003; Smallman & Roese, 2009). However, there is a decisive difference between images about the past and images about the future. Images about the past depict events that already have happened (or could have happened) in a certain way, and thus the events are behaviourally closed (i.e., nothing can be done to change things). Events that are depicted in images about the future, on the contrary, may become true or they may not become true. Therefore thoughts and images about future events have particular relevance for behaviour.

FREE THOUGHTS IN SOCIAL PSYCHOLOGY

In social psychology, expectancy judgements about future events have been widely researched during the past decades. However, there has been a dearth of empirical investigations into free thoughts and images as they appear to the mind's eye. It is only recently that researchers have investigated this topic more extensively. While Jerome Singer (1966, 1975), an early pioneer of fantasy research, had his participants rate their own daydreams and fantasies regarding various attributes (such as frequencies, tense, affect, acceptance, and subjective experience), more recent approaches to the phenomena of free thoughts and images analyse the emotional and neuropsychological underpinnings of mental time travel and episodic future thinking, as well as their consequences (e.g., Schacter & Addis, 2007; Szpunar, 2010). They also question how the emergence and content of mental simulations about the future result from heuristics and physiological states (e.g., Kahneman & Tversky, 1982). The role of the self has been of central interest: To what extent do thoughts that connect one's current self with the future self involve conscious awareness or "autonoetic consciousness"? Can such thoughts occur in humans and non-human primates alike (Tulving, 2005)? Recent research on free thoughts and images about the future also investigates the conditions that lead to mind-wandering or task-unrelated thoughts (Killingsworth & Gilbert, 2010; Smallwood & Schooler, 2006). Free thoughts are targeted in studies on affective forecasting (Morewedge, Gilbert, Myrseth, Kassam, & Wilson, 2010; Wilson & Gilbert, 2005), anticipated regret (Gilbert, Morewedge, Risen, & Wilson, 2004), and mental simulations (Kahneman & Tversky, 1982; Taylor et al., 1998).

Originating from earlier work by Eric Klinger on the structure and content of fantasies and their motivational concomitants, recent research has also started to approach the question of the cognitive, affective, and motivational concomitants and consequences of free thoughts, such as daydreams and fantasies. Eric Klinger (1975) postulated that the frequency of daydreams and fantasies of certain content is an indication of current concerns (or goal commitment; Oettingen & Gollwitzer, 2001) with respective consequences for selective attention and information processing. Similarly, research spelling out the notion of mindsets has looked at the information-processing concomitants of a deliberative versus an implementation mindset. The former fosters cognitive tuning towards making an informed decision and the latter fosters cognitive tuning towards planning and goal striving (Gollwitzer, 1990). Free thoughts and images about the future have also been conceptualised as planning the course of an action (Hayes-Roth & Hayes-Roth, 1979). Planning may involve anticipation of opportune situations to behave in goal-directed ways (i.e., if situation x arises, then I will perform behaviour y). Such if-then plans, or implementation intentions (Gollwitzer, 1999), have been investigated in their effects on goal striving, but also in the context of research on prospective memory (i.e., remembering to act on one's intentions), showing the neurophysiological concomitants of automatic goal striving (S. J. Gilbert, Gollwitzer, Cohen, Oettingen, & Burgess, 2009). Mindsets, planning, and implementation intentions all contain free thoughts about the future, although the free thoughts are organised in a predetermined and highly structured framework.

FREE THOUGHTS AND BEHAVIOUR

The named approaches investigate the structure and content of thoughts and images of future events and behaviours. It is striking that many of them have developed and are still developing in relative independence of each other (e.g., fantasies and daydreams, mental simulations, mind wandering, planning, prospective memory). Even more strikingly, relatively little research has been done on the behavioural consequences of free thoughts and images, although there are notable exceptions. For example, mental simulations related to the process of reaching a goal (process simulations) rather than to the outcome of the goal (outcome simulations) were found to spur plans and reduce anxiety, thereby facilitating performance (Taylor et al., 1998). In the same vein, counterfactual thinking depicting how a negative event or setback could have gone better in the past triggers negative thoughts about the future that in turn predict efforts of remedy (Epstude & Roese, 2008; Markman, Gavanski, Sherman, & McMullen, 1993; Smallman & Roese, 2009). Finally, once people feel committed to a goal, forming

implementation intentions or if-then plans spur automatic goal striving (Gollwitzer, 1999).

It is the behavioural change caused by free thoughts and images about the future that I will focus on in the present chapter. Thus the research complements both the plentiful findings on the behavioural consequences of expectancy judgements on the one hand, and the recent approaches to the structure and content of free thoughts and images on the other hand. Focusing on the role of free thoughts in terms of fantasies and daydreams for behaviour change, the present research will involve correlational, experimental, and intervention studies. Methods range from reaction time and neuroimaging techniques to observations and content analyses. Samples stem from different life-stages and cultures, and study themes tap into diverse life domains, including achievement, interpersonal, and health domains.

The present chapter has three parts. First, based on the distinction between positive thoughts about the future in terms of fantasies versus expectancy judgements, I will report on a series of studies showing that positive thinking in terms of future fantasies can have detrimental effects on effort and success, while expectancy judgements offer known benefits. However, positive fantasies are not necessarily motivationally bad. Therefore the second part of the chapter will refer to positive fantasies as a source of wise goal selection and selective goal striving: By contrasting positive fantasies about the future with the present reality standing in the way of fantasy realisation (mental contrasting), people can discriminate in their goal pursuit (commitment and striving) between goals that are promising and goals that are futile. Thus mental contrasting allows people to pursue the futures they want and are able to achieve; at the same time, people can relinquish those futures they either do not want, or that they want but cannot achieve.

Finally, in the third part of the chapter I will explore the translational implications of the present research. A series of intervention studies shows that mental contrasting can be taught as a metacognitive strategy, and that teaching it is cost- and time-effective. Mental contrasting may be successfully applied—either by itself or in combination with if-then plans—to equip people to become masters of their everyday life and long-term goals. By becoming their own therapists or coaches people can now realise their idiosyncratic goals—be they small or large, near or far, specific or vague, concrete or abstract, and self-directed or other-directed.

POSITIVE FANTASY AND PERFORMANCE

The self-help literature and the coaching industry (e.g., Hill & Stone, 1997; McWilliams, 1995; Peale, 2003) persistently try to persuade us that to "think

positive" is an effective means of getting what we want. And while empirical research reliably finds that high expectations of success and optimistic beliefs indeed foster motivation and successful performance (Bandura, 1997; Heckhausen, 1991; Seligman, 1991; Taylor & Brown, 1988), recent research reveals that alternate forms of thinking positively about the future (e.g., positive fantasies; Oettingen & Mayer, 2002; wishful thinking and other avoidant coping styles; Connor-Smith & Flachsbart, 2007; Holahan, Moos, Holahan, Brennan, & Schutte, 2005; Lengua & Sandler, 1996) are *less* beneficial for effortful action, performance, and well being. At first glance it seems contradictory that optimistic beliefs and positive thoughts should lead to such disparate motivational outcomes. However, whether one judges a desired future as within reach (i.e., has positive expectations about a desired future) or mentally indulges in free thoughts about a desired future (i.e., has positive fantasies about a desired future) may have very different implications for effortful action and successful performance.

In line with these considerations, Oettingen and Mayer (2002) distinguish between two ways of thinking about the future: expectations (beliefs) and fantasies (free thoughts). As outlined above, expectations are judgements of how likely it is that certain events or behaviours will occur in the future (Bandura, 1977; Mischel, 1973; see review by Olson, Roese, & Zanna, 1996). Based on experiences in the past and thus on a person's performance history, expectations specify the probability of whether an event or behaviour will actually happen or not. These expectancy judgements may be conceptualised in several ways: as self-efficacy expectations (i.e., whether one can perform a certain behaviour in its relative context; Bandura, 1997), as outcome expectations (i.e., whether performing the behaviour will produce the desired outcome; Bandura, 1997), as general expectations (i.e., whether a certain event will occur; Heckhausen, 1991; Oettingen & Wadden, 1991), or as generalised expectations (i.e., whether the future in general will be positive or negative; Scheier & Carver, 1992). Conversely, free fantasies are future events or behaviours that appear in the mind (Klinger, 1990; Singer, 1966), regardless of whether it is deemed likely or unlikely that they will occur. For example, despite having minimal chances of getting an A in a course, an undergraduate student can indulge in positive fantasies about receiving the best possible grade.

The two ways of thinking about the future should differentially predict effort and performance. As expectations judge the likelihood of future outcomes by applying past facts to future events (Bandura, 1977, 1997; Mischel, 1973), these types of beliefs provide a valid base for behavioural investment (e.g., Bandura, 1997). Specifically, high expectations of success reflect a successful performance history, which signals that future success

will be likely and that respective investment will be worthwhile. In contrast, positive fantasies reflect one's wishes for the future, which embellish the future regardless of past performance and the probability of future occurrences (Klinger, 1990; Singer, 1966). Therefore, positive fantasies fail to serve as a solid basis for behaviour. Furthermore, indulging in images of a desired and smoothly attained future should yield little energy and effort to achieve the desired future. Fantasising to have already reached the desired future may also impair relevant precautions; for example, people may fail to anticipate potential obstacles and hindrances (Gollwitzer, 1999; Taylor et al., 1998); they may not develop strategies to resist temptations or shield against distractions (Achtziger, Gollwitzer, & Sheeran, 2008; Shah, Friedman, & Kruglanski, 2002); and they may fail to take advantage of opportunities to act towards the desired future (Taylor et al., 1998). The following series of studies examines the motivational power of future thought—in terms of expectations versus fantasy.

Positive fantasy: Weight loss

Early on, Oettingen and Wadden (1991) tested these ideas in obese women enrolled in a weight reduction programme. Participants had an average weight of 106.4 kg ($SD = 16.9$) and a body mass index (weight in kilograms/height in metres squared) of 39.1 ($SD = 6.3$). Before the start of the programme participants indicated the number of pounds they wished to lose in the programme and the likelihood of reaching this weight loss. Expectations of successfully reaching the goal were measured by three related questions: "How likely do you think it is that during this weight reduction programme you will lose the amount of weight (that you have specified)?", "Do you feel that you will be successful in the weight loss programme?", and "How confident are you that after this programme is completed, you will have lost the amount of weight you specified?" Questions were answered using 7-point scales (1 = low, 7 = high).

To measure weight-related fantasies, each participant was asked to vividly imagine herself as the main character in four hypothetical weight- and food-related scenarios. Two stories were designed to elicit fantasies about the participant's weight loss, whereas two others described encounters with tempting foods. Each story led to an unspecified outcome which participants were asked to complete (in writing) by describing the stream of thought that occurred to them. Scenarios were open-ended in order to elicit a variety of responses. One of the scenarios read: "You have just completed Penn's weight loss programme. Tonight you have made plans to go out with an old friend whom you haven't seen in about a year. As you wait for your friend to arrive, you imagine ..." Another scenario asked participants to

imagine that they are confronted with the temptation of a leftover box of doughnuts in the lunch room. Participants rated the positivity and negativity of their thoughts and images to each scenario (using 7-point scales; 1 = low, 7 = high). Thus we measured whether participants positively fantasised about an idealised outcome and whether they imagined an idealised process to reach the outcome. Internal consistency was high (Cronbach's alpha = .70).

Participants with positive expectations about losing weight (i.e., "It is likely that I will lose the indicated amount of weight") lost on average 26 pounds *more* than those with negative expectations (i.e., "It is unlikely that I will lose the indicated amount of weight"). However, participants with positive fantasies (e.g., those who imagined shining when going out with the friend and easily resisting the temptation of the leftover box of doughnuts in the lunch room) lost on average 24 pounds *less* than participants with negative fantasies (e.g., those who imagined having disappointed the friend and having a hard time resisting the leftover box of doughnuts in the lunch room). In short, while positive expectations predicted successful weight loss, positive fantasies predicted little success in reaching one's desired weight.

Positive fantasy: Health, achievement, and interpersonal relations

Other studies supported this pattern of results (Oettingen & Mayer, 2002; see Table 1). In one study (Study 4), involving patients undergoing hip replacement surgery, we asked participants in the evening before their surgery to rate their expectations of recovery and measured the positivity of their recovery fantasies, much in the same way as in the weight loss study reported above. Specifically, we assessed fantasies by having participants imagine themselves in five scenarios. The scenarios were interrupted in the middle, and patients had to imagine them to their completion. One scenario read as follows: "You wake up after surgery in the wake-up room. You feel your body increasingly clearly ..." The other four scenarios described going to the hospital's shopping area to buy a newspaper, taking a walk with friends, tidying up the living room and kitchen, and preparing a dinner invitation. Two weeks after the surgery, physical therapists assessed their patients' range of hip joint motion, the number of stairs they could walk, and their general recovery. On all three variables the more positive the expectations the more success the patients had; however, the more positive the fantasies the less successful they were (Oettingen & Mayer, 2002, Study 4). These results provide further evidence that positive expectations predict high effort and successful performance, while positive fantasies predict low effort and poor performance.

In another study (Oettingen & Mayer, 2002, Study 1) we measured expectations and fantasies about transition into work life among university

graduates. Participants indicated how probable they thought it was that they would find an adequate job in their field. This measure of general expectations encompassed self-efficacy expectations, outcome expectations (Bandura, 1997), and expectations concerning external factors (e.g., the economic situation). To measure the valence of the fantasies we first asked whether during their everyday life students had already experienced positive thoughts, images, or fantasies on the subject of transition into work life, graduating from university, looking for and finding a job. Then they were told: "Please now generate such positive thoughts, images, or fantasies and write them down." A half page with lines was prepared for participants to write on. Finally participants had to indicate: "How frequently did you experience such thoughts and images?" The 10-point scale ranged from *very rarely* to *very often*. Participants were then given the exact same instructions with respect to negative fantasies (i.e., only the word positive was replaced by the word negative). To arrive at an overall scale of the valence of career-related future fantasies we subtracted reported frequencies of negatively toned fantasies from those of positively toned fantasies.

Then 2 years later we contacted students again. Those with positive expectations of successfully finding a suitable job after college graduation had received more job offers and had earned higher salaries over the course of the 2 years than those reporting more negative expectations of success. However, the more positive than negative fantasies about finding a suitable job after college participants had, the less successful in their job search over 2 years they were, sending out fewer applications, receiving fewer job offers, and ultimately earning less money.

Other similar studies focused on fantasies about starting a romantic relationship and achieving academic success (e.g., performing well on a midterm exam; Oettingen & Mayer, 2002, Studies 2 and 3; see Table 1). The reported pattern of findings applies for short-term and long-term success (up to 2 years), for subjective as well as for objective indicators of success (e.g., reported effort and actual course grades), for different measures of fantasy (frequency, valence), and for samples of different ages and cultural backgrounds (younger and older adults; German and U.S.). In sum, positive expectations predicted high effort and successful performance, while positive fantasies predicted low effort and poor performance. Importantly, low effort mediated the predictive relation between positive fantasies and poor performance (Oettingen & Mayer, 2002, Study 3).

Positive fantasy and expectation: Mutual suppressor effects

In the studies reported above, high expectations of success and positivity of fantasies showed positive correlations (reaching from $r = .21$ to $r = .37$). Consequently, partial correlations tended to be higher than raw correlations

TABLE 1
Success and effort as predicted by expectation and fantasy: Studies 1, 2, 3, and 4

	Index				*Positivity scale*				*Negativity scale*			
Success and effort	*Expectation*		*Fantasy*		*Expectation*		*Fantasy*		*Expectation*		*Fantasy*	
Study 1												
Number of job offers	.41***	(.30*)	−.39**	(−.26*)								
Amount of salary	.33*	(.25)	−.29*	(−.19)								
Number of applications	−.04	(−.17)	−.40**	(−.43**)								
Study 2												
Intimate relationship	.55***	(.53***)	−.23*	(−.10)								
Confession of love	.11	(.07)	−.21*	(−.20)								
Study 3												
Course grades	.21**	(.17)	−.16*	(−.10)	.22**	(.17)	−.19*	(−.13)	.19*	(.17)	.11	(.05)
Study effort	.20*	(.12)	−.25**	(−.19*)	.20*	(.12)	−.27**	(−.22*)	.17*	(.12)	.19*	(.15)
Study 4												
Hip joint motion	.27*	(.10)	−.43***	(−.37**)	.24*	(.10)	−.39**	(−.33**)	.27*	(.10)	.44***	(.37**)
Walking on stairs	.37**	(.25*)	−.36**	(−.23*)	.35**	(.25*)	−.33**	(−.22)	.36**	(.25*)	.35**	(.23*)
General recovery	.30*	(.20)	−.31*	(−.21)	.28*	(.20)	−.27*	(−.18)	.31*	(.20)	.32**	(.22*)

Partial correlation coefficients controlled for the other predictor variable; raw correlation coefficients in parentheses. *$p < .05$. **$p < .01$. ***$p < .001$. From "The motivating function of thinking about the future: Expectations versus fantasies", by G. Oettingen & D. Mayer (2002). *Journal of Personality and Social Psychology*, *83*, 1198-1212. Copyright 2002 by the American Psychological Association, Inc. Reprinted with permission.

(see Table 1, raw correlations in parentheses), suggesting that the two predictor variables acted as mutual suppressor variables. High expectations of success might have facilitated positive fantasies (Klinger, 1977), and positive fantasies might have raised respective expectations of success (Anderson & Godfrey, 1987; summary by Tversky & Koehler, 1994). Regardless of how the positive relation between expectations and fantasies emerged, the observed mutual suppressor effects suggest that future research will benefit from measuring both expectations and fantasies, because both will predict behaviour most accurately when the other type of thinking about the future is statistically adjusted.

Positive fantasy: Outcome versus process

Positive fantasies regarding both outcome as well as process contributed to low effort and success. In the weight loss study both scenarios about outcome and process fantasies (e.g., referring to meeting a friend after the weight loss programme and being left with tempting foods) predicted low success. In addition, Oettingen and Mayer (2002, Study 4) content-analysed the degree of idealisation as well as the extent to which participants' fantasies referred to outcome versus process in the hip replacement patients. Positive fantasies about successful recovery outcomes and about a successful recovery process correlated positively with idealisation (e.g., "My friends are completely amazed how I am doing" and "I am practicing walking on the stair-ways downwards – without help, and I walk easily and quickly to the newspaper stand"), suggesting that the idealising attributes of positive fantasies rather than their content (process versus outcome) hurt successful performance.

These results speak to the literature on process versus outcome simulations (Taylor et al., 1998), which finds process simulations leading to better performances than outcome simulations. The seeming contradiction is readily explained, however, when considering how the two lines of research conceptualise and operationalise process simulations. In fantasy research, positive process fantasies depict an ideal, easy, and straightforward way to reach the desired future. In contrast, Taylor and her colleagues (1998) conceptualise process simulations as visualisations of the cumbersome way to reach the desired future. For example, in an experiment with students studying for their midterm exam those in the process simulation condition "were told to visualise themselves sitting at their desks, on their beds, or the library, and studying the chapters, going over the lecture notes, eliminating distractions such as turning off the television or stereo ..." (p. 432). Process simulations, in contrast to positive fantasies, do not feign easy success but depict the cumbersome steps of moving towards the desired

future. In that way the motivational superiority of process simulations over outcome simulations is well in line with what we find for negative fantasies. These negative or questioning fantasies depict the obstacles and hindrances to fantasy realisation, the laborious and tedious steps to overcome these impediments, and they question whether reaching the desired future will indeed be so ideal. As our results show, these more negative fantasies benefit effort and performance rather than the positive fantasies, whether the latter relate to outcome or process.

Positive fantasy: Disadvantaged students

More recently we also observed that positive fantasies (experiencing one's thoughts and mental images about the future positively) predict poor effort and low success in adolescent and adult students of low socioeconomic status and minority ethnicity who are enrolled in vocational-education programmes. We had wrongly suspected that, for individuals who find their present environment especially difficult (and therefore may be in particular need of positive fantasies), perhaps it would be appropriate to indulge in positive fantasies that depict the future as bright and easily attained. However, in three studies H. B. Kappes, Oettingen, and Mayer (2012) showed that such beneficial effects of positive fantasies do not play out. Positive-future fantasies early in the programme, measured by asking participants to rate their own fantasies to relevant scenarios (similar to the studies described before), predicted more days absent (Studies 2–3) and lower grades at the end of the programme (Studies 1–3), even when adjusting for initial academic competence, expectations of successful achievement, and self-discipline. Regarding the predictive power of expectations we observed results supporting our notion that expectations rather than fantasies are based on experiences in the past. Specifically, expectations of successful achievement predicted fewer days absent and higher grades only when measured midway through the school year, once participants had experience with their own academic standing (Study 3). Results indicate that positive fantasies, which allow people to indulge in images of a bright future, predict poor achievement even in vocational students immersed in a particularly difficult environment.

Positive fantasy: Symptoms of depression

So far we have shown that positive fantasies predict poor effort and performance, even in individuals having to cope with disadvantaged environments. Based on these findings one may conclude that low effort and performance might eventually also impair a person's mental health.

Specifically, although positive fantasies may take away the negative mood of the moment, they may conjure negative mood in the long run, because success is scarce and failure impending. That is, positive fantasies may be of little protection against depressive moods in the future. Indeed, in four studies Oettingen, Mayer, and Portnow (2011) show that the relation of positive future fantasies and depressive symptoms follows the hypothesised pattern: Concurrently, positive fantasies about the future related to fewer symptoms of depression. However, over periods of 4 weeks to 2 years positive fantasies predicted comparatively more symptoms of depression. This pattern of results held for middle-school children and adult students, for fantasies measured by semi-projective questionnaires and daily-diary methods, and for various measures of depression (e.g., CDI; Kovacs, 1985; CES-D; Radloff, 1977; BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). And importantly, as we predicted, low academic success mediated the relation between positive fantasies and heightened depressive symptoms. These results again suggest that positive fantasies may have deleterious effects on personal accomplishments when they tempt a person into mental attainment and low engagement.

Positive fantasy: Giving to others

However positive fantasies, while they seem to be hurtful for a person's own accomplishments, may be helpful for a person's generosity towards others in need or in crisis (e.g., lack of medication or being struck by a hurricane). That is, they may make people act generously and against their own interests. Indeed, charity solicitations often encourage people to imagine a positive future of successfully helping others. H. B. Kappes, Sharma, and Oettingen (in press) tested the consequences of positive fantasies for giving to others. However, in three studies we observed that positive fantasies about successfully giving to a charity left people *less* willing to give time or money towards actually helping others, and this was true in particular when helping demanded valuable resources (e.g., in terms of money or time). This finding held regardless of whether the crisis was obscure or publicly salient. Compared to control manipulations (e.g., generating factual descriptions of crisis resolution or solving a demanding task), positive fantasies about crisis resolution created the perception that action would be relatively undemanding, and when it came to actual helping, they held off action to resolve the crisis. Thus positive fantasies—whether they pertain to investing efforts for one's own person or for others—seem to have detrimental effects. Importantly, rather than measuring the predictive power of positive fantasies, the just-reported results on crisis resolution were obtained by manipulating positive fantasies, to then compare the effects on giving to relevant other thoughts (e.g., factual descriptions) or to no relevant thoughts.

PROCESSES OF POSITIVE FANTASY

In the following, I will describe further experimental work manipulating positive fantasies as compared to relevant control groups in order to elucidate *how* positive fantasies hamper effort and success. Specifically, in line with the arguments above, we speculated that positive fantasies would cause mental attainment of the desired future, leading to relaxation and low energy.

Positive fantasy: Mental attainment

Oettingen and Mayer (2002) hypothesised that positive fantasies depicting a desired future in an idealised way would lead people to react as though they had already attained the imagined desired future. Experimental findings supported these hypotheses through valid indicators of implicit affect (H. B. Kappes, A. Kappes, & Oettingen, 2012). In one study fantasies pertained to the topic of neuroenhancing drugs. These are medical—especially psychopharmacological—means for enhancing healthy individuals' cognitive functioning. Neuroenhancing drugs have become popular among college students as they are intended to improve concentration and memory. More than one in three college students have tried a neuroenhancing drug to improve their study skills (Talbot, 2009).

We had undergraduate participants generate either positive fantasies that idealised a future experience of taking a neuroenhancing drug or, in two control conditions, generate fantasies that either questioned or depreciated the future experience of taking a neuroenhancer. In a fourth condition participants did not generate fantasies. Specifically, in the positive-fantasy condition participants were asked to imagine that they took a neuroenhancer, and to visualise themselves with excellent focus, concentration, and memory, and how wonderful that would be, while in the questioning- and negative-fantasy conditions the imagined experiences were either neutral or negative.

We measured mental attainment via an affective measure, using an automatic evaluation paradigm (Fazio, Sanbonmatsu, Powell, & Kardes, 1986). People evaluate adjectives more quickly as positive or negative when these adjectives are immediately preceded by words of similar valence; thus the relative time taken to evaluate adjectives that follow a particular prime indicates how the individual automatically evaluates that prime word. During goal pursuit people automatically evaluate instrumental objects more positively; that is, in a more approach-friendly way as compared to people who have completed their goal pursuit. For example, individuals leaving an assigned task incomplete evaluated task-related words more positively than when allowed to complete it (i.e., Ferguson & Bargh, 2004).

Accordingly we hypothesised that engaging in positive fantasies about a desired future, by feigning completion, would result in comparatively less positive automatic evaluations of words related to the desired future. Indeed, when positive fantasies about the idealised experience of taking a neuroenhancer were induced, these positive fantasies resulted in less positive automatic evaluations of words related to neuroenhancing drugs, suggesting the mental attainment of the experience. The findings imply that one reason why positive fantasies predict low effort and success over time (e.g., Oettingen & Mayer, 2002) is that positive fantasies allow people to mentally attain their desired futures, leaving relatively little motivation for the actual pursuit of the desired future.

These results are in line with findings showing mental attainment after the accomplishment of goals. For example, after participants fulfilled the goal of searching for a specific target stimulus they were less able to access the target word than they were before the search was completed, and less able than those in a no-goal control condition; these effects were moderated by the expectancy and incentive of the goal (Förster, Liberman, & Higgins, 2005). Even observing other people's completion of a goal to which they felt committed led to low accessibility of respective goal-related words (McCulloch, Fitzsimons, Chua, & Albarracin, 2011). Similarly, although unfulfilled goals interfere with unrelated tasks, when they are fulfilled such interference effects are eliminated (Masicampo & Baumeister, 2011a). Finally, these studies on mental attainment of positive fantasies and goal attainment are now complemented by findings suggesting that advance planning in the form of implementation intentions (Gollwitzer, 1999) can curb the cognitive effects of unfulfilled goals, thus freeing cognitive resources for other pursuits (Masicampo & Baumeister, 2011b).

Positive fantasy: Energisation

Based on the hypothesis that mental attainment would lead to low motivation, H. B. Kappes and Oettingen (2011) experimentally induced positive fantasies and analysed their effects on exerted effort as measured by energisation in four studies. Energy plays a key role in allowing people to pursue and achieve their desired futures (Brehm & Self, 1989; Klinger, 1975). In line with classic approaches of motivation, Elliot (2006) argued that: "a full account of motivation will attend to both direction and energisation" (p. 114). Historically, the concept of energisation arose from Cannon's (1915) concept of energy mobilisation, and has been defined as "the extent to which the organism as a whole is activated or aroused" (Duffy, 1934, p. 194). Energy can be mobilised by physiological factors such as exercise, as well as by the anticipated exertion of effort (Wright, Brehm, & Bushman, 1989). Positive fantasies, by allowing the mental attainment of the desired future,

should obscure the need for effort in the service of actual attainment (Oettingen & Mayer, 2002). To test this hypothesis, H. B. Kappes and Oettingen (2011) conducted three experiments to induce either positive fantasies or a control condition, and then measured energy by physiological indicators (Study 1) and by subjective feelings (Studies 2–3). A final experiment tested whether positive fantasies would be particularly de-energising when they addressed a currently pressing need (Study 4).

Study 1 examined the effect of positive fantasies on energy as indicated by systolic blood pressure (SBP, the maximum pressure exerted by the blood against the vessel walls following a heartbeat; Obrist, 1981; Wright, 1996). Heightened systolic blood pressure has been found to be a valid indicator for increased demand for oxygen and nutrients (Brownley, Hurwitz, & Schneiderman, 2000). As idealised positive fantasies obscure the need to invest effort, we hypothesised that positive fantasy about a desired future would lead to low energy as indicated by SBP. Female participants were induced to positively fantasise about looking good in high-heeled shoes, a fashion attribute that is associated with being desirable and attractive (Kaiser, 1996). Participants in the positive-fantasy condition were told to imagine being glamorous and admired for wearing high heels. As a control condition, participants were asked whether wearing high-heeled shoes would actually be so glamorous, thereby preventing participants from mentally enjoying the desired fantasy of wearing high heels. As dependent variable we measured the change in participants' SBP before and after fantasising. Indeed, participants in the positive-fantasy condition showed decreased SBP, whereas those in the questioning-fantasy condition sustained their blood pressure. Study 2 conceptually replicated this effect, but measured subjective feelings. Participants who had to produce positive fantasies about success in an essay contest reported feeling less energised than those who produced negative fantasies.

In Study 3 energisation was measured via subjective feelings and self-reported accomplishments. Participants who had to generate positive fantasies about the upcoming week had lower immediate feelings of energisation than participants who had to merely record their fantasies about the upcoming week. The immediate feelings of low energisation from positive fantasies had a sustained impact: They resulted in poor accomplishment in terms of lower mastery of everyday challenges, as reported at the end of the week. Importantly, poor accomplishment in positive-fantasy participants was mediated by feelings of low energisation right after the experiment.

Finally, Study 4 investigated the importance of context variables. Specifically, positive fantasy, when pertaining to a pressing need, should be particularly prone to sap energy. Participants were undergraduate students at New York University. As the university is highly selective we

assumed that student participants in general have a relatively high need for achievement. To silence that need for achievement, in half of the participants the need for water was induced. Therefore all student participants were asked to have no food and water for at least 4 hours prior to coming to the lab. To increase thirst even more we asked all participants to eat salty crackers (mimicking a taste test). Half of the participants were then offered as much water as they wanted. For these participants the need for water was satisfied and thus the need for achievement could surface again. As predicted, for these participants, who again were relatively high in need for achievement, induced fantasies about successfully achieving an A in an important exam led to lowered energisation (i.e., lowered systolic blood pressure). On the contrary, in participants who were kept thirsty and thus were still high in need for water, induced fantasies about the pleasurable experience of having a glass of water led to being de-energised. In short, the effect of positive fantasy on low energy depended on need state; positive fantasies decreased energy when they pertained to a currently pressing need.

Across all four studies we tried to rule out alternative explanations. For example, we controlled for the possibility that positive fantasies are easier to generate than questioning or negative fantasies. We also excluded the possibility that questioning or negative fantasies per se are more irritating than positive fantasies. Finally we included a neutral fantasy condition that allowed us to conclude that positive fantasies were de-energising, while negative fantasies were energising.

Are there any benefits from being relaxed and de-energised via positive fantasies? Jerome Singer (1975) has suggested that positive fantasies help people to patiently wait and endure meaninglessness. For example, when resources such as food and water are scarce, positive fantasies may help to calmly endure hunger and thirst. Similarly, if upcoming tasks such as exams or interviews evoke anxiety, indulging in positive fantasies about desired outcomes is a way to reduce this unwanted anxiety. However, in the long run, instead of promoting effort and achievement, positive fantasies will sap people's energy to make the necessary efforts towards attaining their desired future. Fantasies that are less positive—that question whether an ideal future can be achieved, and that depict obstacles, problems, and setbacks—are more beneficial for mustering the energy needed to obtain success.

The energy-sapping effects of positive fantasies need to be differentiated from the energy-depleting effects of self-control. As postulated in the limited energy model (Muraven & Baumeister, 2000), self-control relies on limited energy, and therefore engaging in self-control behaviour will hamper subsequent self-control performance. Supporting these ideas, glucose replenishes depleted energy after self-control attempts (Gailliot et al., 2007). The present work, rather than focusing on depletion of needed

energy, assumes that by leading to mental attainment positive fantasies obscure the need for energy. That is, positive fantasies suggest there is no need for energy as the desired future—supposedly—has already been attained.

Importantly, we found that aroused needs augment the de-energising effects of positive fantasies. These findings are in line with classic motivation research, which indicates that needs influence the content of people's thoughts and mental images (McClelland, Clark, Roby, & Atkinson, 1949). For example, as hunger increases, people are more likely to generate stories where food is the central theme and where the need for food is mentioned (Atkinson & McClelland, 1948). Consequently, when needs cannot be satisfied in actuality (such as when thirsty people are not given an opportunity to obtain water), satisfying them in fantasy may serve eventually to satisfy the actual needs by decreasing arousal so that one can focus on problem solving. Positive fantasies originating from unsatisfied needs may also guarantee that the task of satisfying the needs stays in the focus of attention and thus eventually gets completed (James, 1890).

ORIGINS OF POSITIVE FANTASY

According to these considerations needs should spur fantasies that are experienced as particularly positive. Indeed, H. B. Kappes, Schwörer, and Oettingen (in press) identified need states as promoting positive fantasies about relevant stimuli (i.e., those that could address the need). In three studies we aroused several different need states, both physiological (e.g., for water, Study 2) and psychological (e.g., for meaning in job seekers or for relatedness in elderly people, Studies 1 and 3). In a correlational study we aroused the need for power (Study 4).

For example, in Study 3 we aroused the need for affiliation or relatedness (Baumeister & Leary, 1995; Deci & Ryan, 2004; Murray, 1938). Optimising such relatedness to close significant others is particularly important as people age (Carstensen, Isaacowitz, & Charles, 1999), so we addressed a sample of older adults. We aroused the need for relatedness by asking participants to list 12 recent examples of "close contact with others who care about you"; control participants had to list 4 such examples. Participants who had the difficult experience of listing 12 examples should feel that they actually lack close contact with caring others, arousing the need for relatedness (e.g., Sanna & Schwarz, 2003). We measured both need-relevant and irrelevant fantasies for all participants. Relevant fantasies were elicited by having participants fantasise the ending to scenarios such as "You are on your way to a store when you suddenly recognise one of your close friends. You go over to the friend and ..." Irrelevant fantasies were elicited by having participants fantasise the ending of similar scenarios without

mention of close friends. After writing down their thoughts and images, participants rated them for positivity and negativity. We hypothesised and observed that participants with an aroused need for relatedness generated more positive fantasies in the relevant scenario than the irrelevant scenario; the same difference did not emerge for control participants.

SUMMARY

Positive future thought may take the form of expectations versus free thoughts or fantasies. In line with the literature on efficacy and control beliefs, expectations of being able to attain a successful future predict high effort and successful performance. By contrast, fantasies about attaining a positive future predict low effort and little success. But positive fantasies do not only hurt effort and performance. They also predict impaired mental health: Low effort and little success translate into more depressive symptoms over time. I have described correlational and experimental research supporting these ideas as well as several cognitive and motivational processes (both implicit and explicit) responsible for the detrimental effects of positive fantasies. Specifically, positive fantasies seduce people to prematurely attain and consume their desired future. In addition they lead to relaxation and low energy, which in turn predict a lack of effort and success in attaining the desired future. Altogether, the presented research indicates a clear warning to the self-help literature and the coaching industry: When it comes to positive thinking in the form of free thoughts and images about the future, the industry's recipe of "Think Positive!" will not help. In fact, it may even hurt people in fulfilling their developmental tasks as well as in fostering their mental health.

FANTASY REALISATION THEORY

If, as in the studies reported above, fantasies are problematic for effort and action, the question becomes what can be done with these thoughts to make them relevant for effort and behaviour change? What needs to be done to these fantasies to turn them into strong goal pursuits (i.e., goal commitment and goal striving)? Various mental strategies related to one's wishes and fantasies may impact goal commitments. The *theory of fantasy realisation* specifies four such self-regulation strategies (Oettingen, 2000): mental contrasting, indulging, dwelling, and reverse contrasting (Figure 1). In mental contrasting people first imagine the fulfilment of a fantasy (e.g., giving a good presentation at a conference) and then reflect on the present reality that *stands in the way* of attaining the desired future (e.g., evaluation anxiety). Mental contrasting is a problem-solving strategy based on imagining both future and reality that makes people recognise that they

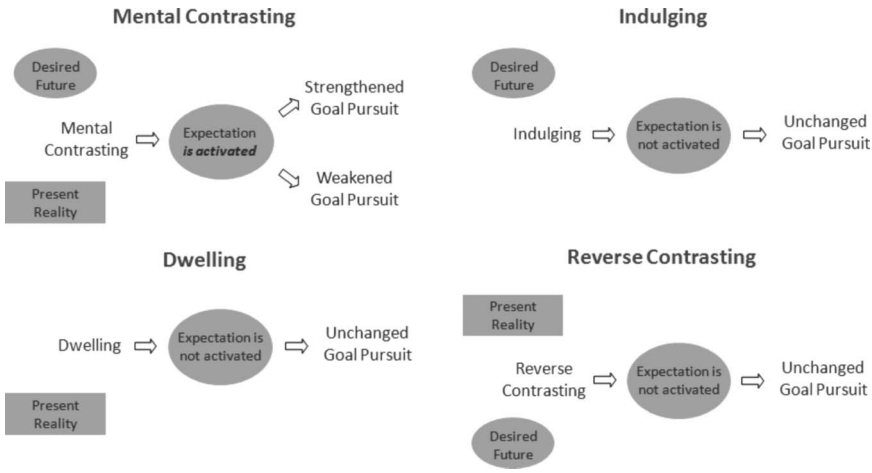

Figure 1. Mode of self-regulatory thought.

have not fulfilled their wish yet, and that they need to take action in the present reality in order to achieve the desired future. Specifically, they need to overcome or circumvent the aspect (obstacle) of present reality that stands in the way of fantasy realisation. As a consequence, expectations of attaining the desired future become activated and determine a person's goal commitment and subsequent cognitive, emotional, and behavioural striving to attain the desired future. When expectations of success are high, people will actively commit to and realise the desired future. When expectations of success are low, people will actively refrain from doing so, and thus they will pursue alternative wishes and desired futures. In this way mental contrasting helps people discriminate between pursuing feasible and unfeasible goals.

The theory of fantasy realisation specifies three other self-regulation strategies of goal commitment and performance. People may engage either in indulging (envisioning only the wished for future), in dwelling (reflecting only on the present reality), or in reverse contrasting (reflecting on the present reality and then envisioning the desired future). Indulging and dwelling do not produce any discrepancy between future and reality, and thus the individual fails to recognise that actions are necessary to achieve the desired future. Therefore expectations of success do not become activated, and goal commitment and performance do not reflect the perceived likelihood of reaching the desired future. In reverse contrasting the future does not serve as an anchor of present reality: Unlike in mental contrasting, a relational construct of reality *standing in the way* of the desired future is not activated. Therefore expectations should not guide goal commitment. That is, individuals who indulge, dwell, or reverse contrast should show an unchanged, moderate level of goal commitment and performance: they do

not fully commit when they have high expectations of success, and they do not actively let go when they have low expectations of success. For example, when it comes to the goal of giving a good presentation at a conference, an indulging, dwelling, or reverse-contrasting person will show moderate preparation and performance, regardless of whether a successful performance is perceived as within one's reach or as hardly possible.

MENTAL CONTRASTING AND PERFORMANCE

To test these hypotheses, one study (Oettingen, Pak, & Schnetter, 2001, Study 3), had college students name their most important interpersonal wish or concern and indicate their expectations about whether their wish or concern would have a happy ending. For example, participants named "to get to know someone I like", "to solve a conflict with my partner", or "to improve the relationship with my mother". All participants then had to list four aspects of their desired future and four aspects of present reality that stand in the way of fantasy realisation. We then established four conditions. In the mental-contrasting condition students had to alternate in their mental elaborations between one future aspect and one reality aspect, beginning with a future aspect. In the other conditions students had to mentally elaborate four future aspects (indulging), or four reality aspects (dwelling), or else participants alternated between future and reality aspects beginning with a reality aspect (reverse contrasting).

Directly following these mental exercises, all participants reported their feelings of energisation with respect to solving their interpersonal concern. Two weeks later, to assess the behavioural consequences of commitment, we asked participants to indicate the two most difficult steps they had undertaken to solve their interpersonal concern, and to report the exact date they had performed these steps. The difference in days between the date of participation in the experiment and the date participants reported to have taken the steps determined the immediacy of fantasy realisation. Note that the present concept of commitment does not denote the act of having made a decision, as commitment is defined in the work by Eric Klinger (1977; Wicklund & Brehm, 1976). Rather, it specifies the degree of determination to implement a set goal. According to Locke and Latham (1990, 2002), goal commitment is most validly measured by its behavioural consequences such as effortful behaviour and level of performance.

Mental-contrasting participants felt energised and behaved in line with their expectations of success more than indulging, dwelling, and reverse-contrasting participants (see Figure 2). High-expectancy participants in the mental-contrasting condition felt most energised and started right after the experiment to solve their interpersonal concern, while low-expectancy participants felt least energised and delayed their steps towards fantasy

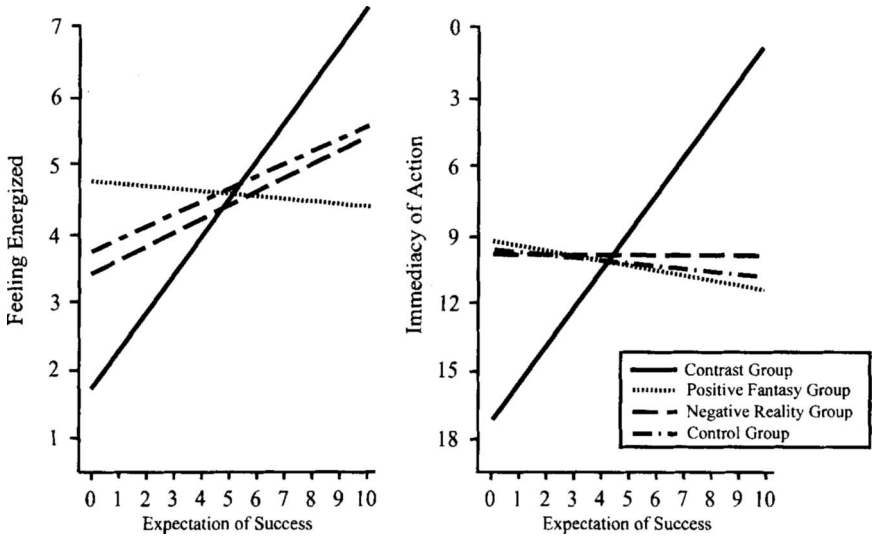

Figure 2. Regression lines depicting the link of expectation of success to feeling energised (left) and to immediacy of action (right) as a function of self-regulatory thought. From "Self-regulation of goal setting: Turning free fantasies about the future into binding goals (Study 3)", by G. Oettingen, H. Pak, & K. Schnetter (2001). *Journal of Personality and Social Psychology, 80*, 736–753. Copyright 2001 by the American Psychological Association, Inc. Reprinted with permission.

realisation over the period of the study. On the contrary, indulging and dwelling participants felt moderately energised and started fantasy realisation after about a week, independently of whether they expected to solve the concern or not. Participants in the reverse-contrasting condition (who first mentally elaborated the negative reality and only then the positive future) showed the same pattern of results as participants in the indulging and dwelling conditions. The latter finding implies that the relational construct of reality *standing in the way* of the desired future needs to be activated for mental contrast effects to occur.

Importantly, the pattern of results was not attributable to differential effects of the manipulation on level of expectations. We found an almost perfect correlation between participants' expectations of success measured before and after the experiment. This finding implies that mental contrasting fosters fantasy realisation by making high expectations of success relevant for goal commitment rather than by changing the level of expectations of success (see also Oettingen, Mayer, Thorpe, Janetzke, & Lorenz, 2005; Oettingen, Mayer, & Thorpe, 2010).

Another experiment using the same procedure replicated the results with respect to cognitive indicators of goal commitment (Oettingen et al., 2001,

Study 1). Specifically, we measured the extent to which participants formed plans to realise their fantasies. Immediately following the experiment all participants were confronted with eight sentence stems presented in random order: Four sentence stems suggested the formulation of plans (e.g., If . . . , then I will . . .), and four did not require the formulation of plans (e.g., In principle, I will . . .). Participants were supposed to complete those four out of the eight sentence stems that best matched how they were thinking about their interpersonal concern. We counted the number of sentence stems leading to the formulation of plans and observed the predicted expectancy-dependency in the mental-contrasting condition, but not in the indulging and dwelling conditions.

In a third study we measured goal commitment by other-rated actual behaviour (Oettingen et al., 2001, Study 4). First-year students enrolled in a vocational school for computer programming indicated their expectations of excelling in mathematics. Next, they named aspects that they associated with excelling in mathematics (e.g., feelings of pride, increasing job prospects) and aspects of present reality, or potential obstacles (e.g., being distracted by peers or feeling lazy). As in the previous studies, in the mental-contrasting condition participants had to elaborate in writing two aspects of the desired future and two aspects of present reality, in alternating order beginning with an aspect of the desired future. Participants in the indulging condition were asked to elaborate four aspects of the desired future only; in the dwelling condition they were asked instead to elaborate four aspects of the present reality only. As dependent variable, participants indicated how energised they felt with respect to excelling in maths (e.g., how active, eventful, energetic). More importantly, 2 weeks after the experiment participants' teachers, blind to condition, reported how much effort each student had invested over the interim and provided each student with a course grade for that time period. As predicted, only in the mental-contrasting condition did the students feel energised, exert effort, and earn grades based on their expectations of success. Those with high expectations of success felt the most energised, invested the most effort, and received the highest course grades; those with low expectations of success felt the least energised, invested the least effort, and received the lowest course grades. On the contrary, participants in both the indulging and dwelling conditions felt moderately energised, exerted moderate effort, and received medium grades independent of their expectations of success.

Thus mental contrasting led students to invest in their vocational education when learning and success appeared feasible, but it led students to let go when learning and success was not perceived as feasible. Such letting go or goal disengagement is advantageous whenever alternative goals are available (Wrosch, Miller, Scheier, & Brun de Pontet, 2007; Wrosch, Scheier, Miller, Schulz, & Carver, 2003). To guarantee the availability of

alternative routes, in the study described above (Oettingen et al., 2001, Study 4) we chose first-year vocational students as participants. These students had just started their vocational education and thus had alternative career paths still at their disposal. That is, they potentially could switch to alternative, better-suited careers (than computer programming).

Alternatives are less advisable or feasible in other cases, however: For example, elementary and middle-school students need to wholeheartedly embrace their academic goals in order to fulfil their developmental tasks (e.g., to learn basic mathematics and language; Havighurst, 1948/1972); here disengagement or postponement may be detrimental. In such cases, mental contrasting can be used to help people to fully commit to a given goal pursuit. For example, one may strengthen existing expectations of success by providing positive situated feedback. Or one may ask people to apply mental contrasting to idiosyncratic wishes that are deemed feasible (e.g., losing three pounds of weight; being friendly to one's neighbour). Finally, in a group context where performance in solving standardised tasks is aimed for, educators or leaders may provide novel tasks that can potentially be solved by all members of the group. All three approaches—strengthening expectations of success, asking for idiosyncratic feasible wishes, and providing feasible tasks—turn mental contrasting into a promoter of keen goal pursuit, which is a wise route to take when disengagement is not a viable option (e.g., A. Gollwitzer, Oettingen, Kirby, Duckworth, & Mayer, 2011; Johannessen, Mayer, & Oettingen, in press; Oettingen, Marquardt, & Gollwitzer, in press; see below for details). In sum, mental contrasting can be used to help people select between feasible and unfeasible futures, but it can also be used to help people to wholeheartedly pursue a feasible desired future.

Mental contrasting: Range of performance effects

Mental-contrasting effects have been observed in a wide variety of domains and regarding diverse subject matter: for example, getting to know an attractive stranger and finding a balance between work and family life (Oettingen, 2000), studying abroad and acquiring a second language (Oettingen, Hönig, & Gollwitzer, 2000; Oettingen et al., 2001; Oettingen et al., 2005; Oettingen et al., 2009), pursuing self-improvement goals and increasing tolerance (Oettingen et al., 2005), and reducing or stopping cigarette consumption (Oettingen, Mayer, & Thorpe, 2010). Thus mental contrasting qualifies as a content-free strategy of regulating goal pursuit (commitment and performance) that applies to a wide array of life domains. It even regulates responses to negative performance feedback as measured by processing relevant information, sheltering subjective competence as well as instilling optimistic attributional patterns (A. Kappes, Oettingen, & Pak, in press).

Mental-contrasting research assessed the strength of goal commitment by cognitive (e.g., making plans), affective (e.g., feelings of disappointment, feelings of energisation), and behavioural (e.g., amount of effort, financial investment) indicators. These indicators were measured via self-report or observations, either directly after the experiment or weeks later. Mental contrasting turned out to be an easy-to-apply self-regulatory tool that is applicable to participants across age. The described effects were obtained for school children, and even when children or adult participants elaborated the future and the reality only very briefly (i.e., were asked to imagine only one aspect of the desired future and one aspect of present reality; Oettingen et al., 2000, Study 1; A. Kappes & Oettingen, 2012, Studies 1 and 2; A. Kappes, Singmann, & Oettingen, in press).

It is important to note that in none of these studies did the outcomes of mental contrasting occur as a result of changes in the level of expectations (feasibility) or incentive valence (desirability), but rather as a result of the mode of self-regulatory thought (i.e., mental contrasting, indulging, dwelling, or reverse contrasting), with mental contrasting aligning strength of goal commitment and performance to expectations. We found almost perfect correlations between participants' expectations and incentive value measured before and after the manipulations of self-regulatory thought. In addition, induced mode of self-regulatory thought did not differentially change the levels of expectations and incentive value (e.g., Oettingen et al., 2005, 2010).

Furthermore, as noted above, for mental-contrasting effects to occur, people need to first elaborate the desired future and only then reflect on the present reality. Only when the desired future is elaborated first can it be taken as the reference point against which the present reality is considered as a potential obstacle (e.g., a party is considered a potential obstacle to getting an A in the exam). The reverse order (reverse contrasting) fails to depict the reality as potentially *standing in the way* of the future. Whether the obstacle of reality is then endorsed as an obstacle that can be overcome by respective instrumental means will depend on the expectations of success: When expectations are high people will endorse the reality as an obstacle to realising the desired future and thus connect it to relevant instrumental means. When expectations of success are low people will dismiss the reality as an obstacle disconnecting it from respective means; now people will again be open to new endeavours (e.g., party is seen as a fun event).

In sum, the reported pattern of results, seen as a whole, shows that mental contrasting is a mode of thought or strategy that people can use to wisely regulate their goal pursuit. First, it helps people to build strong commitments to feasible, desired future outcomes (i.e., those with high expectations of success). However, equally important, mental contrasting also fosters active disengagement from unfeasible desired future outcomes

(i.e., those with low expectations of success). Through this disengagement, mental contrasting allows people to pursue alternative, more promising endeavours and to start searching for new goals.

Mental contrasting: Helping relations

Recent research suggests that mental contrasting not only regulates goal engagement and goal disengagement, but also promotes the *choice of suitable means* for effective goal striving. Oettingen, Stephens, Mayer, and Brinkmann (2010) examined the mental-contrasting effects on seeking and giving help as a means to an end. Specifically, in Study 1 college students indicated their expectations of successfully seeking academic help from a person where help-seeking is perceived as a challenge. They were then asked to name aspects of successfully seeking academic help from this person as well as obstacles of present reality standing in the way of asking the person for help. In the mental-contrasting condition, participants alternated in elaborating the future and the reality, starting with the future, while in the indulging condition and the dwelling conditions they only elaborated the future or the reality, respectively. Two weeks after the experiment all participants indicated to what extent their academic problems had been solved through the help of the person they had named. Mental contrasting about successfully seeking academic help led to expectancy-dependent attainment of help more often than indulging and dwelling.

In Study 2, critical care paediatric nurses were induced to mentally contrast, indulge, or dwell—this time about successful help-giving to patients' relatives. Again, mental contrasting led to expectancy-dependent commitment to giving help more often than the two control conditions. Thus, in addition to regulating commitment to goals, mental contrasting regulates the commitment to use appropriate means to achieve those goals. These findings also attest to mental contrasting as a strategy to strengthen prosocial behaviour (helping others). The findings relate to work by Bagozzi, Dholakia, and Basuroy (2003), who distinguish between goal desires (directed at end states) and implementation desires (directed at means to the chosen end states). Our findings imply that mental contrasting may regulate both goal desires and implementation desires.

One needs to keep in mind, however, that mental contrasting creates goal commitments in line with a person's expectations of success, implying that when expectations are low people will disengage from goal pursuit. However, as noted above, when disengagement is not advisable or feasible, it is important that high expectations of success are put in place before people are asked to engage in mental contrasting. To assure this prerequisite, one may simply induce high expectations of success by giving positive situated feedback in the critical performance domain (Oettingen et al., in press).

Mental contrasting turns positive feedback into goal commitment

In two studies employing a creativity test (i.e., solving insight problems; Dow & Mayer, 2004), Oettingen et al. (2011) tested whether mental contrasting after positive feedback would translate into strong goal commitment as inferred from enhancing creative performance. Participants received positive or moderate bogus feedback on their creative potential and thus arrived at either high or moderate expectations regarding their creative potential (which was said to be relevant for taking an upcoming creativity test). They then engaged either in mental contrasting about succeeding on the upcoming creativity test, in indulging, in dwelling, or in irrelevant contrasting (i.e., elaborating aspects of a picture). We based our hypotheses on the dual pathway to creativity model (DPCM; De Dreu, Baas, & Nijstad, 2008) postulating that creative performance depends on both flexible processing of information and perseverance. As mental contrasting fosters both flexible processing of information and persistence, we reasoned that it should enhance creative performance. As outlined above, even though the predictions of fantasy realisation theory pertain to all aspects of goal commitment (i.e., cognitive, affective, motivational, and behavioural), in the present study we focused on the behavioural consequences. Behavioural consequences such as performance on tests are considered the most valid measure of goal commitment (Locke, Latham, & Erez, 1988).

Unlike indulging, dwelling, or irrelevant contrasting, mental contrasting produced better performance on the creativity test after positive feedback than after moderate feedback. Thus only mental-contrasting participants benefited from situational positive feedback directed at their creative potential. By manipulating rather than only measuring expectations of succes, the present research adjusts for confounding variables and validates previous findings: Mental contrasting does actually cause expectancy-dependent goal commitments (performance). It also points to a technique that helps to reap the benefits of *ad hoc* one-time positive feedback about a person's potential. We observed that mental contrasting of future and reality—rather than indulging, dwelling, or irrelevant contrasting—can turn such positive feedback into strong performance.

Mental contrasting of negative future fantasies: Approach and avoidance of a feared future

So far we have reported findings about mental contrasting of a positive desired future with a negative present reality. However, mental contrasting does not have to pertain to the attainment of a positive desired future; people can also fantasise about a negative future and contrast fantasies

about a negative feared future with reflections on the positive present reality. Oettingen et al. (2005) observed in a group of xenophobic high school students that fantasies about a feared future (e.g., foreign youth moving into the neighbourhood), contrasted with obstacles of a positive reality standing in the way of the feared future (e.g., reports about exciting soccer matches with foreign youth), produced more expectancy-dependent goal commitment to approach the feared future than only fantasising about the feared future or only reflecting on the positive reality. Commitment was measured by participants' tolerance and willingness to invest time and effort in welcoming the foreigners into their neighbourhood. Thus mental contrasting can be used to create *approach* goals that make people successfully conquer a feared future.

Importantly, mental contrasting of a negative feared future can also be used to create *avoidance* goals that help people evade the feared future (Oettingen, Mayer, & Thorpe, 2010). In a study with chronic cigarette smokers, commitment to the goal of avoiding the feared consequences of smoking can be facilitated by mentally contrasting the future of negative health consequences with the current positive reality of still having a healthy body. This study contained six conditions: Mental contrasting of the negative future of suffering from continued smoking, mental contrasting of the positive future of enjoying the reduction of smoking, and for each mental contrasting condition one relevant indulging and one relevant dwelling group.

All participants first had to indicate their expectations and perceived incentive value for reducing their cigarette consumption. Participants in the *positive-future conditions* then had to list four positive aspects of reducing their consumption (e.g., they named not having yellow fingers, being fitter), and four negative aspects of present reality standing in the way (e.g., being bored, partying). We then established the positive-future mental-contrasting, indulging, and dwelling conditions as described before. In the *negative-future conditions*, on the contrary, participants were asked to list four negative aspects that they associated with a future of continued smoking (e.g., developing lung cancer, being a bad model for children), and four positive aspects of reality that they *could lose* due to continued smoking (e.g., having healthy lungs or pretty skin). We then established the three experimental groups: In the negative-future mental-contrasting condition, participants had to mentally elaborate two negative aspects of the future of continued smoking and two positive aspects of the endangered reality that they could lose due to unmodified smoking, in alternating order, beginning with a negative *aspect of the future*. In the indulging in the negative future and dwelling on the positive reality conditions, participants fantasised about four negative aspects of the undesired future and four positive aspects of the present endangered reality.

When measuring immediacy of action towards reducing cigarette consumption, we observed expectancy-dependence in both mental-contrasting conditions, but no expectancy-dependence in the other conditions. That is, regardless of whether a desired or undesired future is imagined, once future fantasies are contrasted with the respective reality (i.e., whether the relational construct of *standing in the way* or the relational construct of *endangered*, respectively, is activated) expectancy-dependent commitment ensued. Mental contrasting of a desired and feasible future led to approach goals; mental contrasting of an undesired and avoidable future led to avoidance goals (for approach versus avoidance goals, see Thrash & Hurst, 2009; for promotion versus prevention goals, see Higgins, 1997). The latter finding is welcome news for people who are plagued by self-regulation concerns that discourage fantasies about a positive future. For example, people who adhere to self-damaging behaviour (e.g., excessive alcohol consumption) might not readily generate fantasies about a positive future of reducing their alcohol consumption. Accordingly, fantasies about a negative future should benefit those who have trouble to generate respective positive future fantasies, but still want to abstain from such bad habits.

COGNITIVE AND MOTIVATIONAL PROCESSES OF MENTAL CONTRASTING

The described experiments focused on commitment and performance outcomes caused by the four modes of self-regulatory thought: mental contrasting, indulging, dwelling, and reverse contrasting. They showed that mental contrasting rather than the other modes of thought produce selective, expectancy-dependent goal commitment with subsequent goal striving and goal attainment. Interestingly, no-treatment control conditions also led to commitment that was independent of expectations just like indulging, dwelling, and reverse contrasting (e.g., Oettingen, 2000; A. Kappes & Oettingen, 2012; A. Kappes, Singmann, et al., in press). Apparently, mental contrasting heightens or lowers goal commitment and performance depending on expectations of success, while indulging, dwelling, and reverse contrasting leave goal commitment and performance unchanged. In other words, mental contrasting is a mode of thought that affects behaviour change, while the other modes of thought preserve stability (for the reciprocal influences of cultural factors and self-regulatory strategies of change versus stability, see Oettingen, 1997).

Missing from our discussion so far is the empirical analysis of how mental contrasting works. One may think that changes in feasibility (expectations) or desirability (incentive value) might qualify as mediators, but as described above these variables were never found to be affected by mental contrasting. Rather, as the studies reported in the following section will show, mental

contrasting produces changes in implicit cognition and in energisation, which in turn predict selective goal pursuit and behaviour change. The final study of this upcoming section provides neurological data on the cognitive processes recruited by the mental contrasting exercise itself. The neurological data imply that mental contrasting is a cognitively demanding mental exercise of problem solving.

Cognitive processes: Strength of association between future and reality

As for cognitive processes, mental contrasting should modulate the strength of the association between future and reality and between reality and instrumental means in an expectancy-dependent way. In a series of four studies employing a primed lexical decision task (Neely, 1977) to measure the strength of association between future and reality, A. Kappes and Oettingen (2012) hypothesised that when expectations of successfully reaching a desired future are high, mental contrasting will strengthen the association between the desired future and the reality; when expectations are low, mental contrasting will weaken the future-reality association.

We reasoned that mental contrasting can be understood as a cognitive procedure similar to propositional learning, where the endorsement or negation of propositions affects associations between mental concepts. The creation of such associations takes place in two steps (Gawronski & Bodenhausen, 2006; Lagnado, Waldmann, Hagmayer, & Sloman, 2007; Waldman & Hagmayer, 2001). First, a preliminary proposition between two mental representations is generated (Lagnado et al., 2007). Second, reasoning processes evaluate the validity of this proposition by assessing its consistency with relevant knowledge. The extent of endorsement or negation of the proposition changes the strength of the resulting association (De Houwer, 2009).

Applying these ideas to mental contrasting suggests that (1) mental contrasting creates the preliminary proposition that the desired future can be reached by overcoming the present reality, and (2) that this proposition needs to be tested for its validity. Expectations of success, then, provide the necessary information for testing the validity: When they are high this proposition will be endorsed, when low the proposition will be negated. Hence, only when expectations are high should people confirm the proposition that the obstacles of reality towards the desired future can be overcome, resulting in strong associations between future and reality. The results of such expectancy-dependent reasoning processes should then be observable in associative memory, resulting in either strong associations between future and reality when the proposition is endorsed (high expectations of success) or in weak associations when the proposition is rejected (low expectations of success).

Order plays an important role in propositional learning. For example, when pressing a button turns on a device one might suspect causality, whereas when the order is reversed one would not (Lagnado et al. 2007). Similarly we predicted that order plays a role when thinking about the desired future and the present reality. Contrary to mental contrasting, where the obstacle of reality is elaborated after the desired future, in reverse contrasting people start with thinking about the obstacle of reality and then turn to the desired future; hence they do not think about the reality in the context of the desired future. Therefore reverse contrasting should only lead to thinking about the reality per se. For example, a student thinking about being invited to a party, and only then thinking about reaching an A in the upcoming exam might imagine what to bring as a gift to the party, instead of how to decline the invitation. That is, the reality is not perceived as standing in the way of the desired future—the invitation to the party is not deemed an obstacle to attaining an A. Hence the future (A in exam) and the obstacle (invitation to the party) should not be linked, thus leaving the association between desired future and obstacle of reality untouched. The strength of association between getting an A and party would neither be strengthened nor weakened (when expectations are high or low, respectively).

In one study (A. Kappes & Oettingen, 2012, Study 2) using an acute stress paradigm (videotaped public speaking), the participants' task was to give a presentation in front of a camera about their professional skills, which would then be evaluated by human resource experts. Participants indicated their expectations of success and generated a future aspect of doing well in the talk as well as an aspect of reality standing in their way, summarising each aspect in one word. Thereafter we established three experimental conditions: a mental-contrasting condition, a reverse-contrasting condition, and an irrelevant-content control condition (engaging in positive and negative thoughts and images about a meeting with a supervisor).

To measure the strength of association between future and reality, between reality and future, and—for adjusting—the accessibility of future and reality, we used a primed lexical decision task (Neely, 1977). We measured the strength of the association between *future* and *reality* through participants' mean reaction times on trials using their idiosyncratic future word as prime and their idiosyncratic reality word as target. To test whether mental-contrasting effects are directed, we also measured the strength of the association between *reality* and *future* through participants' mean reaction times on trials with their reality word as prime and their future word as target. Finally, to adjust for mere accessibility effects, we primed participants' idiosyncratic future and reality words by neutral stimuli (single strings of Xs).

Specifically, students learned that in an upcoming lexical decision task we would use the words they previously named (i.e., future and reality words)

among others. They had to indicate as quickly as possible whether each item presented on the screen (i.e., the primed target word) was a word or a nonword by pressing one of two labelled keys. Each experimental trial started with the presentation of a fixation cross followed by the presentation of a prime (presented for 50 ms) which was backward masked to prevent participants from consciously seeing the prime. Finally the target word appeared on the screen. The strength of the association between *future* and *reality* was indexed by participants' mean reaction times on four trials comprising the future word as prime and the reality word as target; the strength of the association between *reality* and *future* was indexed by participants' mean reaction times on four trials comprising the reality word as prime and the future word as target; the *accessibility* of the future and reality was measured by priming participants with a string of Xs, and then providing either the future word or the reality word as target (eight trials). Finally, 48 filler trials containing neutral words as primes and as targets (e.g., umbrella, noon) and 64 nonword trials were included. Thus the complete lexical decision task comprised 128 trials: Half were real word trials of which one-fourth were critical trials. After finishing the lexical decision task participants gave their presentations in front of a camera, explaining what qualified them as ideal job candidates (see also Oettingen et al., 2009, Study 1).

Unlike the reverse-contrasting and irrelevant-content control conditions, the mental-contrasting condition led to future–reality associations as well as performance (as assessed by two independent raters blind to condition and hypotheses) in line with participants' expectations of success. These results prevailed even when we adjusted for the accessibility of future and reality. However, we did not find differential effects of the conditions on reality–future associations, indicating that mental-contrasting effects are directed from future to reality. Importantly, future–reality associations mediated the effects of expectations on goal commitment in the mental-contrasting condition. That is, when expectations of success were high, mental contrasting led to strong future–reality associations, which in turn predicted strong performance; when expectations of success were low, mental contrasting inhibited future–reality associations, which in turn predicted weak performance.

A. Kappes and Oettingen (2012) replicated these results across a variety of experimental methods: whether expectations were measured or manipulated, whether indicators of commitment were affective and self-reported (e.g., feelings of responsibility, Study 1) or behavioural and other-rated (e.g., solving a creativity test, Study 3). Finally, mental-contrasting effects on future–reality associations did vanish when participants were informed that the goal was achieved, implying that future–reality associations wax and wane with ongoing versus completed goal pursuit (Study 4). Thus the

present results are in line with research reported above, showing that goal completion dissolves the cognitive, affective, and behavioural effects of goal striving (Förster et al., 2005; McCulloch et al., 2011; Masicampo & Baumeister, 2011a).

Cognitive processes: Strength of association between reality and instrumental means

Mental contrasting not only links future and reality, it also connects present *reality to relevant instrumental means* (i.e., means to overcome or circumvent the present reality to attain the desired future). In two studies that use similar designs and procedures as above, A. Kappes, Singmann, and Oettingen (in press) showed that mental contrasting paired with high expectations of success strengthened associations between present reality and instrumental behaviour; however it weakened reality–behaviour associations when paired with low expectations of success. Importantly, analogous to the results on mental contrasting and strength of future–reality associations, the strength of the reality–behaviour associations mediated goal commitment as indicated by actual performance (e.g., taking the stairs instead of the lift to achieve the goal of getting physically fit).

Cognitive processes: Obstacle perception

These findings suggest that mental contrasting with high expectations of success should lead people to identify aspects of reality as obstacles to reaching the desired future—as high expectations imply that obstacles are surmountable by the available instrumental means. For example, mental contrasting should lead an ambitious student with high expectations to identify the weekend party as an obstacle to attaining an A. Conversely, mental contrasting with low expectations should lead people to refrain from taking on aspects of reality as obstacles, as low expectations reflect that obstacles cannot be surmounted by the available means. In the example above, the student who expects to fail the exam anyway will dismiss the party as an obstacle. Such dismissal might free the students for alternative opportunities (e.g., to enjoy the party).

In one experiment where mental contrasting pertained to being accepted at a desired graduate school, A. Kappes, Wendt, Reinelt, and Oettingen (2012) tested this idea by assessing whether mental contrasting paired with high expectations leads to identifying a relevant reality aspect as an obstacle standing in the way of the desired future, and whether mental contrasting paired with low expectations diminishes such obstacle identification. We used a task-switching paradigm (for a review see Kiesel et al., 2010) to identify implicit obstacle categorisation.

One study (Study 2) was said to deal with undergraduates' thoughts regarding graduate school. Students indicated their expectation of being accepted at their favourite graduate school, listed one aspect of being accepted and one aspect of reality standing in the way (students named, e.g., high stress, high tuition) as well as one aspect that would aid them to get into their favourite graduate school (students named, e.g., studying hard, being determined). They then had to summarise the reality aspect in one word (e.g., stress, tuition), as they also had to do for the aid-related aspect (e.g., studying, determination). We then established a mental-contrasting condition, a reverse-contrasting condition, and an irrelevant-content control condition in the same way as described for the previous studies.

Moving to the task-switching categorisation task, in 40 learning trials students first had to indicate whether a presented stimulus was an obstacle-related word or an aid-related word (categorisation task), or whether it was printed in yellow or blue (colour identification task) by pressing one of two response keys, each of which was associated with both a word category and a colour. Specifically, students had to press the left key when the presented word was either printed in yellow (i.e., on colour-naming trials) or was aid-related (i.e., on categorisation trials). Contrary, students had to press the right key when the presented word was either printed in blue (i.e., on colour-naming trials) or was obstacle-related (i.e., on categorisation trials). We then tested the compatibility effect. The compatibility effect (Meiran, 1996; Rogers & Monsell, 1995) implies that incompatible stimuli (colour and category suggest different button-press responses) in comparison to compatible stimuli (colour and category suggest same button-press responses) reliably worsen performance in terms of reaction times and errors. In our study, we assessed implicit categorisation of idiosyncratic reality words as obstacles, by looking at the compatibility effect they evoked when presented in the colour identification task. Regarding the reality word we therefore subtracted reaction times and errors on congruent trials from reaction times and errors on incongruent trials. Hence higher scores indicated a stronger implicit categorisation of the idiosyncratic reality word as an obstacle. Even though compatibility effects are usually also found on task-repetition trials, they are more pronounced on task-switching trials (Meiran, 1996). Accordingly our main dependent variable was the compatibility effect of the reality words on task-switching trials.

At the end of the study we measured goal commitment by participants' feelings of taking responsibility for getting into the desired graduate school (Cantor, Norem, Niedenthal, Langston, & Brower, 1987; Oettingen et al., 2001). We found that mental contrasting (versus reverse contrasting and irrelevant content) paired with high expectations fostered implicit obstacle identification, while mental contrasting paired with low expectations weakened implicit obstacle identification. The indicators of obstacle

identification in turn mediated mental-contrasting effects on feelings of responsibility for attaining the desired future.

We conceptually replicated these results (Study 3) by examining obstacle identification in 10- to 12-year-old chess experts. We induced mental contrasting versus reverse contrasting and asked the children to solve one task where the solution required the identification of one's own queen standing in the way of the checkmate (i.e., *obstacle task*), whereas the other task did not (i.e., *non-obstacle task*). Specifically, on the obstacle task children had to see that their own queen stood in the way of the checkmate; on the non-obstacle task the solution required a series of equally clever moves unrelated to seeing something standing in the way. As our main dependent variable we recorded whether the children came up with the right solution, and how long it took them to find the solution.

Compared to the reverse-contrasting control condition, children in the mental-contrasting condition with high expectations performed better on the obstacle task: they more quickly and accurately detected the queen as an obstacle. Children in the mental-contrasting condition with low expectations performed worse, indicating that they had problems detecting the obstacle. As predicted, in the reverse-contrasting and the irrelevant-content control conditions, high and low expectations did not matter in the obstacle task. Importantly there were no differences between any of the conditions in the non-obstacle task.

In sum, a series of studies shows that the strength of associations between future and reality, and between reality and instrumental means, mediates mental-contrasting effects on relevant commitment and performance; the same is true for identifying the reality as an obstacle. In other words, mental contrasting spoils idealised future fantasies: When expectations of success are high, as soon as the desired future appears in front of the mind's eye the obstacle of reality also appears. The obstacle in turn is then connected to means instrumental to goal attainment. Quite to the contrary, when expectations of success are low, mental contrasting leads to the dissociation between future and reality, and between reality and instrumental means; also, the reality is dismissed as an obstacle. It seems, then, that the strength of associations between future, reality, and instrumental means and the identification of relevant reality aspects as obstacles play a pivotal role in producing the effects of mental contrasting on the prudent selection of goal pursuits.

Motivational processes: Energisation

After discussing cognitive mediators, there is still the question of motivational mediators of mental-contrasting effects on goal commitment. As in the research on positive fantasy I will focus on the most basic variable of motivation: energisation. Pioneer research in goal setting identified

feelings of energisation as paramount to promoting goal-directed behaviour, (Locke & Latham, 2002). It shows that commitment to realising a desired future has an "energising function" (i.e., *activity incitement*; Brunstein & Gollwitzer, 1996; *subjective vitality*; Ryan & Frederick, 1997); for example, desired futures that prove challenging to achieve (e.g., a seasoned marathon runner who sets her sights on beating a personal best time) give rise to greater effort than less-challenging desired futures (e.g., a seasoned marathon runner who sets her sights on finishing an upcoming marathon; Locke & Latham, 2002). As previously discussed, when expectations of success are high, mental contrasting, unlike the relevant control groups, impels people to endorse the present reality as an obstacle to the desired future, which consequently prompts commitment; when expectations of success are low, mental contrasting does the contrary, people now dismiss the reality as an obstacle lowering their commitment.

Thus Oettingen et al. (2009) investigated whether energisation serves as a motivational process responsible for the effects of mental contrasting on expectancy-dependent goal commitment and performance. Economics students were asked to deliver a speech in front of a video camera supposedly to help a human resource department develop a measure of professional skills. Participants were assigned to either a mental-contrasting or an indulging condition. As dependent variables participants indicated their initial feelings of energisation via a self-report measure (e.g., How energised do you feel when you think about giving your talk?), and to gauge participants' evaluations of their own presentations they were asked to rate their performance. Commitment was assessed via independent raters' evaluations of the quality of actual performance (Oettingen et al., 2009, Study 2). Consistent with previous mental-contrasting studies, individuals in the mental-contrasting condition (as compared to those in the indulging condition) evidenced a strong link between perceived expectations of success and subjective self-evaluations of performance as well as expectations and objective ratings of the videotaped presentations (Figure 3). Importantly, in the mental-contrasting condition feelings of energisation fully and significantly explained the relation between expectations of success and both the subjective and objective quality of performance.

A study measuring energisation by cardiovascular responses substantiated these findings (Oettingen et al., 2009, Study 1). As pointed out before, cardiovascular responses such as systolic blood pressure (SBP) are reliable indicators of physiological arousal states and effort mobilisation (Gendolla & Wright, 2005; Wright & Kirby, 2001). Participants indicated their expectations of solving an important interpersonal concern and then were induced to either mentally contrast or indulge regarding this concern. We assessed SBP twice, before and during the thought procedure of mental contrasting versus indulging, and then measured participants' commitment

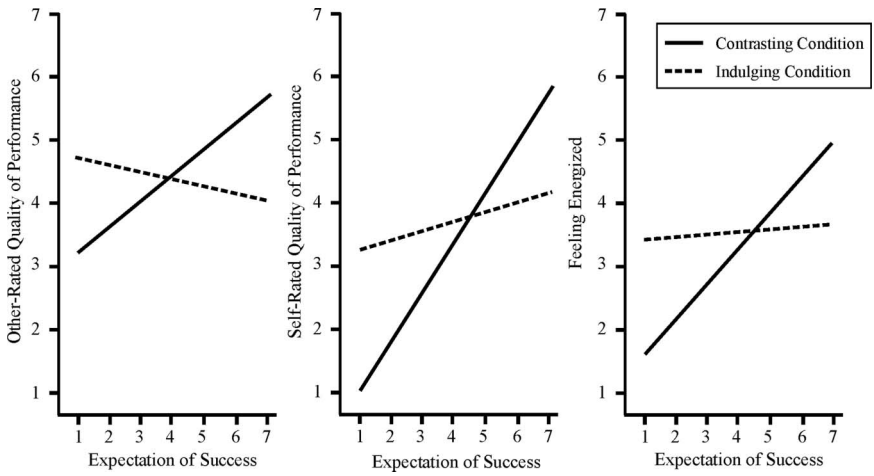

Figure 3. Regression lines depict the link between expectation and other-rated quality of performance (left), self-rated quality of performance (middle), and feeling energised (right) as a function of mental contrasting and indulging. From "Mental contrasting and goal commitment: The mediating role of energisation", by G. Oettingen, D. Mayer, A. T. Sevincer, E. J. Stephens, H. Pak, & M. Hagenah (2009). *Personality and Social Psychology Bulletin, 35*, 608–622. Copyright 2009 by the Society for Personality and Social Psychology, Inc. Reprinted with permission.

to solve the concern by asking how disappointed they would feel if they did not resolve their concern (Oettingen et al., 2001; Gollwitzer & Kirchhof, 1998).

Change in SBP as well as anticipated disappointment showed stronger expectancy-dependence in the mental-contrasting than in the indulging condition (Figure 4). As in the previous study, in the mental-contrasting condition expectancy dependence of commitment was mediated by energisation (here change in SBP). Interestingly, mental contrasting changed the level of energisation from before to after mental contrasting for both high-expectation and low-expectation participants, albeit in opposite directions. Whereas mental contrasting increased energisation in high-expectancy participants, it decreased energisation in low-expectancy participants. On the contrary, changes in energisation were not seen in indulging participants.

These two studies, examining energisation as a motivational mediator of the effects of mental contrasting versus indulging, not only highlight the role of energisation in expectation-dependent goal commitment but also point to the possibility that energisation resulting from mental contrasting in one domain may transfer to other unrelated domains. For example, when one

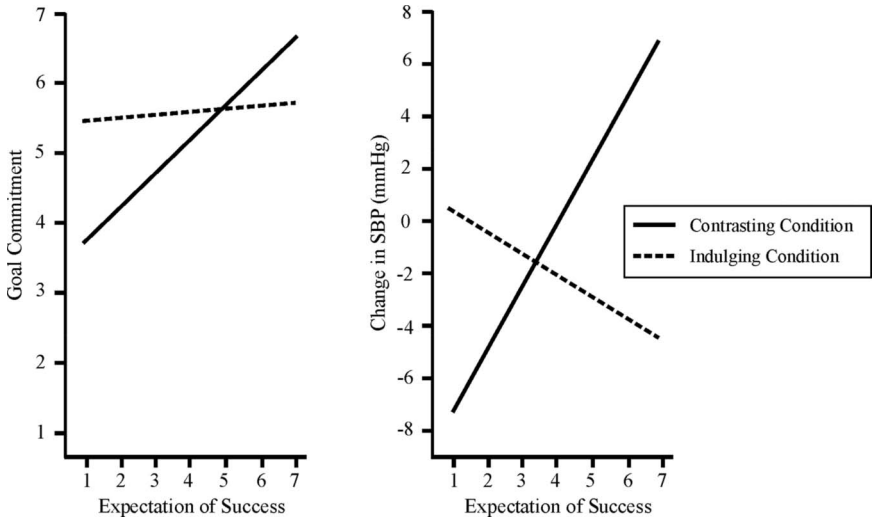

Figure 4. Regression lines depict the link between expectation and goal commitment (left), and expectation and SBP change in mmHg (right) as a function of mental contrasting and indulging. From "Mental contrasting and goal commitment: The mediating role of energisation", by G. Oettingen, D. Mayer, A. T. Sevincer, E. J. Stephens, H. Pak, & M. Hagenah (2009). *Personality and Social Psychology Bulletin, 35*, 608–622. Copyright 2009 by the Society for Personality and Social Psychology, Inc. Reprinted with permission.

engages in mental contrasting with regards to an interpersonal concern, the resulting expectancy-dependent energisation may transfer to studying for an upcoming test.

In sum, in the presented studies the conscious self-regulatory procedure of mental contrasting produced active changes in both explicit and implicit measures of cognition, affect, and behaviour. On the contrary, indulging in the desired future, dwelling on present reality, and reverse contrasting were not change agents; instead they stabilised cognition, affect, and behaviour. As mental contrasting is a strategy of behavior change we were interested in the neural underpinnings of the procedure of mental contrasting. Specifically we asked whether the mental-contrasting technique is an effortful exercise and whether brain processes are involved which are in line with the theoretical considerations of fantasy realisation theory.

Mental contrasting: Neural correlates

The experiments above show that mental-contrasting effects are based on changes in implicit cognition and motivation, and that these non-conscious effects in turn predict behavioural change. However, we assume that the procedure of mental contrasting itself, as it involves reasoning and problem

solving, should be a cognitively effortful and demanding exercise. Specifically, as opposed to indulging, mental contrasting requires individuals to look into the future, past, and present, as they form goal commitments in line with their expectations. Continuous magnetoencephalography (MEG), a brain-imaging technique measuring magnetic fields produced by electrical activity in the brain (Achtziger, Fehr, Oettingen, Gollwitzer & Rockstroh, 2009), was used to test the assumption that mental contrasting and indulging are two different mental procedures. The authors expected dissimilar patterns of brain activity in areas associated with working memory, episodic memory, intention maintenance, action preparation, and vivid visualisation. Specifically, mental contrasting was predicted to show stronger activity in all regions of interest in comparison to indulging. Using a within-participant design, Achtziger et al. had student participants relax inside the MEG machine during a 5-minute rest period, then *mentally* (as opposed to the standard written elaboration) engage in either mental contrasting and then indulging, or indulging and then mental contrasting. The self-regulation exercises pertained to idiosyncratic desired and feasible future outcomes.

As such, mental contrasting was found to be associated with greater activity in brain regions linked to *working memory processes*. However, mental contrasting also led to more activity in brain areas associated with *episodic memory* in line with mental contrasting demanding the elaboration of reality in the context of the desired future. Such elaborations should recruit memories of relevant obstacles that were experienced in the past as well as relevant memories about past successes and failures in trying to overcome them. Mental contrasting was also linked to heightened activity in brain regions that are related to *vividly imagining* events. As mental contrasting implies switching back and forth from images about a desired future to images of impeding reality, images of both the desired future and obstacles should become particularly vivid and crystallised. Finally, mental contrasting led to more activity in brain regions that are related to *holding intentions* and *action preparation* in line with mental contrasting forming strong goal commitment, given that relevant expectations of success were high.

Mental contrasting and indulging were identified as two distinct mental activities, and mental contrasting resulted in more brain activity as compared to indulging. These specific results support the mental procedures ascribed to mental contrasting by fantasy realisation theory. They also suggest that certain preliminaries have to be fulfilled in order for mental contrasting to unfold its beneficial effects. For example, as mental contrasting taxes working memory, people should not be able to effectively perform mental contrasting whenever cognitive resources are blocked by dual-task activities (e.g., demanding cognitive tasks, coping with interpersonal stressors, extreme tiredness, or physical frailty and pain).

Moreover, as mental contrasting is based on the effective retrieval of relevant obstacles experienced in the past, it should be particularly effective for people who have carefully encoded obstacles, which can thus be easily and accurately retrieved from memory. Depicted in this MEG study is the cognitive complexity of mental contrasting to promote expectancy-dependent goal commitment and performance.

SUMMARY

Across life domains, mental contrasting produces expectancy-dependent goal commitment and performance via non-conscious cognitive and motivational processes. Specifically, mental contrasting modulates the strength of the associations between future and reality as well as between reality and instrumental means, and it changes whether the reality is classified as an obstacle or not. Regarding motivational processes, mental contrasting affects energisation measured non-consciously via systolic blood pressure, but also consciously by self-reported feelings. Analysing the conscious procedure of mental contrasting rather than its direct non-conscious effects, the findings derived from continuous magnetoencephalography (MEG) support the notion that the procedure of mental contrasting is effortful as it activates brain areas involving working memory, episodic memory, intention maintenance, action preparation, and vivid visualisation.

Importantly, mental contrasting is a consciously enacted strategy that triggers non-conscious processes of prudent (expectancy-dependent) goal pursuit. Thus, the self-regulation strategy of mental contrasting should be differentiated from processes of goal pursuit that run off by themselves without conscious effort. Such self-reliant control processes of goal pursuit may depend on goal properties (e.g., difficulty, complexity) or contextual variables (e.g., distractions, temptations). An example of such self-reliant control processes is the phenomenon of automatic effort increase when goal pursuit becomes increasingly difficult (Wright, 1996). Also, counteractive self-control can be seen as a self-reliant control process, as it addresses the self-control operations that people automatically employ to prevent temptations from undermining goal attainment (Fishbach & Trope, 2005). Automatic self-control also underlies counteractive optimism, a self-control strategy of generating optimistic predictions of future goal attainment when anticipating obstacles during goal pursuit (Zhang & Fishbach, 2010). A final example is goal shielding (measured by reduced accessibility of a competing goal) that directly ensues when commitment to the focal goal is high (Shah et al., 2002). Interestingly, when people consider the progress they have made towards the goal there is less goal shielding, as people already open up to competing goals; this effect occurs even with just the intention to make

progress in the future (Fishbach & Dhar, 2005). However, this effect of goal progress hampering goal shielding can only be expected if the goal-directed actions taken (or intended) are interpreted by the individual as completing the goal; if these actions are instead interpreted as indicating a strong commitment to the focal goal, then improved goal shielding can be expected (Fishbach, Dhar, & Zhang, 2006; Koo & Fishbach, 2008). In line with this latter finding, mental contrasting produces expectancy-dependent associations only as long as the goal is still active; once it is completed these associations vanish (A. Kappes & Oettingen, 2012, Study 4).

ORIGINS OF MENTAL CONTRASTING

Since mental contrasting has an impact on selective goal commitment and performance, it seems meaningful to investigate which situational variables affect the spontaneous use of mental contrasting. In six studies, H. B. Kappes, Oettingen, Mayer, and Maglio (2011) started to address this question. The authors hypothesised that sad mood as a contextual influence promotes self-initiated mental contrasting. Mental contrasting—rather than indulging, dwelling, and reverse contrasting—is a problem-solving procedure that induces behaviour change. Therefore sad mood, as it facilitates problem solving and signals a need for changing the status quo, should foster mental contrasting more than happy or neutral moods.

Various mood inductions were used: In the first three studies, participants read about an actual mood-inducing event (Study 1), wrote about a hypothetical event (Study 2), and experienced a real event (Study 3). Mood inductions also varied in modality: They were verbal (reading in Studies 1, 5; writing in Study 2) as well as nonverbal (music in Studies 4, 6). Following mood induction, in Studies 1 and 2, we measured self-regulation strategies by adapting the paradigm used for the experimental studies. Specifically, all participants had to name their presently most important wish or concern in a given domain, to indicate the likelihood of wish fulfilment, and to generate four aspects of wish fulfilment (i.e., desired future aspects), and four aspects standing in the way of wish fulfilment (i.e., present reality aspects). Thus all participants had to list eight aspects: four desired future aspects and four present reality aspects. In the experimental research where self-regulation strategies were manipulated, participants were next told which aspects to elaborate in writing and in which order. In the present research, departing from the experimental procedure, all participants instead freely chose the order in which they elaborated and wrote on four (and only four) of these eight aspects. Finally we classified participants according to their order of elaboration to distinguish between those who spontaneously used mental contrasting, indulging, dwelling, or reverse contrasting.

Participants were identified as using mental contrasting when they chose to elaborate two future aspects and two reality aspects and started with a future aspect. Thus the criteria were that elaborations had to be balanced between future and reality aspects and begin with a future aspect. Participants who elaborated two future aspects and two reality aspects but started with a reality aspect were identified as reverse contrasting. Participants who predominantly elaborated aspects of the future or aspects of reality (i.e., three or four future or reality aspects) were identified as indulging or dwelling, respectively. In all six studies, across the various mood inductions, we observed that sad mood—as it signals an impending problem—facilitated self-initiated mental contrasting more than neutral mood or happy mood. Importantly, mood did not affect the relation between mental contrasting and selective formation of goal commitment. Apparently sad mood aids in self-regulation by causing people to self-initiate strategies producing goal commitments sensitive to their expectations of success.

While an understanding of the mechanisms underlying the beneficial effects of mental contrasting and of the contextual elicitors of spontaneous mental contrasting is important for furthering the psychology of goal pursuit, it is equally important to develop an understanding of *if* and *how* people can use these techniques on their own to enhance the quality of their everyday lives. Thus the next section focuses on the metacognitive utility of mental contrasting as well as the combined strategy of mental contrasting with implementation intentions (i.e., MCII) as a first attempt to translate years of laboratory research into practical applications to improve people's lives.

MENTAL CONTRASTING: INTERVENTIONS

The term translational research pertains to the translation of scientific discoveries into practical applications to benefit the solving of societal and individual problems (Tashiro & Mortensen, 2006; Woolf, 2008). The question in our research has been whether mental contrasting can be used for translational practices. Specifically, can individuals use mental contrasting as a metacognitive strategy of desired behaviour change to benefit their everyday lives and long-term endeavours? The next section describes how teaching mental contrasting as a metacognitive strategy, by itself or in combination with implementation intentions (MCII), may be used to help people self-regulate their behaviour change—in professional and school life, in everyday skills and integrative bargaining, as well as in improving critical health behaviours.

MENTAL CONTRASTING (MC)

As noted above, mental contrasting is a self-regulation strategy of wise goal selection. It promotes the pursuit of feasible goals by strengthening commitment, and at the same time it helps people to disengage from unfeasible goals by weakening commitment. Mental contrasting can thus be considered as a strategy fostering behaviour change—either it leads people to actively get involved, or it leads people to actively let go of pursuing a desired future, thus liberating them for alternative endeavours. Knowledge about the strategy of mental contrasting allows for the creation of metacognitive interventions that teach people how to wisely select their short-term and long-term goal pursuits. The following study involving healthcare professionals directly speaks to a brief intervention of the self-regulation of wise goal selection by mental contrasting.

Mental contrasting (MC) increases management of everyday life in healthcare professionals

Oettingen, Mayer, and Brinkmann (2010) hypothesised that applying mental contrasting flexibly and independently to idiosyncratic everyday life concerns helps people discriminate between those concerns that they are able to resolve and concerns that they better delegate, postpone, or relinquish. By contrast, indulging in everyday life should cause people to moderately invest in solving their everyday concerns irrespective of whether they will be able to resolve them or not. Such lack of discriminative competence should put indulging people at risk for poor decision making and ineffective time management.

The aim of the study was twofold: First, to examine if teaching people mental contrasting enables them to apply mental contrasting as a metacognitive strategy towards their own wishes and concerns, and second to investigate how using mental contrasting affects meeting the demands of everyday life. In the brief intervention Oettingen, Mayer, and Brinkmann (2010) assigned middle-level healthcare managers to two conditions. Participants in one condition were taught to use mental contrasting regarding their everyday concerns, while participants in the other condition were taught to indulge. Two weeks later participants in the mental-contrasting condition reported having fared better in managing their time and decision making during everyday life than those in the indulging condition. In addition they reported having successfully completed some tasks and delegated or relinquished others. The results suggest that, by helping people to set expectancy-dependent goals, the metacognitive strategy of mental contrasting qualifies as a cost- and time-effective tool to improve the management of everyday life. Whereas the Oettingen, Mayer, and Brinkmann (2010) study

pertains to adaptive choice of individualised everyday goals, a recent study investigates whether mental contrasting can be taught to support school-children in solving standardised tasks in constrained group contexts.

Mental contrasting (MC) increases school performance in disadvantaged elementary- and middle-school children

Teaching mental contrasting as a strategy that helps people to solve standardised tasks in group contexts seems especially important in organisational and educational institutions where there are no options for disengagement (i.e., no child left behind). Two brief intervention studies investigated whether mental contrasting can be used in class contexts as a time- and cost-effective self-regulation strategy to support learning in young children from disadvantaged backgrounds (A. Gollwitzer et al., 2011).

The authors postulated and observed that teaching mental contrasting of feasible desired future outcomes would result in better academic performance than teaching students to only think positively about the respective future. Specifically, German elementary-school children and U.S. middle-school children from low-income neighbourhoods who were taught mental contrasting regarding an effort-dependent and attainable foreign language task (i.e., high expectations of success) achieved comparatively higher scores in learning foreign language vocabulary words after 2 weeks or 4 days, respectively. That is, mental contrasting increased academic performance in school children from low-income areas as young as 7 years old. Going beyond interventions teaching mental contrasting of idiosyncratic wishes, the present educational intervention targeted a desired future that all children could attain. The study thus shows how mental contrasting can be applied to solve assigned and standardised learning tasks in a group setting, benefiting all members of the group without leaving any child behind.

Individuals can also be taught mental contrasting as a strategy to vigorously pursue their wishes and concerns rather than select between feasible and unfeasible future endeavours. They just need to be instructed to practice and apply mental contrasting to the wishes and concerns that they feel are challenging, but at the same time are well within their reach. Thus the following intervention study investigates the effects of mental contrasting applied to idiosyncratic wishes that are also deemed feasible (i.e., high expectations of success).

Mental contrasting (MC) improves health behaviour in dieting students

Using a brief mental-contrasting intervention, Johannessen et al. (in press) asked dieting students to name the most important dieting wish that they

deemed attainable within a 2-week period. Then students in one condition were directed to mentally contrast, while those in the other condition were directed to indulge in thoughts and images about the named dieting wish; remaining students were placed in a no-treatment control condition. Two weeks afterwards dieters retrospectively rated their behaviour change: In the mental-contrasting condition participants reported having consumed fewer calories overall, fewer high-calorie foods, and more low-calorie foods compared to those in the indulging and control conditions.

Interestingly, using mental contrasting on the feasible dieting wish not only led to comparatively smaller calorie intake, but its effects transferred across domains: Mental-contrasting students also reported having been more physically active. This transfer effect from the diet to the exercise domain suggests a more generalised effect of mental contrasting; however, we do not yet know how mental contrasting transferred across domains. Perhaps effectively applying mental contrasting to improve one's diet might ready an individual to use the same self-regulatory tool regarding exercise. Or it is the energisation induced by mentally contrasting the dieting wish that transfers to being more physically active. Finally, dieting itself may spur more exercise (Dunn et al., 2006). All of these processes may cause the transfer of mental-contrasting effects to other life domains as well (e.g., the academic and interpersonal domains).

Mental contrasting (MC) facilitates integrative bargaining

Another everyday life task that may benefit from mental contrasting is finding integrative solutions when dealing with others. Kirk, Oettingen, and Gollwitzer (2011) investigated this question in the framework of an integrative bargaining task, "New Car", (developed by the Dispute Resolution Research Center at the Kellogg School of Business). In this task, partners (seller and buyer) can earn mutually beneficial agreements if they make trade-offs on issues of a car sale that matter more to one partner than the other. Participants were instructed that they would negotiate with each other anonymously, over an instant messenger programme, and that they would have 20 minutes to come to an agreement. Successful bargaining (point maximisation) is based on readily finding integrative solutions. The best way to find integrative solutions and thereby to maximise profit is to express demands that are beneficial to oneself but do not hurt the other person, and to make concessions that benefit the other person but do not hurt oneself. Mental contrasting, as it promotes discrimination among possible means to goal attainment (Oettingen, Stephens, et al., 2010), should enable such reasonable demands and concessions.

Before negotiating, both partners were taught how to engage in mental contrasting regarding point maximisation (e.g., feelings of pride or proving a

skilled person) with the reality standing in the way of earning many points (e.g., the other person being stubborn or time running out), in indulging, or in dwelling. Participants in the control condition moved directly to the negotiation task with no training. The authors observed that mental contrasting led to finding more integrative agreements and thus higher joint profits compared to indulging, dwelling, or control participants. However, mental contrasting not only enhanced the amount of joint profits achieved, it also led to heightened equity of achieved profits. The findings remained significant even when adjusting for social value orientation, subjective negotiation style, gender, and negotiator competence. Supporting that mental contrasting leads to selective use of instrumental means and to prosocial behaviour in terms of help-giving (Oettingen, Stephens, et al., 2010), the present findings show that mental contrasting also causes people to find creative and cooperative solutions in negotiation settings.

MENTAL CONTRASTING WITH IMPLEMENTATION INTENTIONS (MCII)

Mental contrasting helps to discriminate between feasible and unfeasible goals, so that goal pursuit is enhanced when expectations are high, and weakened when expectations of success are low. When goal disengagement is not a viable option, mental contrasting can be directed to form strong goal commitments to desired focal goals that are also feasible. However, even if people form strong goal commitments they are not always successful at translating them into effective goal-directed behaviour. For instance people might simply forget to act, they might be unaware of suitable situations for actions, or they might be distracted if and when a suitable situation presents itself. Implementation intentions (Gollwitzer, 1999) help to avert these problems as they specify a relevant cue (“If I have the urge to snack crisps”) and link it to a respective goal-directed response (“then I will eat a piece of fruit”).

Therefore mental contrasting and implementation intentions are complementary procedures: Mental contrasting when expectations of success are high fosters energisation and goal commitment. Such goal commitment is necessary for implementation intentions to unfold their effects (Sheeran, Webb, & Gollwitzer, 2005). In addition, mental contrasting helps to specify the personal obstacles and the means that can be used to specify the if- and then- parts of implementation intentions. Adding to the non-conscious associations between the obstacles and respective instrumental means produced by mental contrasting, in forming implementation intentions people explicitly formulate if-then associations between the obstacle and instrumental means. These associations are then strong enough to instigate automatic

action control when the specified situation is encountered (Gollwitzer & Sheeran, 2006). In sum, mental contrasting provides the prerequisites for implementation intentions to enhance goal attainment.

MCII facilitates integrative bargaining—more than mental contrasting and implementation intentions alone

To extend the findings of the previous study, Kirk, Oettingen, and Gollwitzer (in press) tested the impact of the different modes of self-regulatory thought: MCII versus mental contrasting and implementation intention alone on performance in the bargaining task just described. Again, participants were randomly assigned to dyads and negotiated over the sale of a car. Before negotiating we induced one of the three self-regulation strategies noted above (in both seller and buyer).

We found that using the combined strategy of mental contrasting with implementation intentions (MCII) led to higher joint gains than using either mental contrasting or implementation intentions alone. Content analysis revealed that dyads who only formed implementation intentions did not develop the insight necessary for cooperative planning; consequently they resulted in the lowest joint gains. On the other hand, mental contrasting produced insight into cooperative planning, but without forming explicit if-then plans; participants earned joint gains only at a level that was in between implementation intentions and MCII. Interestingly the cooperative planning mediated the observed effect on joint gain. Apparently, mental contrasting promoted the insights needed for finding integrative solutions.

MCII breaks snacking habits—more than mental contrasting and implementation intentions alone

Adriaanse et al. (2010) tested MCII against its components and a control group in the health domain. In a first study, the authors investigated the effectiveness of combining mental contrasting with implementations in diminishing unhealthy snacking habits. Participants were either taught MCII or, in the control condition, were asked to think about and list healthy options for snacks. As predicted, participants in the MCII condition consumed fewer unhealthy snacks than participants in the control condition. Importantly, in Study 2 MCII was more effective than mental contrasting or forming implementation intentions alone. Interestingly, and in line with the findings that mental contrasting helps people wisely discriminate which goals to pursue and which not, mental contrasting increased perceived clarity about critical cues for unhealthy snacking. Together these findings suggest that MCII is an effective

strategy for fighting bad habits. One of the underlying processes making MCII superior to implementation intentions alone may be that mental contrasting produces clarity about the critical cues for the unwanted habitual behaviour.

MCII heightens exercise behaviour in healthy participants

A challenging test for the effectiveness of mental contrasting with implementation intentions is to produce long-term improvements of health habits, of exercise on the one hand and of a healthy diet on the other. In fact, a common finding with regard to health behaviour change is that while initial success is quite prevalent, long-term maintenance of the changed behaviour is rare (Polivy & Herman, 2002). However, extended behaviour modification is necessary if one wants to reap the benefits of protective health behaviours (e.g., for regular exercise: Department of Health, 2004). Yet roughly half of the individuals who begin a self-monitored exercise programme abandon it within 6 months (Dishman, 1991). Therefore it seems crucial to develop interventions to facilitate long-term behaviour change in exercise.

Stadler, Oettingen, and Gollwitzer (2009) conducted an intervention study to determine whether participants who received relevant information and were taught the MCII technique would exercise more, immediately after the intervention and in the long-run, than participants in an information-only control group. Middle-aged women were recruited to take part in this intervention study focusing on healthy lifestyles. In the information-only control group women learned about the benefits of regular exercise. In the MCII group participants received the same information, and learned the mental-contrasting technique (once for 1 hour with one half-hour telephone follow-up). Specifically, participants were asked to apply MCII by themselves to the wish or goal of exercising whenever possible. Participants were free to choose whatever form of exercising they wished to engage in, and they were encouraged to anticipate those obstacles that were personally most relevant.

Participants in the MCII group were taught how to form three types of implementation intentions regarding the obstacle standing in the way of exercising (e.g., feeling too tired in the evening to go for a run) using an "if-then" format: one to overcome the obstacle generated by mental contrasting (e.g., If I feel exhausted when I get home from work tonight, then I will immediately put on my running shoes and go for a jog in the neighbourhood), one to prevent this obstacle (e.g., If I hear the clock chime five o'clock, then I will pack my things and leave the office to go for a run), and one to identify a good opportunity to act (e.g., If the sun is shining, then I will go for a 30-minute jog in the park). Participants

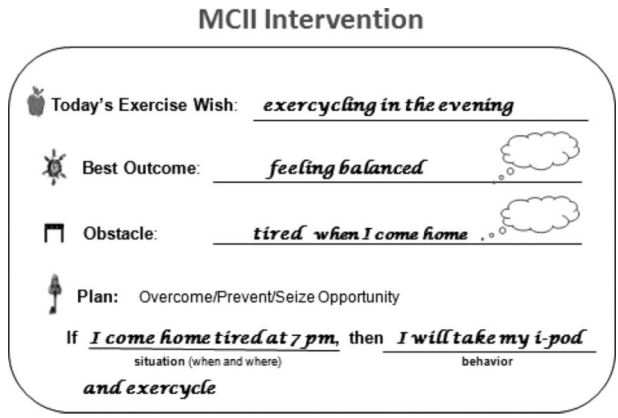

Figure 5. Sample practice sheet: Exercise.

learned the MCII-technique with regards to their short- and long-term concerns (for a sample practice sheet regarding a 24-hour exercise wish, see Figure 5).

As dependent measures, participants recorded in daily diaries how much they had exercised in 15-minute intervals. As compared to baseline the MCII technique enhanced exercise more than the information only intervention. This effect emerged immediately after the intervention and remained stable for 4, 8, and 16 weeks after the intervention. Participants in the MCII group exercised nearly twice as much, that is, 1 hour more per week, as compared to baseline and as compared to participants in the information control group. As moderate amounts of physical exercise are shown to strengthen cardiovascular and respiratory systems, decrease risk for heart disease and Type 2 diabetes, help with weight control, improve stress and pain management, reduce risks of certain types of cancers and improve quality of sleep (Mayo Foundation for Medical Education and Research, 2007), the MCII intervention may have far-reaching consequences for overall health.

MCII heightens healthy eating

To test the effects of MCII on healthy eating, Stadler, Oettingen, and Gollwitzer (2010) used the above-described intervention regarding concerns of healthy eating, this time counting the number of portions of fruits and vegetables (for a sample practice sheet regarding a 24-hour diet wish, see Figure 6). As dependent variables, participants filled out diaries for 7 consecutive days at baseline and at five follow-up times. They marked one

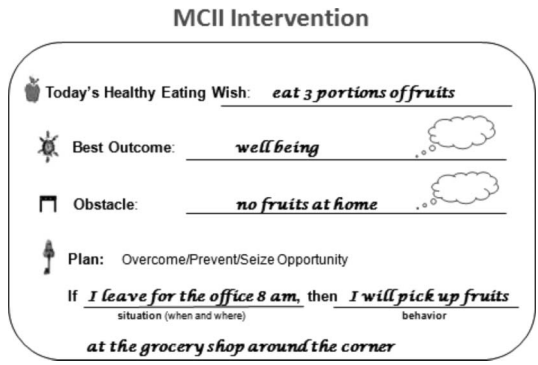

Figure 6. Sample practice sheet: Healthy eating.

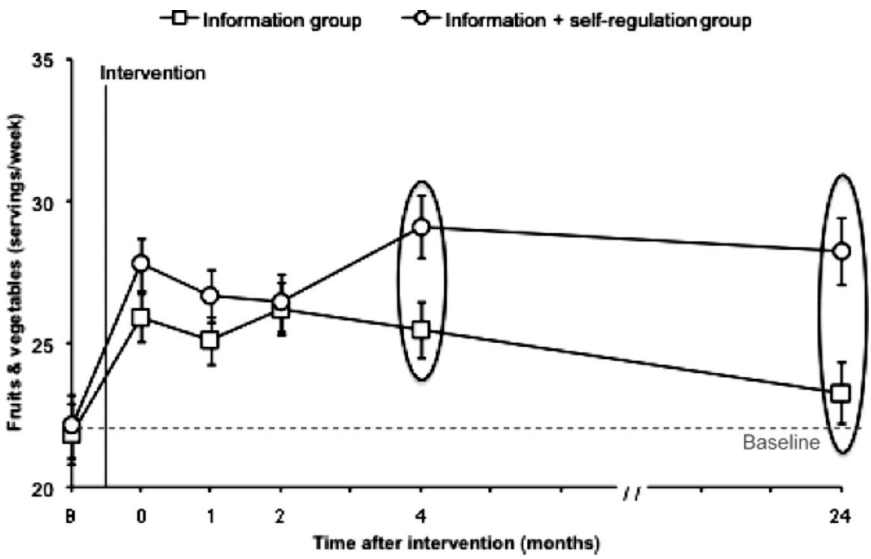

Figure 7. Intake of fruits and vegetables (in servings per week) for information + MCII group and information group only over the 24 months of the study, model-based estimated means and standard errors. B = Baseline, 0 = week immediately after intervention. From "Intervention effects of information and self-regulation on eating fruits and vegetables over two years", by G. Stadler, G. Oettingen, & P. M. Gollwitzer (2010). *Health Psychology, 29*, 274–283. Copyright 2010 by the American Psychological Association. Reprinted with permission.

box in the diary for each serving of fruits and vegetables they ate. One serving was defined in the diary instructions as one handful of cut raw, frozen, cooked, or canned fruits or vegetables, or one glass of 100% content

fruit or vegetable juice (see Kim & Holoway, 2003, for validation of brief measures for fruit and vegetable intake).

The 24-month randomised controlled trial showed that already shortly after the intervention, and for as long as 2 years thereafter, participants in the MCII group ate more fruits and vegetables than the information-only group; the latter group returned to baseline levels (see Figure 7). These results were obtained even though participants were not contacted any more in the period between 4 and 24 months after the intervention. In sum, teaching MCII induced eating more healthily than teaching information only – right away and over a period of 2 years after the intervention.

MCII improves mobility in chronic back pain patients

A great challenge facing many physical therapists who work with chronic back pain patients is motivating patients to exercise. One obstacle standing in the way of successful rehabilitation is that pain sufferers anticipate pain in any activity-related situation, and thus tend to avoid activity altogether. In this study, the MCII intervention was adapted for a clinical sample of chronic back pain patients (Christiansen, Oettingen, Dahme, & Klinger, 2010). Back pain outpatients were taught the MCII technique in conjunction with the standard treatment offered to chronic back pain sufferers. The standard outpatient back pain programme offered by the rehabilitation centre entailed 3 to 4 weeks of treatment including individual informative seminars (e.g., relaxation techniques, handling stress), medical care, and psychological consultation, physical therapy, and exercise. The experimental condition added two half-hour sessions to the standard back pain programme: In the first session participants engaged in mental contrasting about realising fantasies related to improved mobility (e.g., increasing mobility in everyday life; playing with a grandchild); and during the second session participants identified behaviours in response to the obstacles generated in the first session to serve as the focus of implementation intentions (e.g., ''If I am afraid of causing damage to myself, then I will remember that movement heals pain'', ''If I see my baby granddaughter at our next family picnic, then I will bend down to play with her'').

The dependent variables for this study were physical strength, appropriate lifting behaviour, and pain severity, determined once 10 days and again 3 months post-intervention, all in comparison to respective pre-intervention baseline measures. To assess physical strength participants completed a self-report measure to gauge their functional limitations in activities of daily living, and two objective measures: a lifting test (i.e., ''handling load'' of the Functional Capacity Evaluation, FCE; Gouttebarge, Wind, Kuijer, & Frings-Dresen, 2004) and a bicycle ergometer test. To assess severity of pain, participants completed a self-report rating scale.

Patients in the MCII intervention group increased physical strength and mobility at 10 days and 3 months after the intervention as assessed by both the subjective and objective measures. These effects were independent of participants' experienced pain, which did not differ between conditions during and after treatment. Altogether, the intervention consisted of two sessions for a total of 1 hour. Other short-term psychological interventions take at least 4 to 6 hours (e.g., Linton & Nordin, 2006; for review see the findings of the "Cochrane Back Group"; Ostelo et al., 2005). Studies including problem-solving approaches contain multiple sessions (e.g., 19 half-day sessions over the course of 8 weeks; van den Hout, Vlaeyen, Heuts, Zijlema, & Wijnen, 2003). The present findings suggest that MCII is a powerful time- and cost-effective self-regulatory tool that, in no more than one hour, can help promote physical activity in patients known to have difficulties with rehabilitation.

MCII fosters studying for an important standardised test (PSAT)

So far MCII intervention studies have pertained to the health domain. An equally challenging area for behaviour change is improving study behaviour in adolescents. Therefore Duckworth, Grant, Loew, Oettingen, and Gollwitzer (2011) tested the effect of MCII in American second-year high-school students preparing to take a high-stakes standardised exam in the autumn of their third year. They were randomly assigned to complete either a 30-minute written MCII intervention or a placebo control writing exercise. Participants in the intervention condition completed over 60% more practice questions than did participants in the control condition. These findings point to the usefulness of MCII in academic achievement. They also speak to the ease of teaching MCII to young participants (see also the above-mentioned mental-contrasting intervention on foreign language acquisition with elementary-school children; A. Gollwitzer et al., 2011). Finally, by sustaining effort on standardised tests MCII should be of great benefit to adolescents' future lives.

MCII increases attendance and grade point average (GPA) in disadvantaged middle-school children

An open question is whether MCII has long-lasting effects on attendance and course grades, especially in disadvantaged students. To answer this question, Duckworth, Kirby, A. Gollwitzer, and Oettingen (2011) conducted an intervention study with fifth-grade middle-school children from disadvantaged backgrounds. One group of children learned how to apply MCII to their everyday wishes and concerns; the other group of children were taught to think and feel positively about fulfilling their

wishes and solving their concerns. In the MCII condition, children were taught how to do the Wish Outcome Obstacle Plan (WOOP) exercise (Oettingen, 1996), and they were encouraged to apply it to their everyday life wishes and concerns. Specifically, the WOOP exercise entails that individuals generate a *W*ish, name and mentally elaborate its best *O*utcome, name and elaborate their relevant personal *O*bstacle, and then form an "if obstacle/opportunity, then goal-directed action" *P*lan (for a practice sheet of the WOOP exercise, see Figure 8, left side). To prevent dissemination of the MCII procedure among the participating children, in the positive-thinking control group the children were taught an exercise also called WOOP. However, there were subtle differences in the WOOP taught to children in the MCII group versus the control group. Specifically, in the control group children had to generate a *W*ish, name and mentally elaborate its best *O*utcome, but then they had to name and elaborate another best *O*utcome (instead of the relevant personal obstacle), and they had to form an "if outcome, then feeling" *P*lan (instead of form an "if obstacle/opportunity, then goal-directed action" plan; for a practice sheet of the positive-thinking control condition, see Figure 8, right side). Compared to children in the positive-thinking control condition, children taught MCII at the start of the spring semester significantly improved their report card grades and came to school on time more reliably by the end of the school year. These findings suggest that MCII may also be used as a cost- and time-effective strategy to help close the achievement gap between disadvantaged and advantaged children.

SUMMARY

Mental contrasting, by itself and in conjunction with implementation intentions, can be taught as a metacognitive strategy to produce behaviour change ranging from management of everyday life, learning basic academic and interpersonal bargaining skills, to self-discipline as well as objective

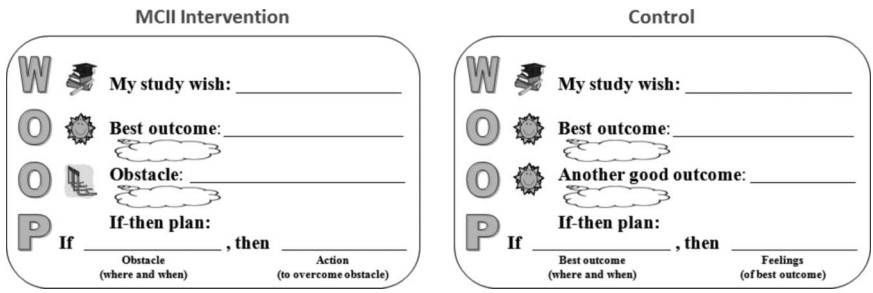

Figure 8. Practice sheets of the WOOP exercise.

school attendance and report card grades. It improves regular exercise and healthy eating as well as physical mobility in back pain patients. The results are based on interventions with samples of different ages ranging from children to middle-aged adults and from different cultures such as the United States and Germany. It seems evident that mental contrasting can be ubiquitously applied as a metacognitive strategy to help people manage and improve their everyday lives.

CONCLUSION

Every new generation has its unique psychological burdens and it seems that stress and lack of time are some of the salient burdens of our time. The findings reported in the present article suggest that the strategy of "*Think positive!*" is not enough to alleviate the time crunch and overwhelming demands in our daily lives. On the contrary, thinking positive can result in low effort and little success in meeting our goals. In fact, thinking about an idealised future can feign having already attained the desired future, and thus detract from the cumbersome but necessary effort to actually reaching success.

Despite what the self-help and coaching industry wants us to believe, for desired behaviour change to occur thinking about the future should involve both the desired future and the resisting reality. Only then can future and reality be mentally connected in the sense that the reality contains obstacles that can and will be mastered on the way to fantasy realisation. Therefore mental contrasting of future and reality energises people to successfully attain the wishes that are within their reach; at the same time, it de-energises people when their wishes are beyond their reach, thus promoting disengagement, freeing people for alternative pursuits.

Intervention research shows that mental contrasting can be taught as a metacognitive strategy in a cost- and time-effective way. It produces behaviour change and mastery of everyday life and long-term pursuits. However, it also triggers new insights, creativity, and integrative negotiation skills leading to actual successes in, for example, bargaining and breaking bad habits. Importantly, mental contrasting can be used in combination with implementation intentions as an exercise called mental contrasting with implementation intentions (MCII). Mental contrasting and implementation intentions complement each other: Mental contrasting provides the necessary strong goal commitment and it facilitates the identification and endorsement of relevant cues and instrumental behaviours, which then specify the if- and the then- components of implementation intentions.

The self-regulatory strategy of mental contrasting enables people to discriminate between their feasible and unfeasible desires, provides the strength to change what stands in the way of achieving the feasible, and

gives the composure to let go of the unfeasible desires—to then re-engage in alternative pursuits. This discriminative aptitude may be referred to as *motivational* intelligence. Not to forget, however, that motivational intelligence also means to engage in indulging when expectations are low and relinquishment is not an option—as it allows people to stay in the field. Finally, motivational intelligence means to cease indulging and engage in mental contrasting once expectations of success have been sufficiently strengthened.

REFERENCES

Achtziger, A., Fehr, T., Oettingen, G., Gollwitzer, P. M., & Rockstroh, B. (2009). Strategies of intention formation are reflected in continuous MEG activity. *Social Neuroscience*, *4*, 11–27.

Achtziger, A., Gollwitzer, P. M., & Sheeran, P. (2008). Implementation intentions and shielding goal striving from unwanted thoughts and feelings. *Personality and Social Psychology Bulletin*, *34*, 381–393.

Adriaanse, M. A., Oettingen, G., Gollwitzer, P. M., Hennes, E. P., de Ridder, D. T. D., & de Witt, J. B. F. (2010). When planning is not enough: Fighting unhealthy snacking habits by mental contrasting with implementation intentions (MCII). *European Journal of Social Psychology*, *40*, 1277–1293.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs, NJ: Prentice-Hall.

Anderson, C. A., & Godfrey, S. (1987). Thoughts about actions: The effects of specificity and availability of imagined behavioural scripts on expectations about oneself and others. *Social Cognition*, *5*, 238–258.

Atkinson, J. W., & McClelland, D. C. (1948). The projective expression of needs. II. The effect of different intensities of the hunger drive on thematic apperception. *Journal of Experimental Psychology*, *38*, 643–658.

Bagozzi, R. P., Dholakia, U. M., & Basuroy, S. (2003). How effortful decisions get enacted: The motivating role of decision processes, desires, and anticipated emotions. *Journal of Behavioural Decision Making*, *16*, 273–295.

Bandura, A. (1977). Self-efficacy: Towards a unifying theory of behavioural change. *Psychological Review*, *84*, 191–215.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Bandura, A., & Locke, E. A. (2003). Negative self-efficacy and goal effects revisited. *Journal of Applied Psychology*, *88*, 87–99.

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, *117*, 497–529.

Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory to measure depression. *Archives of General Psychatry*, *4*, 561–571.

Brehm, J. W., & Self, E. A. (1989). The intensity of motivation. *Annual Review of Psychology*, *40*, 109–131.

Brownley, K. A., Hurwitz, B. E., & Schneiderman, N. (2000). Cardiovascular psychophysiology. In J. T. Cacioppo, L. G. Tassinary, & G. G. Berntson (Eds.), *Handbook of psychophysiology* (2nd ed., pp. 224–264). New York: Cambridge University Press.

Brunstein, J. C., & Gollwitzer, P. M. (1996). Effects of failure on subsequent performance: The importance of self-defining goals. *Journal of Personality and Social Psychology*, *70*, 395–407.

Cannon, W. B. (1915). *Bodily changes in pain, hunger, fear and rage: An account of recent researches into the function of emotional excitement*. New York: Appleton.

Cantor, N., Norem, J. K., Niedenthal, P. M., Langston, C. A., & Brower, A. M. (1987). Life tasks, self-concept ideals, and cognitive strategies in a life transition. *Journal of Personality and Social Psychology*, *53*, 1178–1191.

Carstensen, L. L., Isaacowitz, D., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist*, *54*, 165–181.

Carver, C. S., & Scheier, M. F. (2009). Optimism. In M. R. Leary & R. H. Hoyle (Eds.), *Handbook of individual differences in social behaviour* (pp. 330–342). New York: Guilford Press.

Christiansen, S., Oettingen, G., Dahme, B., & Klinger, R. (2010). A short goal-pursuit intervention to improve physical capacity: A randomized clinical trial in chronic back pain patients. *Pain*, *149*, 444–452.

Connor-Smith, J. K., & Flachsbart, C. (2007). Relations between personality and coping: A meta-analysis. *Journal of Personality and Social Psychology*, *93*, 1080–1107.

De Dreu, C. K. W., Baas, M., & Nijstad, B. A. (2008). Hedonic tone and activation level in the mood-creativity link: Towards a dual pathway to creativity model. *Journal of Personality and Social Psychology*, *94*, 739–756.

De Houwer, J. (2009). The propositional approach to associative learning as an alternative for association formation models. *Learning & Behaviour*, *37*, 1–20.

Deci, E. L., & Ryan, R. M. (2004). *Handbook of self-determination research*. Rochester, NY: Rochester University Press.

Department of Health. (2004). *At least five a week: Evidence on the impact of physical activity and its relationship to health: A report from the Chief Medical Officer*. London: Department of Health.

Dishman, R. K. (1991). Increasing and maintaining exercise and physical activity. *Behaviour Therapy*, *22*, 345–378.

Dow, G. T., & Mayer, R. E. (2004). Teaching students to solve insight problems: Evidence for domain specificity in creativity training. *Creativity Research Journal*, *16*, 389–402.

Duckworth, A. L., Grant, H., Loew, B., Oettingen, G., & Gollwitzer, P. M. (2011). Self-regulation strategies improve self-discipline in adolescents: Benefits of mental contrasting and implementation intentions. *Educational Psychology*, *31*, 17–26.

Duckworth, A. L., Kirby, T. A., Gollwitzer, A., & Oettingen, G. (2011). *Teaching self-regulation improves academic performance*. Manuscript submitted for publication.

Duffy, E. (1934). Emotion: An example of the need of reorientation in psychology. *Psychological Review*, *41*, 184–198.

Dunn, C. L., Hannan, P. J., Jeffery, R. W., Sherwood, N. E., Pronk, N. P., & Boyle, R. (2006). The comparative and cumulative effects of a dietary restriction and exercise on weight loss. *International Journal of Obesity*, *30*, 112–121.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, *95*, 256–273.

Elliot, A. J. (1997). Integrating the "classic" and "contemporary" approaches to achievement motivation: A hierarchical model of approach and avoidance achievement motivation. In M. Maehr & P. Pintrich (Eds.), *Advances in motivation and achievement* (pp. 243–279). Greewich, CT: JAI Press.

Elliot, A. J. (2006). The hierarchical model of approach-avoidance motivation. *Motivation and Emotion*, *30*, 111–116.

Epstude, K., & Roese, N. J. (2008). The functional theory of counterfactual thinking. *Personality and Social Psychology Review*, *12*, 168–192.

Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C., & Kardes, F. R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology*, *50*, 229–238.

Ferguson, M. J., & Bargh, J. A. (2004). Liking is for doing: The effects of goal pursuit on automatic evaluation. *Journal of Personality and Social Psychology*, *87*, 557–572.
Fishbach, A., & Dhar, R. (2005). Goals as excuses or guides: The liberating effect of perceived goal progress on choice. *Journal of Consumer Research*, *32*, 370–377.
Fishbach, A., Dhar, R., & Zhang, Y. (2006). Subgoals as substitutes or complements: The role of goal accessibility. *Journal of Personality and Social Psychology*, *91*, 232–242.
Fishbach, A., & Trope, Y. (2005). The substitutability of external control and self-control in overcoming temptation. *Journal of Experimental Social Psychology*, *41*, 256–270.
Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behaviour: An introduction to theory and research*. Reading, MA: Addison-Wesley.
Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behaviour: The reasoned action approach*. New York: Psychology Press.
Förster, J., Liberman, N., & Higgins, E. T. (2005). Accessibility from active and fulfilled goals. *Journal of Experimental Social Psychology*, *41*, 220–239.
Gailliot, M. T., Baumeister, R. F., DeWall, C. N., Maner, J. K., Plant, E. A., Tice, D. M., et al. (2007). Self-control relies on glucose as a limited energy source: Willpower is more than a metaphor. *Journal of Personality and Social Psychology*, *92*, 325–336.
Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. *Psychological Bulletin*, *132*, 692–731.
Gendolla, G. H. E., & Wright, R. A. (2005). Motivation in social settings: Studies of effort-related cardiovascular arousal. In J. P. Forgas, K. Williams, & W. von Hippel (Eds.), *Social motivation* (pp. 71–90). New York: Cambridge University Press.
Gilbert, D. T., Morewedge, C. K., Risen, J. L., & Wilson, T. D. (2004). Looking forward to looking backward: The misprediction of regret. *Psychological Science*, *15*, 346–350.
Gilbert, S. J., Gollwitzer, P. M., Cohen, A.-L., Oettingen, G., & Burgess, P. W. (2009). Separable brain systems supporting cued versus self-initiated realization of delayed intentions. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *35*, 905–915.
Gollwitzer, A., Oettingen, G., Kirby, T. A., Duckworth, A. L., & Mayer, D. (2011). Mental contrasting facilitates academic performance in school children. *Motivation and Emotion*, *35*, 403–412.
Gollwitzer, P. M. (1990). Action phases and mind-sets. In E. T. Higgins & R. M. Sorrentino (Eds.), *The handbook of motivation and cognition: Foundations of social behaviour* (Vol. 2, pp. 53–92). New York: Guilford Press.
Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist*, *54*, 493–503.
Gollwitzer, P. M., & Kirchhof, O. (1998). The willful pursuit of identity. In J. Heckhausen & C. S. Dweck (Eds.), *Life-span perspectives on motivation and control* (pp. 389–423). New York: Cambridge University Press.
Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. *Advances in Experimental Social Psychology*, *38*, 69–119.
Gouttebarge, V., Wind, H., Kuijer, P. P. F. M., & Frings-Dresen, M. H. W. (2004). Reliability and validity of Functional Capacity Evaluation methods: A systematic review with reference to Blankenship system, Ergos work simulator, Ergo-Kit and Isernhagen work system. *International Archives of Occupational and Environmental Health*, *77*, 527–537.
Gray, J. A., & McNaughton, N. (2000). *The neuropsychology of anxiety* (2nd ed.) New York: Oxford University Press.
Havighurst, R. J. (1948/1972). *Developmental tasks and education*. New York: David McKay.
Hayes-Roth, B., & Hayes-Roth, F. (1979). A cognitive model of planning. *Cognitive Science*, *3*, 275–310.
Heckhausen, H. (1991). *Motivation and action*. New York: Springer-Verlag Publishing.

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, *52*, 1280–1300.
Hill, N., & Stone, W. C. (1997). *Success through a positive mental attitude: Discover the secret of making your dreams come true*. Wellingborough, UK: Thorsons.
Holahan, C. J., Moos, R. H., Holahan, C. K., Brennan, P. L., & Schutte, K. K. (2005). Stress generation, avoidance coping, and depressive symptoms: A 10-year model. *Journal of Consulting and Clinical Psychology*, *73*, 658–666.
James, W. (1890). *Principles of psychology*. New York: Holt.
Johannessen, K. B., Oettingen, G., & Mayer, D. (in press). Mental contrasting of a dieting wish improves self-reported health behaviour. *Psychology & Health*. doi:10.1080/08870446.2011.626038.
Kahneman, D., & Miller, D. T. (1986). Norm theory: Comparing reality to its alternatives. *Psychological Review*, *93*, 136–153.
Kahneman, D., & Tversky, A. (1982). The simulation heuristic. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgements under uncertainty: Heuristics and biases* (pp. 201–208). New York: Cambridge University Press.
Kaiser, S. B. (1996). *The social psychology of clothing: Symbolic appearances in context*. New York: Fairchild.
Kappes, A., & Oettingen, G. (2012). *The emergence of goal commitment: Mental contrasting connects future and reality*. Manuscript submitted for publication.
Kappes, A., Oettingen, G., & Pak, H. (in press). Mental contrasting and the self-regulation of responding to negative feedback. *Personality and Social Psychology Bulletin*.
Kappes, A., Singmann, H., & Oettingen, G. (in press). Mental contrasting instigates goal-pursuit by linking obstacles of reality with instrumental behavior. *Journal of Experimental Social Psychology*. doi: 10.1016/j.jesp.2012.02.002
Kappes, A., Wendt, M., Reinelt, T., & Oettingen, G. (2012). *Mental contrasting effects on the identification of obstacles*. Manuscript submitted for publication.
Kappes, H. B., Kappes, A., & Oettingen, G. (2012). *When attainment is all in your mind*. Manuscript submitted for publication.
Kappes, H. B., & Oettingen, G. (2011). Positive fantasies about idealised futures sap energy. *Journal of Experimental Social Psychology*, *47*, 719–729.
Kappes, H. B., Schwörer, B., & Oettingen, G. (in press). Needs instigate positive fantasies of idealized futures. *European Journal of Social Psychology*. doi: 10.1002/ejsp.1854
Kappes, H. B., Oettingen, G., & Mayer, D., (2012). Positive fantasies predict low academic achievement in disadvantaged students. *European Journal of Social Psychology*, *42*, 53–64.
Kappes, H. B., Oettingen, G., Mayer, D., & Maglio, S. (2011). Sad mood promotes self-initiated mental contrasting of future and reality. *Emotion*, *11*, 1206–1222.
Kappes, H. B., Sharma, E. & Oettingen, G. (in press). Positive fantasies dampen charitable giving when many resources are demanded. *Journal of Consumer Psychology*. doi: 10.1016/j.jcps.2012.02.001
Kiesel, A., Steinhauser, M., Wendt, M., Falkenstein, M., Jost, K., Philipp, A. M., et al. (2010). Control and compatibility in task switching? A review. *Psychological Bulletin*, *136*, 849–847.
Killingsworth, M. A., & Gilbert, D. T. (2010). A wandering mind is an unhappy mind. *Science*, *330*, 932.
Kim, D. J., & Holowaty, E. J. (2003). Brief, validated survey instruments for the measurement of fruit and vegetable intakes in adults: A review. *Preventive Medicine*, *36*, 440–447.
Kirk, D., Oettingen, G., & Gollwitzer, P. M. (2011). Mental contrasting promotes integrative bargaining. *International Journal of Conflict Management*, *22*, 324–341.
Kirk, D., Oettingen, G., & Gollwitzer, P. M. (in press). Promoting integrative bargaining: Mental contrasting with implementation intentions. *International Journal of Conflict Management*.
Klinger, E. (1971). *Structure and functions of fantasy*. New York: Wiley.

Klinger, E. (1975). Consequences of commitment to and disengagement from incentives. *Psychological Review*, *82*, 1–25.

Klinger, E. (1977). *Meaning and void*. Minneapolis: University of Minnesota Press.

Klinger, E. (1990). *Daydreaming: Using waking fantasy and imagery for self-knowledge and creativity*. Los Angeles, CA: Tarcher.

Koo, M., & Fishbach, A. (2008). Dynamics of self-regulation: How (un)accomplished goal actions affect motivation. *Journal of Personality and Social Psychology*, *94*, 183–195.

Kovacs, M. (1985). The Children's Depression Inventory (CDI). *Psychopharmacology Bulletin*, *21*, 995–998.

Lagnado, D. A., Waldmann, M. R., Hagmayer, Y., & Sloman, S. A. (2007). Beyond covariation: Cues to causal structure. In A. Gopnik & L. Schulz (Eds.), *Causal learning: Psychology, philosophy, and computation* (pp. 154–172). Oxford, UK: Oxford University Press.

Lengua, L., & Sandler, I. (1996). Self-regulation as a moderator of the relation between coping and symptomatology in children of divorce. *Journal of Abnormal Child Psychology*, *24*, 681–701.

Lewin, K. (1926). Vorsatz, Wille und Bedürfnis [Intention, will, and need]. *Psychologische Forschung*, *7*, 330–385.

Linton, S. J., & Nordin, E. (2006). A 5-year follow-up evaluation of the health and economic consequences of an early cognitive behavioural intervention for back pain: A randomized, controlled trial. *Spine*, *31*, 853–858.

Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice Hall.

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task performance: A 35 year odyssey. *American Psychologist*, *57*, 705–717.

Locke, E. A., Latham, G. P., & Erez, M. (1988). The determinants of goal commitment. *Academy of Management Review*, *13*, 23–39.

Maddux, J. E. (1999). Expectancies and the social-cognitive perspective: Basic principles, processes and variables. In I. Kirsch (Ed.), *How expectancies shape experience* (pp. 17–39). Washington, DC: American Psychological Association.

Mahler, W. (1933). Ersatzhandlungen verschiedenen Realitätsgrades [Compensatory action based on different degrees of reality]. *Psychologische Forschung*, *18*, 27–89.

Markman, K. D., Gavanski, I., Sherman, S. J., & McMullen, M. N. (1993). The mental simulation of better and worse possible worlds. *Journal of Experimental Social Psychology*, *29*, 87–109.

Markman, K. D., & McMullen, M. (2003). A reflection and evaluation model of comparative thinking. *Personality and Social Psychology Review*, *7*, 244–267.

Martin, L. L., & Tesser, A. (1989). Towards a motivational and structural theory of ruminative thought. In S. Uleman & J. A. Bargh (Eds.), *Unintended thought* (pp. 306–326). New York: Guilford Press.

Masicampo, E. J., & Baumeister, R. F. (2011a). Unfulfilled goals interfere with tasks that require executive functions. *Journal of Experimental Social Psychology*, *47*, 300–311.

Masicampo, E. J., & Baumeister, R. F. (2011b). Consider it done! Plan making can eliminate the cognitive effects of unfulfilled goals. *Journal of Personality and Social Psychology*, *101*, 667–683.

Mayo Foundation for Medical Education and Research. (2007). *Exercise: 7 benefits of regular activity*. Retrieved from Mayo Clinic website: http://www.mayoclinic.com/health/exercise/HQ01676

McClelland, D. C., Clark, R. A., Roby, T. B., & Atkinson, J. W. (1949). The projective expression of needs. IV. The effect of the need for achievement on thematic apperception. *Journal of Experimental Psychology*, *39*, 242–255.

McCulloch, K. C., Fitzsimons, G. R., Chua, S. N., & Albarracin, D. (2011). Vicarious goal satiation. *Journal of Experimental Social Psychology*, *47*, 685–688.

McWilliams, P. (1995). *You can't afford the luxury of a negative thought*. Los Angeles, Ca.: Prelude Press.

Meiran, N. (1996). Reconfiguration of processing mode prior to task performance. *Learning, Memory, and Cognition*, *22*, 1423–1442.

Mischel, W. (1973). Towards a cognitive social learning reconceptualisation of personality. *Psychological Review*, *80*, 252–283.

Moberly, N. J., & Watkins, E. R. (2008). Ruminative self-focus, negative life events, and negative affect. *Behaviour Research and Therapy*, *46*, 1034–1039.

Morewedge, C. K., Gilbert, D. T., Myrseth, K. O. R., Kassam, K. S., & Wilson, T. D. (2010). Consuming experience: Why affective forecasters overestimate comparative value. *Journal of Experimental Social Psychology*, *46*, 986–992.

Muraven, M. R., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, *126*, 247–259.

Murray, H. A. (1938). *Explorations in personality*. New York: Oxford University Press.

Neely, J. H. (1977). Semantic priming and retrieval from lexical memory: Roles of inhibitionless spreading activation and limited-capacity attention. *Journal of Experimental Psychology: General*, *106*, 226–254.

Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology*, *109*, 504–511.

Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science*, *3*, 400–424.

Obrist, P. A. (1981). *Cardiovascular psychophysiology: A perspective*. New York: Plenum Press.

Oettingen, G. (1996). Positive fantasy and motivation. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behavior* (pp. 236–259). New York: Guilford Press.

Oettingen, G. (1997). Culture and future thought. *Culture & Psychology*, *3*, 353–381.

Oettingen, G. (2000). Expectancy effects on behaviour depend on self-regulatory thought. *Social Cognition*, *18*, 101–129.

Oettingen, G., & Gollwitzer, P. M. (2001). Goal setting and goal striving. In A. Tesser & N. Schwarz (Eds.), *Blackwell handbook of social psychology: Intraindividual processes* (pp. 329–347). Oxford, UK: Blackwell.

Oettingen, G., Hönig, G., & Gollwitzer, P. M. (2000). Effective self-regulation of goal attainment. *International Journal of Educational Research*, *33*, 705–732.

Oettingen, G., Marquardt, M., & Gollwitzer, P. M. (in press). Mental contrasting turns positive feedback on creative potential into successful performance. *Journal of Experimental Social Psychology*.

Oettingen, G., & Mayer, D. (2002). The motivating function of thinking about the future: Expectations versus fantasies. *Journal of Personality and Social Psychology*, *83*, 1198–1212.

Oettingen, G., Mayer, D., & Brinkmann, B. (2010). Mental contrasting of future and reality: Managing the demands of everyday life in health care professionals. *Journal of Personnel Psychology*, *9*, 138–144.

Oettingen, G., Mayer, D., & Portnow, S. (2011). *Positive fantasies about the future predict depressive symptoms*. Manuscript submitted for publication.

Oettingen, G., Mayer, D., Sevincer, A. T., Stephens, E. J., Pak, H., & Hagenah, M. (2009). Mental contrasting and goal commitment: The mediating role of energisation. *Personality and Social Psychology Bulletin*, *35*, 608–622.

Oettingen, G., Mayer, D., & Thorpe, J. S. (2010). Promotion and prevention fantasies and the self-regulation of goal commitment to reduce cigarette consumption. *Psychology and Health*, *25*, 961–977.

Oettingen, G., Mayer, D., Thorpe, J. S., Janetzke, H., & Lorenz, S. (2005). Turning fantasies about positive and negative futures into self-improvement goals. *Motivation and Emotion*, *29*, 237–267.

Oettingen, G., Pak, H., & Schnetter, K. (2001). Self-regulation of goal-setting: Turning free fantasies about the future into binding goals. *Journal of Personality and Social Psychology*, *80*, 736–753.

Oettingen, G., Stephens, E. J., Mayer, D., & Brinkmann, B. (2010). Mental contrasting and the self-regulation of helping relations. *Social Cognition*, *28*, 490–508.

Oettingen, G., & Wadden, T. A. (1991). Expectation, fantasy, and weight loss: Is the impact of positive thinking always positive? *Cognitive Therapy and Research*, *15*, 167–175.

Olson, J. M., Roese, N. J., & Zanna, M. P. (1996). Expectancies. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 211–238). New York: Guilford Press.

Ostelo, R. W. J. G., Van Tulder, M. W., Vlaeyen, J. W. S., Linton, S. J., Morley, S. J., & Assendelft, W. J. J. (2005). *Behavioural treatment for chronic low-back pain*. Cochrane Database Syst. Rev.

Polivy, J. & Herman, C. P. (2002). If at first you don't succeed; false hopes of change. *American Psychologist*, *57*, 677–689.

Peale, N. V. (2003). *The power of positive thinking*. *The first fireside edition*. New York: Fireside.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, *1*, 385–340.

Rescorla, R. A. (1985). Conditioned inhibition and facilitation. In R. R. Miller & N. S. Spear (Eds.), *Information processing in animals: Conditioned inhibition* (pp. 299–326). Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Rogers, R. D., & Monsell, S. (1995). Costs of a predictable switch between simple cognitive tasks. *Journal of Experimental Psychology*, *124*, 207–231.

Ryan, R. M., & Frederick, C. (1997). On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality*, *65*, 529–565.

Sanna, L. J., & Schwarz, N. (2003). Debiasing the hindsight bias: The role of accessibility experiences and (mis)attributions. *Journal of Experimental Social Psychology*, *39*, 287–295.

Schacter, D. L., & Addis, D. R. (2007). The optimistic brain. Consequences of hippocampal damage across the autobiographical memory network. *Nature Neuroscience*, *10*, 1345–1347.

Scheier, M. F., & Carver, C. S. (1992). Effects of optimism on psychological and physical well-being: Theoretical overview and empirical update. *Cognitive Therapy and Research*, *16*, 201–228.

Seligman, M. E. P. (1972). Learned helplessness. *Annual Review of Medicine*, *23*, 407–412.

Seligman, M. E. P. (1991). *Learned optimism*. New York: Knopf.

Shah, J. Y., Friedman, R., & Kruglanski, A. W. (2002). Forgetting all else: On the antecedents and consequences of goal shielding. *Journal of Personality and Social Psychology*, *83*, 1261–1280.

Sheeran, P., Webb, T. L., & Gollwitzer, P. M. (2005). The interplay between goal intentions and implementation intentions. *Personality and Social Psychology Bulletin*, *31*, 87–98.

Singer, J. (1975). *The inner world of daydreaming*. New York: Harper & Row.

Singer, J. L. (1966). *Daydreaming*. New York: Random House.

Smallman, R., & Roese, N. J. (2009). Counterfactual thinking facilitates behavioural intentions. *Journal of Experimental Social Psychology*, *45*, 845–852.

Smallwood, J., & Schooler, J. W. (2006). The restless mind. *Psychological Bulletin*, *132*, 946–958.

Stadler, G., Oettingen, G., & Gollwitzer, P. M. (2009). Physical activity in women: Effects of a self-regulation intervention. *American Journal of Preventive Medicine*, *36*, 29–34.

Stadler, G., Oettingen, G., & Gollwitzer, P. M. (2010). Intervention effects of information and self-regulation on eating fruits and vegetables over two years. *Health Psychology*, *29*, 274–283.

Szpunar, K. K. (2010). Episodic future thought: An emerging concept. *Perspectives on Psychological Science*, *5*, 142–162.

Talbot, M. (2009, April 27). Brain gain: The underground world of "neuroenhancing" drugs. *The New Yorker*.

Tashiro, T., & Mortensen, L. (2006). Translational research: How social psychology can improve psychotherapy. *American Psychologist*, *61*, 959–966.

Taylor, S. E. (1989). *Positive illusions: Creative self-deception and the healthy mind*. New York: Basic Books.

Taylor, S. E., & Brown, J. D. (1988). Illusion and well-being: A social psychological perspective on mental health. *Psychological Bulletin*, *103*, 193–210.

Taylor, S. E., Kemeny, M. E., Reed, G. M., Bower, J. E., & Gruenewald, T. L. (2000). Psychological resources, positive illusions, and health. *American Psychologist*, *55*, 99–109.

Taylor, S. E., Pham, L. B., Rivkin, I. D., & Armor, D. A. (1998). Harnessing the imagination: Mental simulation, self-regulation, and coping. *American Psychologist*, *53*, 429–439.

Thrash, T. M., & Hurst, A. L. (2009). Approach and avoidance motivation in the achievement domain: Integrating the achievement motive and achievement goal traditions. In A. J. Elliot (Ed.), *Handbook of approach and avoidance motivation* (pp. 217–234). New York: Psychology Press.

Tolman, E. C. (1938). The determinants of behaviour at a choice point. *Psychological Review*, *45*, 1–41.

Tulving, E. (2005). Episodic memory and autonoesis: Uniquely human? In H. S. Terrace, & J. Metcalfe (Eds.), *The missing link in cognition* (pp. 4–56). New York: Oxford University Press.

Tversky, A., & Koehler, D. J. (1994). Support theory: A nonextensional representation of subjective probability. *Psychological Review*, *101*, 547–567.

Van den Hout, J. H. C., Vlaeyen, J. W. S., Heuts, P. H. T. G., Zijlema, J. H. L, & Wijnen, J. A. G. (2003). Secondary prevention of work-related disability in nonspecific low back pain: Does problem-solving therapy help? A randomized clinical trial. *Clinical Journal of Pain*, *19*, 87–96.

Waldmann, M. R., & Hagmayer, Y. (2001). Estimating causal strength: The role of structural knowledge and processing effort. *Cognition*, *82*, 27–58.

Wicklund, R. A., & Brehm, J. W. (1976). *Perspectives on cognitive dissonance*. Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Wilson, T. D., & Gilbert, D. T. (2005). Affective forecasting: Knowing what to want. *Current Directions in Psychological Science*, *14*, 131–134.

Woolf, S. H. (2008). The meaning of translational research and why it matters. *Journal of American Medical Association*, *299*, 211–213.

Wright, R. A. (1996). Brehm's theory of motivation as a model of effort and cardiovascular response. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behaviour* (pp. 424–453). New York: Guilford Press.

Wright, R. A., Brehm, J. W., & Bushman, B. J. (1989). Cardiovascular responses to threat: Effects of the difficulty and availability of a cognitive avoidant task. *Basic and Applied Social Psychology*, *10*, 161–171.

Wright, R. A., & Kirby, L. D. (2001). Effort determination of cardio-vascular response: An integrative analysis with applications in social psychology. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 33, pp. 255–307). San Diego, CA: Academic.

Wrosch, C., Miller, G. E., Scheier, M. F., & Brun de Pontet, S. (2007). Giving up on unattainable goals: Benefits for health? *Personality and Social Psychology Bulletin*, *33*, 251–265.

Wrosch, C., Scheier, M. F., Miller, G. E., Schulz, R., & Carver, C. S. (2003). Adaptive self-regulation of unattainable goals: Goal disengagement, goal reengagement, and subjective well-being. *Personality and Social Psychology Bulletin*, *29*, 1494–1508.

Zhang, Y., & Fishbach, A. (2010). Counteracting obstacles with optimistic predictions. *Journal of Experimental Psychology*, *139*, 16–31.