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### Spontaneous Thought and Goal Pursuit: From Functions Such as Planning to Dysfunctions Such as Rumination

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#### Recommended Citation

Klinger, E., Marchetti, I., & Koster, E.H.W. (2018). Spontaneous thought and goal pursuit: From functions such as planning to dysfunctions such as rumination. In K. Fox & K. Christoff (Eds.), *The Oxford handbook of spontaneous thought: Mind-wandering, creativity, and dreaming* (pp. 215-247). New York, NY: Oxford University Press.

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## Oxford Handbooks Online

### **Spontaneous Thought and Goal Pursuit: From Functions Such as Planning to Dysfunctions Such as Rumination**

Eric Klinger, Ernst H.W. Koster, and Igor Marchetti

The Oxford Handbook of Spontaneous Thought: Mind-Wandering, Creativity, and Dreaming

*Edited by Kalina Christoff and Kieran C.R. Fox*

Print Publication Date: May 2018 Subject: Psychology, Cognitive Neuroscience

Online Publication Date: Apr 2018 DOI: 10.1093/oxfordhb/9780190464745.013.24

### **Abstract and Keywords**

Spontaneous thoughts occur by default in the interstices between directed, task-oriented thoughts or moments of perceptual scrutiny. Their contents are overwhelmingly related to thinkers' current goals, either directly or indirectly via associative networks, including past and future goals. Their evocation is accompanied by emotional responses that vary widely in type, valence, and intensity. Given these properties of thought flow, spontaneous thoughts are highly adaptive as (1) reminders of the individual's larger agenda of goals while occupied with pursuing any one of them, (2) promotion of planning for future goal pursuits, (3) deeper understanding of past goal-related experiences, and (4) development of creative solutions to problems in goal pursuit. The same mechanisms may occasion repetitive but unproductive thoughts about the pursuit, the consequences of the failure, or the self, and strong negative emotions steering the train of thought may lead to narrowing of its focus, thus producing rumination.

Keywords: spontaneous thought, adaptive, goal, rumination, emotion

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Under normal conditions, the brain never just rests. As circumstances change from, for example, focusing on tasks to seemingly aimless musing, or from waking to the various phases of sleep (or the reverse of these), the parts of the brain that are most active change from one set to another. Studies of the contents of consciousness have long recognized this apparently unceasing activity, and the technology of brain imaging has permitted researchers to gradually reveal the neural reality that underlies it. Two important generalizations have emerged from these studies, which are also central components of the *goal theory of current concerns* (Klinger, 1971, 1975, 1977, 2013;

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Klinger & Cox, 2011a): (a) spontaneous thought represents the mental baseline; (b) the content of spontaneous thought is mainly related to personal goals.

# **Basic Properties of Spontaneous Thought**

## **Spontaneous Mentation as Baseline or Default Mental State**

First, as early observations suggested, spontaneous thought (in the sense of “unintended, nonworking, non-instrumental mental content that comes to mind unbidden and effortlessly”; Christoff, 2012, p. 52; Klinger, 2009) constitutes a baseline state of mental activity that occurs irresistibly in the absence of instrumental, task-oriented mental activity (Klinger, 1971). Spontaneous thought in this sense includes mostly such states as mind-wandering and other forms of daydreaming. In parallel, early brain imagers discovered that when their research participants turned from task mentation to mind-wandering, certain brain structures, such as the posterior cingulate cortex, medial prefrontal cortex, and (p. 216) possibly medial temporal lobe, predictably became particularly active; they dubbed these the default mode network (e.g., Andrews-Hanna, Reidler, Huang, & Buckner., 2010; Christoff, Gordon, Smallwood, Smith, & Schooler, 2009; Mason et al., 2007; Raichle et al., 2001; Stawarczyk, Majerus, Maquet, & D’Argembeau, 2011b)—“default” here carrying the same meaning as the earlier term “baseline.”

To be clear, mind-wandering is not the only kind of conscious content that can be observed while the default mode network is active. That is, other self-referential and perceptually decoupled content may also occur (e.g., Spreng, Mar, & Kim, 2009). Moreover, mind-wandering is often interwoven with executive systems (Christoff, 2012; Christoff et al., 2009), with the default mode network being positively correlated with the frontoparietal control network during internally focused tasks (e.g., Spreng, Stevens, Chamberlain, Gilmore, & Schacter, 2010). Still, mind-wandering is clearly a prominent part of the default mix (for a more extended discussion of the relationship between the default mode network and mind-wandering, see Klinger, 2013).

Mind-wandering accounts on average for between about a third and a half of conscious thoughts (Killingsworth & Gilbert, 2010; Klinger & Cox, 1987–1988). It would therefore be surprising if it could have evolved in the absence of important contributions to human functioning.

## **Content of Spontaneous Mentation as Principally Goal-Related**

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A second important generalization is that the content of spontaneous waking thought and dreaming is prominently related to the individual's goal pursuits, directly or indirectly, including metaphorically. For animal species, pursuit and adequate attainment of goals is, of course, a categorical imperative for survival. Furthermore, progress toward one's goals is an important determinant of an individual's positive affect (Klug & Maier, 2015). It is therefore not surprising that a chief focus of thought, spontaneous and otherwise, is the pursuit of an individual's goals, great and small. The goal pursuits in mind-wandering are mostly those in the individual's current life, but may also, by association in spontaneous mentation, be those of the past or contemplated future, as revealed through thought- or dream-sampling using probes (Hoelscher, Klinger, & Barta, 1981; Klinger, 1978, 2009; Nikles, Brecht, Klinger, & Bursell, 1998). This view is also supported by indications of spontaneous planning during mind-wandering (Baird, Smallwood, & Schooler, 2011; Stawarczyk, Majerus, Maj, Van der Linden, & D'Argembeau, 2011a)—presumably planning for action toward one of the participant's goals. Studies of thoughts retrospectively recalled as thoughts about "today and yesterday" were also characterized, in comparison with things less thought about, as being about goals marked by stronger commitment or by obstacles to their attainment (Klinger, Barta, & Maxeiner, 1980).

Spontaneous thoughts are probably triggered by cues (meaningful stimuli) that may be external in the environment or internal in the person's own mental activity and that are associated with one or another of the individual's goals. Such cues may take many forms, such as the name of a loved one or something associated in the person's mind with a loved one (or with an enemy, etc.), or a word, image, or smell associated with an ongoing goal pursuit, including cues related to failure to achieve a goal (Chatard & Selimbegović, 2011, Study 6).

A growing literature indicates that becoming committed to pursuing a goal boosts the cognitive-processing priority for cues related to that goal. Thus, knowing a person's goals is a good predictor of which cues (such as spoken words) the person will attend to, recall, and have thoughts or dreams about—namely, those that are associated with the person's own goals, as compared with someone else's goals (Hoelscher, Klinger, & Barta, 1981; Klinger, 1978, 2009, 2013; Nikles et al., 1998). (The parallels in findings with thoughts and dreams become less surprising in light of the argument that dreams are partly akin to mind-wandering in regard to both content and neural substrates; Domhoff & Fox, 2015.)

The processing priority may also be found in interference effects. For example, in the classic Stroop procedure, in which participants are under instructions to name as quickly as possible the color of the font of words displayed one at a time, participants typically respond more slowly when the meaning of the word conflicts with the color, such as green font for the word *red*. Presumably, word meaning takes precedence in cognitive processing over font color. Similarly, reaction times (RTs) in reporting the font color of goal-related words are typically on average longer than they are to non-goal-related words (Johnsen Laberg, Cox, Vaksdal, & Hugdahl, 1994; Riemann & McNally, 1995; Gilboa-Schechtman, Revelle, & Gotlib, 2000; Fadardi & Cox, 2008) or images.

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Presumably, the own-goal-relatedness of the (p. 217) word's meaning grabs processing priority over identification of font color, thereby slowing reporting of font color. This processing priority could readily account for the tendency of conscious mental content in mind-wandering to gravitate toward material related to the individual's own goals. The stimuli for shifts in the content of mind-wandering segments are presumably internal ones in the individual's own ongoing stream of thought.

Interestingly, a recent study provided evidence for the notion that attention allocation is strongly influenced at early stages by the goal-relatedness of information (Vogt, Lozo, Koster, & De Houwer, 2011). In this study, individuals either received a disgust or a neutral induction. As expected, it was shown that a disgust induction elicited attention toward disgust-related pictures that were briefly presented. More important, individuals in the disgust induction condition also showed heightened attention for pictures representing cleanliness, which is due to disgust triggering the goal to be clean and attention thus being allocated to the means (e.g., cleaning products) of becoming clean.

It is, of course, hard to control particular segments of participants' thought stream experimentally so as to examine their role as internal cues to further thoughts. The evidence described in the preceding showed that subtle own-goal-related external stimuli strongly affected the content of thoughts and dreams, but those cues were external. However, in a different kind of interference method, Kopp, D'Mello, and Mills (2015) instructed some participants to list the features of an automobile and other participants to list their to-do plans for the next five days. Subsequently, all read a scientific text and indicated whenever they became aware of their mind wandering to task-unrelated thoughts (TUTs) or to task-related interference (TRIs). As predicted, the participants who had just reminded themselves of their short-term goals reported more TUTs and displayed less comprehension of the text than did the control group, whereas the groups did not differ in TRIs. The difference in TUTs mediated the difference in comprehension. Presumably, recounting one's own goals triggered more subsequent distracting thoughts, probably also about one's own goals. Other research (McVay & Kane, 2013) has also shown with thought probes that displaying word triplets that contain words alluding to participants' personal concerns, as compared with other word triplets, increased subsequent mind-wandering.

Mind-wandering is, of course, by definition thought that wanders off-task. However, Dijksterhuis and his colleagues (e.g., Dijksterhuis & Meurs, 2006; Dijksterhuis & Nordgren, 2006) have proposed that "unconscious thought," defined as "thought or deliberation in the absence of conscious attention directed at the problem" at hand (Dijksterhuis, Bos, Nordgren, & van Baaren, 2006, p. 1005), provides important contributions to goal attainment, such as superior decision-making. Their investigations have provided evidence in support of this position (but see Nieuwenstein et al., 2015). However, this evidence is based on a procedure that, typically and tacitly, operationalizes unconscious thought as whatever mental processing occurs during a task designed to distract the participant from a previous assignment that is to be resumed after an intervening distractor task. This seems very similar to the operational definition

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commonly used for opportunities for mind-wandering, except that the distracting tasks assigned by Dijksterhuis's group, such as the *n*-back task (i.e., pressing a space bar when the character on a screen is the same as one *n* trials ago), are intended to block all conscious thought. What we now know about mind-wandering makes it likely that this procedure reduces but does not completely block it. It remains an open question as to the extent or way that "unconscious thought" and mind-wandering are in fact different processes. Perhaps future brain-imaging research can address this question.

The reason for raising this point here is that one investigation (Bos, Dijksterhuis, & van Baaren, 2008) finds clearly that, in the absence of an experimentally induced goal to complete a task later, the contribution of unconscious thought to that task disappears. This supports the view that continuing the processing of task-relevant information depends on having established the current concern that underlies a goal pursuit. Relatedly, a review of other evidence indicates that "goal completion dissolves the cognitive, affective, and behavioural effects of goal striving" (Oettingen, 2012, p. 34), indicating that successful goal pursuit ends the cognitive effects of the respective current concern.

## Duration and Frequency of Spontaneous Thought Segments

Thought segments are on average very brief. A group of 20 participants, who had received practice with feedback at estimating brief time lapses, rated the durations of their latest thought segments prior to probes, and of the segments just preceding those, in both laboratory settings and, for 12 of them, while living their otherwise normal daily (p. 218) lives. A segment here was defined as a thought that is thematically homogeneous and ends when the topic shifts. These participants' median estimates of segment duration were 5 seconds in both laboratory and daily-life settings, with a mean of 9 seconds in the laboratory setting and 14 seconds (with a standard deviation of 22 seconds) outside the laboratory (Klinger, 1978). These participants rated their confidence in their own estimates as "very confident" 64% of the time and as "moderately confident" 35% of the time. Pope (1977) asked participants in a laboratory to signal with a key press every time their mind shifted to a new topic, which happened on average about 5 to 6 seconds apart. This agrees very approximately with the findings described in the preceding (Klinger, 1978).

These estimated durations applied to all of a participant's sampled thoughts, not just the spontaneous ones, but participants in Klinger's (1978) sample also rated each thought on a variety of variables, including Directedness and Undirectedness, the latter being equivalent to spontaneity. The correlations of Undirectedness ratings with Duration for daily-life samples were  $-.18$  for the latest thought segment and  $-.08$  for the just-previous thought segment; the corresponding correlations for Directedness were  $.17$  and  $.11$ . The corresponding correlations for Undirectedness in laboratory samples were  $-.05$  and  $.00$ ; for Directedness, they were  $.06$  and  $.02$ . Clearly, these are all very small correlations. It

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therefore seems safe to consider spontaneous thoughts, which make up between about a third and a half of people's thought segments, to be of approximately the same duration as directed thoughts.

The implication is that mental content continually jumps from one goal-related topic to another in brief segments that may or may not reflect the same goal. A very rough estimate provides the generalization that waking mental activity over a 16-hour day contains about 4,000 such thought segments (Klinger, 1990), of which perhaps between about 1,300 to 2,000 are spontaneous.

### **Emotional Responses in Relation to Spontaneous Thoughts**

There are a number of reasons to believe that thoughts carry emotional charge and may, in fact, be triggered by at least low-amplitude, fragmentary emotional responses (*proto-emotional* responses; Klinger, 1996). First, there are substantial intra-individual correlations, across words, between the strength of participants' self-rated emotional response to each word and the extent to which they rated each word as related to their "important concerns, problems, worries, or goals that currently preoccupy" them. These correlations range from .45 (Bock & Klinger, 1986) to a set of correlations that ranged from 0.57 to 0.65 in four unpublished data sets.

Second, goal-relatedness of thoughts is associated with emotional arousal. For example, another investigation (Nikula, Klinger, & Larson-Gutman, 1993) prompted participants for their thought content when experimenters observed unsolicited skin-conductance responses, which are often taken to indicate emotional response. Ratings for the goal-relatedness of thoughts were at those times significantly higher than when participants' thoughts were sampled during electodermally quiescent periods. Using a different approach, inducing an affectively negative concern experimentally led to increased mind-wandering and, subsequent to the mind-wandering episodes, continuing negative affect, suggesting that the mental content of the mind-wandering contributed to maintaining the negative affect (Stawarczyk, Majerus, & D'Argembeau, 2013; see also Watkins, Grafton, Weinstein, & MacLeod, 2015, in regard to "emotional extrapolation").

Also, in a lexical-decision task (pressing a button as quickly as possible to indicate whether a letter on a screen was an X or a Y; Schneider, 1987), one side of the screen contained words intended to be peripheral distracting stimuli and probably not consciously perceived. The emotional-arousal effect of the distractor words (as subsequently rated by the participants) was inversely correlated with reaction time to the letters being judged as X or Y; that is, words that participants rated as emotionally arousing slowed their task response—gained higher cognitive processing priority over the assigned lexical decision-making—in a way similar to that found with goal-related words in the Stroop. That this really was an effect of emotion is supported by the finding that the interference with task responses was associated with participants' scores on the Affective Intensity Measure (Larsen & Diener, 1987). Given the preceding evidence that

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goal-related thoughts accompany emotional arousal and that mind-wandering mostly features goal-related thoughts, it is of interest that mind-wandering is itself associated with pupillary dilation, often viewed as indicative of emotional arousal (Franklin, Broadway, Mrazek, Smallwood, & Schooler, 2013).

This similarity between emotional arousal and goal-relatedness in the effects of distractor words on cognitive processing is consistent with the view (p. 219) that “being goal-related” means “being emotionally arousing.” It presumably follows that the emotional tenor of mind-wandering is to some extent determined by the affective quality of the emotional response to cues, which accompanies or perhaps evokes the next segments of thought flow. Glowing recollections of a good time at a party, of recognition for an accomplishment, or of a loving social interaction would expectedly carry a strongly positive emotional charge. Recollections of personal rejection or failure—threats to or loss of important goal attainments—would expectedly carry a strongly negative emotional charge. Furthermore, mood at one time point is associated with the affective tone of subsequent thoughts (Poerio, Totterdell, & Miles, 2013). Correspondingly, emotionally charged thought segments are likely to lead to further segments of similar affective quality, whether anticipation of future positive consequences in the case of a foregoing positive segment, or, in the case of foregoing negative segments, subsequent segments of self-examination, self-criticism, anger at others with anticipation of future avoidance of them or revenge, and imagined future episodes of rejection, failure, or loss. With strong emotional charge, as when important goals are involved, the resulting thought stream may be funneled into loops of thematically and emotionally related or event-repetitive content, as in rumination (rumination is discussed at greater length in a later section).

## Adaptiveness of Spontaneous Thoughts

The preceding view on spontaneous thoughts suggests both adaptive and maladaptive consequences. That spontaneous thoughts must have significant adaptive benefits is a clear logical inference from the apparent fact that humans have evolved to spend up to half of their mental activity engaging in them.

The notion that such an ubiquitous process must have significant adaptive advantages for the human species has received recognition (Baars, 2010; Klinger, 1990; Smallwood & Andrews-Hanna, 2013), but so far only limited research attention, although that is gradually changing, including integration with advancing neuroscientific findings (Andrews-Hanna, 2012; Andrews-Hanna, Smallwood, & Spreng, 2014; Fox, Spreng, Ellamil, Andrews-Hanna, & Christoff, 2015; Gruberger Ben-Simon, Levkovitz, Zangen, & Hendler, 2011). From a purely inductive standpoint, based on informal observation of the contents of spontaneous thoughts, a number of possible benefits are already apparent.



### Keeping Track of Goals

First, given the brevity of most mind-wandering segments and the large number of them during a particular day, and given the tendency for these segments to cycle through thematic material relevant to an individual's numerous current goals, it is apparent that mind-wandering serves the function of reviewing an individual's agenda of goals other than the goal being currently pursued. This must surely refresh memory of these other goals and, most likely, serve as a reminder mechanism for taking timely action.

### Promoting Planning

Second, given that a substantial portion of mind-wandering or daydream segments are future-oriented (Andrews-Hanna et al., 2010; Baird et al., 2011; Buckner, Andrews-Hanna, & Schacter, 2008; Klinger & Cox, 1987–1988; Smallwood, Nind, & O'Connor, 2009; Smallwood, Schooler, et al., 2011), they provide an arena for spontaneous planning or contributions to planning. Indeed, there is now evidence for such a planning function. On the one hand, these spontaneous contributions are in most instances imaginary fragments that bear on goals and plans without providing a linear planning process (Schacter, 2012). On the other hand, there is no reason to believe that mind-wandering cannot wander onto and perhaps be interrupted by brief operant (i.e., instrumental) segments. Researchers discovered that mind-wandering often includes an interweaving of default-network activity with executive brain systems (Christoff, 2012; Christoff, Ream, & Gabrieli, 2004; Christoff et al., 2009; Mason et al., 2007; Spreng et al., 2010). One would expect such a process to contribute to the formulation of concrete plans for future behavior, as found by Baird et al. (2011) and Stawarczyk et al. (2011a). For example, spontaneous imagery of an upcoming party might portray an awkward interaction with an individual who is expected to be present, which might stimulate some operant thoughts of how to handle that situation. Spreng et al. (2010), based on fMRI observations, proposed a three-network model of how this switching process happens. The three networks are the default-mode network, the dorsal attention network, and a frontoparietal control network. The first two have "an intrinsic competitive relationship" (Spreng et al., 2010, p. 303), (p. 220) whereas the third plays a key role in the switch back and forth.

### Creative Problem-Solving

It has long been recognized in popular culture that difficult problems requiring non-routine and hence creative solutions can benefit from merely allowing time to pass before trying to finalize them, as in the advice to "sleep on" the problem. It is likely that not only sleep, but also periods of spontaneous mentation, such as mind-wandering, facilitate this kind of incubation. There are numerous anecdotal accounts of people having important insights into difficult problems during carriage rides, bathing, taking a walk or a nap, and

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so on—that is, activities conducive to spontaneous mentation (e.g., Klinger, 1990; Singer, 2009). Now there are also relevant controlled experiments.

Dijksterhuis and Meurs (2009), investigating the efficacy of “unconscious thought” (Dijksterhuis & Nordgren, 2006), assigned participants to tasks such as finding creative names for pastas or unusual uses for a brick and placed them in one of three conditions: immediate responses, or responses following three-minute periods of either focused thought about the problem or a distractor task. In three experiments, the participants responded with more creative or divergent responses after the distractor task than after the other activities. The investigators hoped to design distractor tasks that would suppress conscious thought, but from what we know about mind-wandering—very brief segments, focused on unmet goals—it seems unlikely that the suppression could have been complete (Singer, 1966). It is therefore likely but uncertain that spontaneous thoughts could have been responsible for the results.

However, Baird et al. (2012) provided participants with two opportunities to think of unusual uses for common objects. Between these opportunities, some participants engaged in a very undemanding task that would provide plenty of time for spontaneous thoughts, and others received a very demanding task that would limit spontaneous mentation. The group who had the undemanding interim task performed significantly better than the other group on the second opportunity to come up with creative solutions. Evidently the chance to engage in spontaneous thought, as in mind-wandering, fostered the necessary incubation of creative solutions in a way that improved performance.

### **Reviewing Past Experiences**

Of course, coming up with new ideas often involves drawing on one’s past experiences. Also, there is pleasure to be savored when reliving one’s past good times and successes, perhaps in relation to hopes for more of them. Furthermore, when faced with one’s own limitations and failures, transcending these often thrusts one into scrutinizing what one might have done differently, sometimes leading to useful insights that improve performance later on. Indeed, the contents of spontaneous thoughts and dreams include a substantial portion of memories and reflections on past events (Andrews-Hanna et al., 2010; Klinger & Cox, 1987–1988), especially during negative moods (Smallwood et al., 2011; Smallwood & O’Connor, 2011). Reviewing past experiences for benefits to future endeavors is presumably advantageous in reaching one’s goals.

### **Reduced Delay Discounting**

Delay discounting is the phenomenon in which people, given the choice, prefer to receive smaller rewards soon rather than larger rewards later; that is, they presumably discount the value to them of the reward the more remote it will be in time. This preference may keep a person from maximizing well-being by settling for less than is available, be it

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money, career satisfaction, or a solid personal relationship. There is evidence that people whose minds wander more than others display less delay discounting (Smallwood, Ruby, & Singer, 2013), presumably therefore displaying more patience and arriving at more prudent choices. Unfortunately, because this evidence is correlational rather than experimental, one cannot be sure regarding the direction of causality.

### **Consolidation of Memories**

There is ample evidence that sleep helps to consolidate long-term memories (e.g., Pace-Schott, Germain, & Milad, 2015), especially during rapid-eye-movement (REM) sleep (McDevitt, Duggan, & Mednick, 2014) and especially with regard to goal-relevant features (Bennion, Payne, & Kensinger, 2015). It now appears that periods of spontaneous thinking confer a similar, albeit weaker, consolidation benefit. In an extensive review of relevant literature, Christoff, Gordon, and Smith (2011) concluded that “recent findings suggest that the off-line processing that occurs during periods of rest is associated with the kind of memory consolidation processes that occur during sleep” (p. 264).

### **(p. 221) Superiority in Shifting Between Internal Thought Flow and External Stimuli**

There are individual differences in control over the direction of attention between internal and external processes. The ability to shift back and forth appears positively related to the individual’s working memory capacity (Rummel & Boywitt, 2014). Additionally, trait measures of mind-wandering appear inversely related to the size of attentional blinks (Thomson, Ralph, Besner, & Smilek, 2015); that is, when individuals are presented with a pair of stimuli in rapid enough succession, they do not register the second of those stimuli. The maximum inter-stimulus interval for this to happen is the size of an individual’s attentional blink. In the study by Thomson et al. (2015), high scores on trait mind-wandering predicted shorter blinks, meaning that people whose minds wander more can on average shift more rapidly than others to the second stimulus in such a pair. Thomson et al. suggest that this is an indication of adaptively finer control over the focus of attention.

### **Facilitating Action Toward Goal-Attainment**

Setting goals and moving on them generally begin with mental processes, often spontaneous, that recognize the desirability of an outcome, its attainability, and the means necessary for attaining it. It is, of course, difficult in observational research to disentangle these processes for purposes of establishing what leads to what. The closest that investigators have come so far is by instructing human participants to initiate daydream-like experiences and to vary something about the nature of these experiences, such as what the person might look forward to enjoying as a result of goal attainment or

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the obstacles that the person might imagine having to overcome (e.g., Oettingen, Pak, & Schnetter, 2001). These imaginal segments are clearly not completely spontaneous in regard to their initiation and certain features of content, but once initiated and broadly determined by the investigator, they then unfold in perhaps partly spontaneous fashion. Experimental evidence indicates that induced daydreaming of this kind can influence subsequent real-life goal attainment. Oettingen et al. (2001) have in a number of studies established that optimal goal-attainment “requires explicit, simultaneous mental elaborations of both the desired future and present reality as instigated in the mental contrasting procedure” (p. 748), as for example reaching health-promoting goals (Johannessen, Oettingen, & Mayer, 2012), exercise goals (Sheeran et al., 2013), and a variety of goals in a depressed sample (Fritzsche et al., 2016). Dwelling only on the pleasures of attainment or only on the obstacles in its way tended to be counterproductive in leading participants to reach their goals (e.g., Oettingen, 1996), as, for instance, in their teachers’ ratings of actual achievement (Oettingen et al., 2001). Other studies of thoughts initiated by experimental instructions but allowed to unfold spontaneously have also found effects on intentions or actions likely to advance particular goal pursuits (e.g., Gollwitzer, 1990; Gollwitzer, Heckhausen, & Ratajczak, 1990; Nenkov & Gollwitzer, 2012). Whether these findings with only partially spontaneous thoughts will transfer to the effects of fully spontaneous thoughts remains to be demonstrated. (For a summary of research related to mental contrasting and prospective thinking, see Oettingen, 2012).

## Costs of Spontaneous Thoughts

Research on the consequences of mind-wandering has focused heavily on its costs in the form of attentional lapses and degraded performance. However, it is important to keep in mind that neuroscientists became interested in mind-wandering and the default mode network as their participants switched from working on tasks to more relaxed intervals between tasks (Raichle et al., 2001). Mind-wandering occurs most often when the brain is less than fully occupied with tasks (such as during rest or undemanding tasks) or the external environment (e.g., Andrews-Hanna et al., 2010), when it is often safe to *decouple* brain activity (Smallwood, Tipper, et al., 2013) briefly from the external environment and ongoing tasks.

Because of this timing, there may be only modest impacts of mind-wandering on performance, but in other cases the impact can be substantial. Mooneyham and Schooler (2013) have presented an extensive review of empirical work on these costs, which include impaired comprehension when reading, impaired sustained attention to tasks, poorer performance on measures of working memory and general aptitude, and, on average, lowered mood. Since the publication of this review, Mrazek, Phillips, Franklin, Broadway, and Schooler (2013) have similarly reported impaired reading comprehension associated with prompt-assessed mind-wandering. A number of further studies have

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found additional costs: attentional lapses associated with impaired performance on the Stroop (p. 222) task (Unsworth & McMillan, 2014), a significant relationship between mind-wandering proclivity and frequency of falls in older adults, presumably at least partly because of inattention to external stimuli (Nagamatsu, Kam, Liu-Ambrose, Chan, & Handy, 2013), particularly in the left visual field (Kam, Nagamatsu, & Handy, 2014), and reduced empathic responses to others' physical discomfort, as assessed by participants' ratings and electrophysiologically with event-related potentials (Kam, Xu, & Handy, 2014). By contrast, when leaving aside its perseverative, ruminative forms, mind-wandering appears unrelated to most measures of health (Ottaviani & Couyoumdjian, 2013; Ottaviani, Shapiro, & Couyoumdjian, 2013).

Nevertheless, the cognitive impairment found in these studies must be qualified by other findings that even during mind-wandering, people retain some sensitivity to external cues when these relate to potentially important matters or when a stimulus is unexpected (Kam et al., 2013). This conclusion is consistent with sleeping or otherwise occupied participants' disproportionate response to and incorporation of unexpected cues related to their goal pursuits (Hoelscher, Klinger, & Barta, 1981; Klinger, 1978). Furthermore, the interference of mind-wandering with task activity appears to affect especially response inhibition and working memory, but not set-shifting (assessed in this case by delays caused after shifts in task rules within a series of trials; Kam & Handy, 2014). The costs of mind-wandering to task performance are therefore apparently different for different aspects of performance and different kinds of external cues, the brain seemingly weighing the relative importance of external information versus maintaining the ongoing stream of thought (Handy & Kam, 2015).

## Spontaneous Thoughts and Mood

The findings for the cognitive costs of mind-wandering are easily understandable. Perceptual decoupling is bound to interfere to some extent with absorbing one's reading material and to distract from other ongoing tasks, including, of course, those that are measures of a person's cognitive capacity. Mooneyham and Schooler's (2013) generalization regarding lowered mood, however, must be treated with caution.

The generalization that mind-wandering lowers mood was misleadingly emphasized in the title and summary statements of an otherwise important article by Killingsworth and Gilbert (2010), an experience-sampling study with a huge sample. Close inspection of their data fails to support the generalization that mind-wandering *as such* lowers mood, only that the thematic *content* of mind-wandering segments influences mood. Inasmuch as minds wander to concerns about one's own goal pursuits, especially those that are still incomplete and those that may be in trouble (Klinger, Barta, & Maxeiner, 1980), one might expect lower, more serious moods on average. However, in Killingsworth and Gilbert's own data, participants rated 42.5% of their mind-wandering episodes as about something "pleasant," with mood then averaging slightly above the overall mood average, roughly equaling mood when not mind-wandering. They rated 31% of the remaining

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mind-wandering episodes as about something “neutral,” with average mood slightly below overall average but above the mood scale’s midpoint. Participants rated mood as sharply below overall average and below the scale midpoint only during the 26.5% of mind-wandering samples that they characterized as about something “unpleasant.” Thus, only particular thought content, not mind-wandering *as such*, was associated with substantially lowered mood (cf. also Smallwood & Andrews-Hanna, 2013; Stawarczyk, Majerus, Van der Linden, & D’Argembeau, 2012). This was also the conclusion reached in subsequent experience-sampling studies (Marchetti, Koster, & de Raedt, 2013; Poerio, Totterdell, & Miles, 2013; see also, Fox, Thompson, Andrews-Hanna, & Christoff, 2014).

### Maladaptive and Excessive Daydreaming

There has recently been an upsurge of interest in a condition in which people spend large amounts of time in imaginative daydreaming, usually involving imaginary companions or casts of characters that recur over time, sometimes as long as years, which gains a kind of quasi-reality (Bigelsen & Schupak, 2011; Schupak & Rosenthal, 2009). Interestingly, an early case report was documented by Féré in his *La Pathologie des émotions* (1892/1899). M. M. was a 37-year-old commercial man, married and with children, who suffered from long periods of absent-mindedness. During these zone-outs, he was somewhat insulated from the surrounding environment or carried on his daily duties in a rather unconscious and mechanical way. Nevertheless, his daydreams were very structured and coherent, given that in his imaginary life “M. M. had constructed at Chaville on the borders of the wood, a pavilion surrounded by a garden. By successive additions the pavilion became a chateau, the garden a park; stables horses (p. 223) and pieces of water were introduced to ornament the domain. [ . . . ] A woman arrived to animate this scene: two children were born, it only remained to make this ideal ménage legitimate. This was the only drawback to the happiness of our dreamer” (Féré, 1892/1899, p. 316). Although this is an anecdotal report and does not represent the virtually unlimited variety of people’s daydreams, the generation of vivid and emotionally salient, imaginary second lives recurs in recent reports of excessive daydreaming as well (Bigelsen & Schupak, 2011).

Importantly, recent accounts show that excessive daydreamers are fully aware that the persons depicted in their daydreams are fictional—there is no question here of delusion or other psychotic phenomena—and the range of the daydreamers’ ability to function in real life may range from excellent to seriously impaired. These daydreamers appear to develop an attachment to their daydream sequences that makes it hard to abandon them. Attempts to suppress them may lead to a yearning, even grief over their loss. These daydreamers are variably accepting or distressed by their habitual daydreaming, especially if they perceive that the daydreams interfere with fully actualizing their potential in real-life goal attainment.

It is unclear to what extent unusual amounts of habitual fanciful daydreaming can be considered a particular psychological disorder. Certainly if it distresses or significantly handicaps the daydreamer and the daydreamer feels incapable of controlling it, it can at

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least be considered a condition that merits clinical intervention. However, its manifestations vary enough across daydreamers that there is no clear single psychopathology with which it can be classified. In some ways it qualifies as obsessive thought, but it seems distinct from that diagnosis in that, whereas its existence in this quantity distresses the daydreamer, the experience of it while it happens feels positively satisfying, and suppressing it leads to grief—a sense of loss of the daydreamed pseudo-reality—rather than to anxiety. It has addictive properties, but at this point there appears to be no research that establishes these. Addiction is a matter of warped decision-making, warped choices. In the case of addiction to substances such as alcohol, there are physical changes that skew decisions by overweighting the subjective value of the substance. It is unclear that daydreaming can instill the same changes. However, it is known that imagining perceptions or actions engages much of the brain's systems that would be engaged by actual perceptions and actions (Kosslyn, Thompson, & Alpert, 1997). Perhaps longer-term imagining of fictional individuals can foster emotional attachments in the same way that extended personal contacts can foster emotional attachments to actual others. Terminating the fictional relationship may then yield a goal-disengagement process (Klinger, 1975, 1977; Klinger & Cox, 2011a) somewhat similar to that produced by the loss of a valued real other person.

### **Rumination**

Rumination is a form of repetitive self-focus that leads to and exacerbates depressive symptoms (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Spasojevic & Alloy, 2001). Rumination has been conceptualized in various ways, emphasizing either the trait or the context-dependent nature of rumination (Smith & Alloy, 2009). Moreover, various theories have provided different proposals on the main triggering events of rumination, which include negative mood as well as goal non-attainment (Smith & Alloy, 2009).

### **The Current Concerns Approach to Rumination**

The *goal theory of current concerns* described earlier (e.g., Klinger, 1977, 2013; Klinger & Cox, 2011a) is helpful in explaining many of the key features of rumination; that is, goal-related cues, presumably including those in one's own thought stream, carry varying degrees and kinds of emotional charge and receive processing priority. Thoughts with strongly emotional content would have a high likelihood of evoking associated subsequent thoughts. These are also likely to carry a similar valence of emotional charge (positive or negative). This process is apparent in, for example, people happily in love, where affect is predominantly positive, but also in people grieving over a rejection, loss, or significant failure, especially while they are disengaging from their seemingly doomed goal (Klinger, 1975, 1977; Klinger & Cox, 2011a), when affect is predominantly negative. The focused nature of the resulting streams of thought is precisely what we observe in rumination. Given the role of emotional response in this process, one would predict that individuals high in trait affectivity would be especially prone to fall into ruminative states. The

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frequently demonstrated high correlation between trait rumination and measures of negative affect supports this prediction (e.g., Watkins et al., 2015).

In support of the idea of narrowed cognitive processing of goal- and emotion-related cues, Grol, (p. 224) Hertel, Koster, and De Raedt (2015) instructed participants to imagine an emotionally wrenching scenario (having just run over people with one's car) and then either dwell on their negative feelings about it, or engage in problem-solving thinking. In a visuo-spatial task where participants needed to process self- versus non-self-related stimuli and detect targets in the periphery, participants high in trait rumination showed attentional narrowing toward personally relevant stimuli, with reduced retention of personally irrelevant peripheral stimuli. Given the close relationship between trait rumination and negative affectivity, it would appear that the strong negative emotions provoked by the ruminative instructions to focus on an emotionally devastating scenario led to thoughts responding repeatedly to ongoing emotionally charged stimuli, both internal (ideation) and external (self-referential experimental stimuli), thereby maintaining the narrow focus of rumination. This notion of difficulties in controlling attentional-processing priorities can be related to a large body of research on information processing and rumination, to which we now turn.

### **Individual Differences and Impaired Attentional Disengagement That Moderate Cognitive and Emotional Mechanisms in Rumination**

Nothing in the *current concerns* approach excludes other factors from operating in rumination, such as individual differences in attentional focus, inhibitory ability, or properties of working memory and executive control functions (e.g., Whitmer & Gotlib, 2013). On the one hand, *current concerns theory* describes mechanisms that govern the flow of spontaneous thoughts in general and indicates how these can operate to produce ruminative thought. Individual differences enter only insofar as different individuals are committed to different sets of goals and vary in the properties and strength of their emotional reactions. However, this formulation can be mapped onto theories that emphasize the cognitive processes related to rumination and that focus on the way in which certain emotionally salient thoughts receive cognitive processing priority. These theories are interesting to explain the persistence of rumination, despite efforts to control this process.

Key mechanisms for the cycling in rumination within a narrow content field have been proposed in a number of theories. Many of these theories emphasize individual differences in cognitive processing styles. For instance, *attentional focus theory* (Whitmer & Gotlib, 2013) provides a variable of individual differences in the degree to which individuals constrict their attention and thought content to particular cognitive themes after they are started. This constriction is enhanced in negative mood states and is weakened during positive moods. An individual's typical degree of constriction would moderate the likelihood that a negatively toned ruminative stream, once started, will continue.



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Individual differences in emotional extrapolation, posited by Watkins, Grafton, Weinstein, and MacLeod (2015), refers to the likelihood that an initial mood state associated with some event, presumably including a thought segment, will persist to color expectancies for subsequent events. *Current concerns theory* also posits some degree of such emotional continuity, in that the thematic content of an emotionally potent, goal-related thought segment is predicted to lead by association to thematically and emotionally related (but not identical) subsequent thought segments. This hypothesized continuity is confirmed by findings of negative affect being maintained across mind-wandering segments (Stawarczyk, Majerus, & D'Argembeau, 2013). Watkins et al. (2015), moreover, theorize that the extent of such continuity constitutes a kind of individual trait. People high in emotional extrapolation would experience amplified emotional continuity. When the emotion is predominantly negative, as in trait negative affectivity (Tellegen et al., 1988), the trait would dispose toward greater likelihood of rumination.

The impaired disengagement factor posited by Koster, De Lissnyder, Derakshan, and De Raedt (2011) as a prominent route toward depression refers to impaired control of attention that weakens the individual's ability to switch from a stream of negative repetitive thoughts to something more constructive that might help to dispel the negative mood. Importantly for this formulation, Koster et al. (2011) propose that, with sufficient repetition and progressive impairment of attentional control, the resulting rumination becomes habitual, further hindering its interruption and redirection. This approach is, then, not primarily an individual-differences approach, but suggests a pathogenic extension of the thought-flow processes described earlier.

Thus, these important approaches identify different possible mechanisms responsible for individual differences in susceptibility to rumination by moderating the processes posited by *current concerns theory*, whose model assumes that, with a powerful enough emotional tone, any goal pursuit (or (p. 225) failed pursuit) can become the subject of repetitive thought by any individual. Such repetitive thought is tantamount to rumination, or may be so in the presence of certain additional qualities, depending on the definition of rumination.

Interesting empirical support for information-processing theories of rumination comes from studies that attempt to experimentally improve attentional or cognitive control where rumination and depressive symptoms are studied as outcome variables. For instance, in a recent study where individuals with heightened levels of rumination were allocated to either a cognitive control training versus an active control condition, it was observed that individuals undergoing cognitive control training for two weeks showed lower emotional reactivity to a lab stressor as well as lowered levels of depressogenic rumination during a subsequent exam period (Hoorelbeke, Koster, Vanderhasselt, Callewaert, & Demeyer, 2015).

## Response Styles and Control Theories of Rumination

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The most influential theory of rumination is currently still the *response styles theory* (RST), which defines rumination as “behaviors and thoughts that focus one’s attention on one’s depressive symptoms and on the implications of those symptoms” (Nolen-Hoeksema 1991, p. 569). According to this theory, individuals react to negative mood by initiating ruminative processing with the aim of enhancing their self-understanding, which unfortunately leads to a paradoxical increase in negative mood (Lyubomirsky & Nolen-Hoeksema, 1995). Within the RST, two specific ruminative subtypes have been defined and are worth mentioning: reflective pondering and depressive brooding (Treyner, Gonzalez, & Nolen-Hoeksema, 2003). Reflective pondering is considered the less maladaptive form of rumination, as it reflects the extent to which individuals try to improve their mood by engaging in problem-focused thinking. Brooding is considered the more detrimental form of rumination, as it represents “a passive comparison of one’s current situation with some unachieved standard” (Treyner et al., 2003, p. 256).

Importantly, Martin and Tesser, consistent with earlier current-concerns theory and evidence regarding depression (Klinger, 1975, 1977; Klinger, Barta, & Maxeiner, 1980), proposed a *control theory* account of rumination. This theory proposes that, as in the earlier current-concerns account of depression, state rumination is initiated by, and focuses on, a perceived discrepancy between one’s goals and one’s current state and continues until the goal is either attained or abandoned (Martin & Tesser, 1989, 1996). Compared with RST, this account is focused less on depressed mood but can be applied more broadly to a wide range of circumstances. Interestingly, it has been found that cuing unresolved personal goals indeed was associated with an increased number of negative ruminative thought intrusions during a sustained attention-to-response task, compared with cuing a resolved personal goal (Roberts, Watkins, & Wills, 2013).

In an attempt to link the RST and the control theory of rumination, Watkins and Nolen-Hoeksema (2014) proposed that rumination can be conceptualized as a mental habit (Hertel, 2004) that starts with episodes of self-focused repetitive thought, triggered by goal discrepancies, which become habitual through an automatic associative process between repetitive thinking and its context (e.g., physical location, mood). When, over time, these contexts trigger a passive focus on negative content combined with low levels of concrete thinking (see Watkins, 2008), the habit of depressive rumination is acquired. The latter type of habitual rumination is thought to be context-independent of goals and resistant to change.

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### **Rumination and Spontaneous Thoughts**

Given the relevance of goals and mental habits in spontaneous thoughts, one might suspect a rather large overlap between ruminative thinking and daydreaming. However, correlational studies clearly report only moderate correlations (Epel et al., 2013; Marchetti, Van de Putte, & Koster, 2014). One explanation for this is that the term *daydreaming* is often used to refer specifically to fanciful mental streams, whereas *rumination* is generally serious and uncreative. In these senses, daydreaming and rumination are by no means the same phenomenon, even though both can usually be construed as instances of mind-wandering, and both are generally instances of spontaneous thought. In a new integrative framework aiming to understand the link between spontaneous thought and cognitive risk factors, Marchetti, Koster, Klinger, and Alloy (2016) propose that spontaneous thought, defined most broadly, can act as a context in which cognitive risk factors for depression such as rumination (but also thoughts of hopelessness, negative self-esteem, and cognitive reactivity) can be readily expressed, which is especially the case in conditions of heightened negative affectivity. In that sense, rumination (p. 226) is a specific subtype of spontaneous thought characterized by dominant negative thought content that is processed in an abstract and repetitive way so as to lock the train of thoughts into a thematically narrow content channel (Klinger, 2013; Watkins, 2008). Here it is important to note that this differs from many other instances in which spontaneous thought unfolds in an open, expansive, and divergent way (Marchetti et al., 2014; Watkins, 2010).

An interesting finding in this regard is empirical evidence showing that the affective consequences of spontaneous thought are multifactorially determined, based on the presence of individual-difference variables that heighten the susceptibility to engaging in state rumination (Marchetti, Koster, & De Raedt, 2013). More specifically, rest-related spontaneous thoughts seem capable of shaping transitory ruminative thoughts in individuals showing, primarily, medium to high levels of trait cognitive reactivity and, secondarily, significant trait levels of ruminative brooding.

## **Clinical Implications**

Traditionally, clinical interventions have targeted only selective kinds of spontaneous thought, such as maladaptive aspects of daydreaming and rumination, which show partial overlap with spontaneous thought (Marchetti et al., 2016; Watkins, 2010). However, examining the content and, perhaps, frequency of spontaneous thought in general could have some interesting clinical implications that are worthy of further examination.

## **Spontaneous Thought as Ancillary Information About Motivational Structure**

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Broadly speaking and in keeping with a transdiagnostic approach, psychopathology is often characterized and maintained by problematic goals architecture. This can take a number of different forms. First, psychopathology, such as anxiety and depression, is frequently characterized by strong avoidance-related goals (see Hayes, Wilson, Gifford, Follette, & Strosahl, 1996), often based on negative experiences and avoiding danger, rejection, or hurt. This has important consequences for the cognitive processing of situations. For instance, for someone with social anxiety and the goal to avoid rejection by others, a social situation may cue attention to social threat and the context-specific means to reach safety (e.g., excuses to leave a gathering early), which can impair new learning and maintain threat-related beliefs. Frequently, such avoidance-related goals outweigh other more positively oriented goals so as to render individuals less likely to process positive information and/or actively pursue desired outcomes.

Given the dependence of spontaneous thought content on an individual's goals, these processes can be predicted to determine the content of the individual's thought flow. Although cognitive therapies try to change clients' beliefs and mental habits as a way to change behavior, it is ultimately the client's behavior and affect that the therapy tries to influence. Insofar as spontaneous thought content is itself troublesome, these procedures have some merit, but altering a client's pattern of goal pursuits—the client's *motivational structure*—can also predictably contribute to changed cognitive processing and spontaneous thought flow. Thus, one strategy for changing troublesome spontaneous thought flow is to change the motivational structure—the individual's set of goals—that largely determines its content and frequency.

Psychopathology can also be rooted in negative life events where individuals see important goals blocked (Klinger, 1975, 1977; Klinger et al., 1980). Here it is crucial for individuals to be capable of disengaging from unattainable goals and to reorient and engage with goals that are more attainable. For various reasons (e.g., perfectionism, high standards, high valuation of the goal, lack of promising alternative goals, etc.) individuals can experience problems with disengaging from desired but unattainable goals or engaging with new goals. These states powerfully impact spontaneous thought content and affect.

Based on our theoretical position that the content of spontaneous thought has important links to each individual's goals, this content (such as mind-wandering, which is pervasive and often adaptive, but may sometimes be viewed as interfering and disruptive) can in the therapeutic context be used in multiple ways, for instance as diagnostic information to aid in obtaining a clear view of the client's goal structure. The content of spontaneous thought and, probably, night dreams can signify or help to clarify individuals' motivational and cognitive structure (Beck, 1971/2004; Klinger, 1971). There are validated measures of goal structure in questionnaire form, such as the Motivational Structure Questionnaire and Personal Concerns Inventory (Cox & Klinger, 2011a; Klinger, 1987; Klinger & Cox, 2011b), but these rely on clients' memories and self-insights. Inferences from examination of clients' spontaneous thought content may add important information.

### (p. 227) **Modifying Spontaneous Thought Content by Modifying Motivational Structure**

Assessing motivational structure is important for treatment of a wide variety of conditions, perhaps especially, but not exclusively, depression, addiction, alienation, aimlessness, and goal conflicts. These may require interventions aiming to replace maladaptive motivational structures with more adaptive ones. For instance, within the Systematic Motivational Counseling framework, validated techniques have been developed to identify maladaptive goals and then help clients disengage from them in favor of more realistic and attainable goals (Cox & Klinger, 2011b). The efficacy of this type of intervention that focuses on clients' motivational structure, rather than solely on cognitive and/or behavioral aspects, has recently been documented in alcoholic patients (Cox, Fadardi, Hosier, & Pothos, 2015), miscellaneous substance abusers with traumatic brain injuries (Cox et al., 2003), and group treatment in a general clinical population (Fuhrmann, Schroer, & de Jong-Meyer, 2011).

The general plan of these interventions is first to assess motivational structure (the types of goals chosen, the degree of commitment to and valuation of each, and expectancies of success) and then to discuss the findings with regard to such matters as the interrelationships among the goals, the degree to which the valuation is the client's own versus someone else's whom the client is trying to satisfy, the reasonableness of the expectancies, conflicts among the goals and possible resolution of them, shifting from aversive to appetitive goal pursuits, disengagement from inappropriate or fruitless goals, possible additional or alternative goals that fit the client's own true values and might provide greater satisfaction, and realistic steps that might render discouragingly difficult goals attainable. The goal of these interventions is, of course, a more adaptive motivational structure, which should brighten mood and help clients abandon destructive behaviors such as substance abuse. In addition to the already cited studies supporting this hypothesis, higher adaptive motivational structure has been found related to lower alcohol consumption in people whose consumption has led to objective life difficulties, such as in the workplace, family and other social relationships, the legal system, health, and so on (Cox et al., 2002). In clients with low scores on adaptive motivational structure, there was no correlation between difficulties incurred from drinking and amount consumed. Although this result was correlational and hence does not permit a firm conclusion about causality, it seems a reasonable inference that highly adaptive motivational structure facilitates reducing injurious alcohol consumption. Although these investigations did not assess spontaneous thought content, their interventions can be predicted to have changed it as well.

As indicated earlier, goal commitments establish cognitive processing priorities that direct attention to goal-related cues. This can become problematic for a variety of conditions and has been investigated with substance abusers. In much of the world, for example, grocery stores sell alcoholic beverages and often place these in locations that are hard to overlook. Heavy imbibers report that these displays rivet their attention and,

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even if they are trying to reduce alcohol use, nevertheless make it harder not to buy. Similarly, when faced with a series of words, the attention of heavy drinkers is drawn to words associated with alcohol use (as to other important goals). One clinical intervention has been designed to reduce this problem by retraining attention. Using Stroop-like interventions, participants adopt the goal of attending to the font color instead of to the semantic meaning of alcohol-related words, or to the color outlines around various depicted bottles. The administrator provides feedback and encouragement. Results show that a series of such training sessions reduces the processing priority of alcohol cues and reduces the amount of alcohol subsequently consumed for up to a three-month follow-up assessment (Cox et al., 2015; Fadardi & Cox, 2009). Although these investigations are still in their early stages (Koster & Bernstein, 2015) and so far have not assessed spontaneous thought, the effect on attentiveness—as one kind of cognitive processing—can be predicted to have also affected thought content, among other clinical outcomes.

## **Training for Concrete Versus Abstract Thought for Facing Difficulties and Mental Contrasting for Goal Attainment**

Another topic, which has been raised in the context of rumination by Watkins, is that the specificity of thought can be important in determining whether thinking has beneficial or detrimental consequences. The work by Watkins (e.g., 2008, 2010) has shown that abstract versus more concrete thought can be problematic in maintaining negative affect. Often, sufficiently concrete cognitive processing is necessary to facilitate adaptive thought and behavior (e.g., planning, problem-solving). Excessive levels of abstract negative (and probably also positive) spontaneous thinking can undermine (p. 228) concrete steps toward a goal. Similarly, although expectancy of ultimate success is important for well-motivated behavior, fantasizing only about positive outcomes and trouble-free goal-pursuit, rather than thinking about the concrete realities necessary for success, reduces chances of energetic pursuit and of success (Oettingen, 2012). To address these aspects, promising training interventions have been developed to rebalance the proportion and occurrence of abstract versus concrete thought (Watkins et al., 2012) and to tie aspirations to concrete processing of steps necessary to achieve them (Oettingen, 2012), processes that at first almost certainly enlist mental activity beyond that of purely spontaneous thought and the default mode network (Achtziger, Fehr, Oettingen, Gollwitzer, & Rockstroh, 2009). Whether the habits of thought developed in these trainings eventually become spontaneous remains to be established.

## **Conclusions**

Spontaneous thought is a phenomenon that is of long-standing interest to researchers. We have reviewed some of the research showing the clear adaptive as well as maladaptive consequences of this phenomenon. Based on a goal perspective, it becomes

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clear why spontaneous thought is so pervasively present in mental life. Moreover, this perspective also casts light on how spontaneous thought can become maladaptive. The progress with regard to methodologies available to study this phenomenon, as well as the strong interest in spontaneous thought from philosophical, psychological, and biological traditions, renders this field an exciting area for integrated research and theory.

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