CHAPTER

18

Unraveling What's on Our Minds: How Different Types of Mind-Wandering Affect Cognition and Behavior

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Abstract

Mind-wandering encompasses a variety of different types of thought, involving various different experiential qualities, emotions, and cognitive processes. Much is lost by simply lumping them together, as is typically done in the literature. The goal of this chapter is to explore the nuances that distinguish different types of mind-wandering. The chapter draws on research on mind-wandering as well as other literatures to gain a better understanding of how these different types of mind-wandering affect cognition and behavior. It specifically discusses the distinct effects of different types of mind-wandering on task performance, working memory, mood, and creativity. Finally, the chapter discusses the idea of deliberate engagement in particular types of mind-wandering as a way to achieve desirable outcomes, such as maintaining a positive mood, enhancing creativity, or aiding decision-making.

Key Words: mind-wandering, cognition, behavior, creativity, working memory, decision-making

The stream of consciousness is a stream with many twists and turns. Even though our sense organs continuously process information about the outside world, much of the time our minds ignore this input and focus instead on spontaneous thoughts unrelated to our current task or environment. When mental activity becomes decoupled from the environment in this way, the processing of external information is reduced, sometimes to the point where our eyes mindlessly scan what's in front of us without making much sense of the information (Schooler et al., 2011; Smallwood, Beach, Schooler, & Handy, 2008; Smallwood, Brown, et al., 2011).

This phenomenon has been studied under a variety of terms, the most prominent ones being *mind-wandering* and *daydreaming* (e.g., Singer & Schonbar, 1961; Smallwood & Schooler, 2006). In the literature, these terms have typically been used interchangeably. Mind-wandering has sometimes been defined as task-unrelated thought (e.g., Smallwood & Schooler, 2006), stimulus-unrelated thought (e.g., Teasdale et al., 1995), or spontaneous thought (Christoff, Irving, Fox, Spreng, & Andrews-Hanna, 2016). Moreover, in colloquial language, the terms *mind-wandering* and *daydreaming* are sometimes applied to situations in which one is thinking about something other than one's primary task (e.g., reading or listening to a lecture), but also to describe periods when one is engaged in no extrinsic task whatsoever and is simply staring out into space. Admittedly there is a fine line between engaging in a non-demanding task (e.g., walking) and doing "nothing," so the distinction between task-unrelated thought and stimulus-unrelated thought is somewhat blurry. In the present chapter, we will therefore use the term *mind-wandering* to encompass a heterogeneous phenomenon (see Seli et al., in preparation), in line with colloquial usage, and the term *task-unrelated thought* when referring specifically to situations in which mind-wandering occurs during another primary task or activity.

Over the last decades, researchers have made considerable progress at uncovering when and how much people mind-wander (Giambra, 1989; Kane et al., 2007; Killingsworth & Gilbert, 2010; McVay, Kane, & Kwapil, 2009; Risko, Anderson, Sarwal, Engelhardt, & Kingstone, 2011), why they do so (McVay & Kane, 2009; McVay & Kane, 2010; Smallwood, 2010), what parts of the brain are involved in it (e.g., Christoff, Gordon, Smallwood, Smith, & Schooler, 2009; Fox, Spreng, Ellamil, Andrews-Hanna, & Christoff, 2015; Mason et al., 2007; Smith et al., 2006; Smallwood et al., 2008), and how mind-wandering affects cognition and behavior (see Mooneyham & Schooler, 2013, for a review). However, the question of "where" our spontaneous thoughts go when they wander off task has received considerably less attention. Mind-wandering is usually defined in the broadest sense, encompassing all types of spontaneous, task-unrelated thought: the banal, fleeting thoughts, complex problem-oriented reflections, fantasies, or intrusive thoughts and worries. But these various types of thought have such different experiential qualities, and involve such different emotions and cognitive processes, that we may lose much by simply lumping them together, as is typically done in the literature. Accordingly, we suggest that systematic analysis of the nature and impact of different types of mind-wandering may help to clarify the nuanced role that different types of mind-wandering play in our daily lives. The goal of this chapter is to explore these distinctions and nuances.

The chapter will draw on research on mind-wandering as well as other literatures that examine different aspects of "thinking" (be it task-related or unrelated, spontaneous, or instructed) more generally. We aim to illustrate how combining these literatures helps us gain a better understanding of how different types of spontaneous thought affect cognition and behavior. Finally, we discuss the idea of deliberate engagement in particular types of mind-wandering as a way to achieve desirable outcomes, such as maintaining a positive mood, enhancing creativity, or aiding decision-making.

Measuring Spontaneous Thought and Discerning Types of Mind-Wandering

Mind-wandering poses a dual challenge to scientific investigation. It is spontaneous, and thus cannot be experimentally induced (although experimental manipulations can decrease or increase the *likelihood* of spontaneous stimulus-unrelated thoughts), and it is subjective, meaning that it cannot be directly observed from the outside. Because we cannot directly observe people's private thoughts, mind-wandering is typically measured through indirect measures, such as errors made on tasks, or through self-report measures.

A frequently used technique to gather self-reports other than through traditional questionnaires is to intermittently probe people about the current content of their thoughts, or simply whether they are mind-wandering or not at a particular moment during a task. By sampling enough of such moments, a technique called "thought sampling" or "experience sampling" (e.g., Antrobus, 1968; Giambra, 1995; Kane et al., 2007; Killingsworth & Gilbert, 2010; Schooler, Reichle, & Halpern, 2004; Parks, Klinger, & Perlmutter, 1998), researchers can get an idea of how often and when people mind-wander and how it affects their cognition and behavior. Another way to assess instances of mind-wandering is by asking participants to "self-catch" their task-unrelated thoughts. This, naturally, requires that they be aware of their task-unrelated thoughts, and is often used as an additional measure in combination with probe-initiated self-reports. These types of measures are used to test the effects of mind-wandering at the state level, by examining the direct consequences of stimulus-independent or off-task thought on subsequent performance, or at the trait level, by correlating individuals' general tendency to mind-wander with other measures.

Although researchers routinely treat mind-wandering as a single undifferentiated construct, some attempts have been made at assessing variations in the content and quality of people's daydreams or mind-wandering episodes. For instance, it has been shown that thoughts about mundane, everyday things are more common than fantasies or worries (Kane et al., 2007; Klinger, 2009, 2013; Klinger & Cox, 1987), thoughts about pleasant topics are more common than negative thoughts (Killingsworth & Gilbert, 2010), and thoughts related to the future are more common than thoughts about the past or present (Baird, Smallwood, & Schooler, 2011; Smallwood, Nind, & O'Connor, 2009). Other content distinctions have distinguished between thoughts about the self and thoughts involving other people (Poerio, Totterdell, Emerson, & Miles, 2015; Ruby, Smallwood, Engen, & Singer, 2013).

Aside from such distinctions in thought content, other qualitative distinctions have been made. For instance, research has made a distinction between task-unrelated thoughts that occur without meta-awareness, that is, without the person consciously

noticing that her mind has disengaged from the task or environment, and task-unrelated thoughts that the individuals is aware of (e.g., self-caught mind-wandering)—a distinction that is also referred to as "zoning out" versus "tuning out" (e.g., Dorsch, 2014; Forster & Lavie, 2009; Schooler, 2002; Schooler, Mrazek, Baird, & Winkielman, 2014; Schooler, Reichele, & Halpern, 2004; Schooler & Schreiber, 2004; Schooler et al., 2011; Seli, Carriere, & Smilek, 2014; Smith et al., 2006). A related distinction is that between intentional and unintentional mind-wandering (Dorsch, 2014; Forster & Lavie, 2009; McMillan, Kaufman, & Singer, 2013; Seli, Carriere, & Smilek, 2014). We speculate that that this distinction may, under most circumstances, map directly onto that of mind-wandering with and without meta-awareness, although it is possible that one *becomes* aware of having daydreamed without having had the intention to. Once a person has become meta-aware of this fact, however, we think that he or she will most likely either stop mind-wandering or decide to continue, at which point it becomes intentional.

Variations of kinds of daydreaming have also been assessed at the trait level, by examining differences in people's characterizations of the general topics they tend to daydream about. This research, spearheaded by Singer and colleagues (e.g., Huba, Aneshensel, & Singer, 1981; Singer & Antrobus, 1961, 1963, 1970) and later Giambra (1980, 1989, 1995), led to the identification of three broad "styles of daydreaming": (1) *positive-constructive daydreaming*, which is characterized by predominantly pleasant and highly captivating daydreams that contain vivid imagery, interpersonal curiosity, and future planning; (2) *guilty-dysphoric daydreaming*, which is characterized by ruminative thoughts and unpleasant emotions such as shame and guilt, fear of failure, and thoughts of aggressive impulses; and finally (3) *poor attentional control*, which is characterized by highly frequent yet fleeting daydreams and a general difficulty in focusing one's attention, be it on internal or external events (Singer & Antrobus, 1963, 1970; Singer, 1974). Little research has been done to relate these particular styles of mind-wandering to consequences for cognition and behavior. However, we can draw on other literatures that have examined the effects of related traits, such as the tendencies toward engaging in mood repair or engaging in ruminative thought. In the following discussion, we review a number of findings from the mind-wandering literature and discuss for each of these findings how a closer look at different types of mind-wandering leads to more nuanced theories and predictions.

How Types of Mind-Wandering Affect Task Performance

The most well-established finding from the mind-wandering literature, and probably the one that is the most self-evident from personal experience, is that mind-wandering during a task interferes with task performance. This has been demonstrated for a broad range of tasks, including relatively simple and monotonous tasks requiring sustained attention (e.g., Carriere, Cheyne, & Smilek, 2008; Cheyne, Solman, Carriere, & Smilek, 2009; Mrazek, Smallwood, & Schooler, 2012; Seli, Cheyne, & Smilek, 2013; Smallwood et al., 2004; Smilek, Carriere, & Cheyne, 2010), working memory and intelligence tasks (e.g., Mrazek et al., 2012), reading (e.g., Franklin, Smallwood, & Schooler, 2011; Schad, Nuthmann, & Engbert, 2012; Schooler, Reichle, & Halpern, 2004; Smallwood, McSpadden, & Schooler, 2008; Smallwood et al., 2008; Smallwood, 2011), and performing more complex tasks such as driving or operating aircraft (Casner & Schooler, 2013; Galéra et al., 2012; Yanko & Spalek, 2013).

But is this universally true for all types of task-unrelated thoughts? Evidence suggests that it is not. One line of evidence comes from research distinguishing task-unrelated thoughts occurring with or without meta-awareness. It has been suggested that, while people are aware of only a small proportion of their spontaneous task-unrelated thoughts (e.g., Schooler, Reichle, & Halpern, 2004), meta-awareness may play a crucial role for regulating those thoughts (e.g., Schooler, 2002). Regulation could mean stopping the train of thought and refocusing attention back on one's main task, or engaging in task-unrelated thoughts only at times when this is minimally disruptive or even adaptive.

Support for the notion that meta-awareness plays a role in the regulation of task-unrelated thoughts comes from studies showing that under conditions associated with reduced executive control, such as alcohol intoxication (Sayette, Reichle, & Schooler, 2009) or cigarette craving (Sayette, Schooler, & Reichle, 2010), task-unrelated thoughts are increased, while meta-awareness is reduced. In contrast, meta-awareness seems to increase when individuals are motivated to catch their task-unrelated thoughts (Zedelius, Broadway, & Schooler, 2015). Finally, and most relevant to the relationship between types of mind-wandering and performance, studies

have found that task-unrelated thoughts that occur with meta-awareness have less of an impact on task performance than those that occur without meta-awareness (Smallwood, McSpadden, & Schooler, 2007, 2008; Zedelius et al., 2015).

A related factor that may moderate the relationship between mind-wandering and performance is intentionality. It is likely that differences between intentional and unintentional mind-wandering will often map onto differences between mind-wandering with or without meta-awareness. After all, carrying out an "intention" implies awareness (although see Custers & Aarts, 2010), and it is hard to imagine that a person could mind-wander unintentionally while being aware of the fact that he or she is mind-wandering. Thus, in line with the findings on meta-awareness and mind-wandering, it is likely that intentional mind-wandering episodes are more adapted to the demands of the current context (i.e., occurring predominantly when task demands are low), and hence are less disruptive to performance, than unintentional (unaware) mind-wandering episodes (see Wammes, Seli, & Smilek, Chapter 20 in this volume). There is evidence that people mind-wander at "opportune" moments, that is, during relatively easy tasks, more than during demanding tasks (e.g., Casner & Schooler, 2013; Kane et al., 2007; Levinson, Smallwood, & Davidson, 2012). It is not clear that this difference is uniquely driven by intentional mind-wandering, but this would be a plausible hypothesis that deserves further investigation.

The distinctions between aware/unaware and intentional/unintentional mind-wandering may go hand in hand with differences in thought content. That is, although to our knowledge this issue has never been explicitly investigated, we would expect deliberate mind-wandering to resemble the type of mind-wandering Singer and colleagues termed *positive-constructive daydreaming*, and unintentional mind-wandering to be more likely to involve intrusive, negative thought content—fitting the *guilty-dysphoric daydreaming* style. This prediction is based on the premise that we prefer to engage in thoughts we find agreeable, and we are more likely to exert control over our thoughts when we are mind-wandering deliberately and/or with awareness. This possibility warrants further investigation and if supported by empirical evidence would illustrate the potentially important ways in which different forms of mind-wandering foster different types of thought content.

How Types of Mind-Wandering Relate to Working Memory

Research suggests that individuals with larger working memory capacity typically mind-wander less during demanding tasks (McVay & Kane, 2009, 2012a, 2012b; Mrazek et al., 2012; Unsworth, Brewer, & Spillers, 2012; Unsworth & McMillan, 2014; Unsworth, McMillan, Brewer, & Spillers, 2012) and engage in more opportune mind-wandering (e.g., Levinson et al., 2012; Rummel & Boywitt, 2014) than those with smaller working memory capacity. This suggests that executive processes that rely on working memory are involved in the ability to regulate or suppress unwanted task-unrelated thoughts at inopportune moments. However, considering that individuals likely find some types of thoughts worth suppressing more than others, does the relationship between working memory and mind-wandering differ depending on the types of mind-wandering people engage in?

This question was investigated in a recent experience sampling study by Marcusson-Clavertz, Cardeña, and Terhune (2015). They found that, for individuals who tend to engage most often in the kind of intrusive, negative mind-wandering described by the *guilty-dysphoric* style, greater working memory capacity was related to reduced mind-wandering during everyday tasks, indicating successful suppression of unwanted task-unrelated thoughts. For individuals who rarely engaged in the *guilty-dysphoric* style, and for whom task-unrelated thoughts are a much more pleasant experience, the opposite was found. This finding nicely illustrates that mind-wandering is not a homogenous construct, and that different types of mind-wandering need to be understood in relation to individuals' interests and motivations to engage in or avoid certain mental events.

Other research on the relationship between working memory and mind-wandering has focused more on the functions that different types of mind-wandering can fulfill. Building on the notion that future-thought is essential for planning and attaining personal goals, and that mentally simulating possible futures is more complex than recalling the past, Baird, Smallwood, and Schooler (2011) expected that working memory capacity would be differentially related to how much people mind-wander about the past, present, and future. Participants performed a relatively non-demanding task, interspersed with thought-probes that prompted them to describe their task-unrelated thoughts. The results confirmed the prediction. While working

memory capacity was unrelated to task-unrelated thoughts about past events, and negatively related to task-unrelated thoughts about the present, higher working memory capacity predicted increased task-unrelated thoughts about future events. These findings, again, illustrate the importance of taking a nuanced approach to understanding the processes involved in different types of mind-wandering and the functions they fulfill for the individual.

How Types of Mind-Wandering Affect Mood

Another key finding in the mind-wandering literature is that compared to being focused on one's current activity, mind-wandering is generally associated with negative mood. For instance, Killingsworth and Gilbert (2010) conducted a large-scale experience-sampling study in which participants were probed randomly several times during their day while going about their everyday life activities, and were asked to report what they were doing at the time of the probe, whether they were focused on their present moment activity or engaged in task-unrelated thoughts, and what mood they were in. The results showed that task-unrelated thoughts were almost exclusively associated with a more negative mood than being focused on the present, regardless of the type of activity participants were engaging in. The negative effect on mood was pronounced when participants reported negative or neutral thoughts, and even when they reported positive task-unrelated thoughts their mood was no better than at times when they were focused on their present-moment activity.

More recent studies, however, indicate that, contrary to Killingsworth and Gilbert's claim that "a wandering mind is an unhappy mind," on some occasions people are happier when their minds are in the clouds. This positive relationship between mind-wandering and happiness is only revealed, however, when differentiating between different types of mind-wandering. For instance, a study by Franklin and colleagues (2013), which used a similar approach to Killingsworth and Gilbert but asked more nuanced questions about positive aspects of people's task-unrelated thoughts (i.e., how interesting, useful, or novel their thoughts were), indicated that task-unrelated thoughts that are experienced as highly interesting in fact led to a more positive mood, a finding that corroborates our common experience. Another study taking the same basic approach found that task-unrelated thoughts with social content and particularly those involving close others are associated with increased happiness (Poerio et al., 2015).

Research conducted in the laboratory found corroborating evidence that mind-wandering doesn't always lead to negative moods. Ruby, Smallwood, Engen, and Singer (2013) measured task-unrelated thoughts during a simple computer task, assessing the valence and content (i.e., self- vs. other-related, past- vs. future-related) of off-task thoughts as well as participants' current mood. They then performed a lag analysis in which they used answers to any given thought probe to predict a participant's mood at the time of the following probe. The results showed that task-unrelated thoughts about the past and involving other people were linked to decreases in mood, but task-unrelated thoughts about the future and about the self were linked to increased positive mood. Moreover, they also found that reports of task-unrelated thoughts in combination with negative mood were predictive of a more positive mood at the time of the next thought probe. This last finding suggests that, while task-unrelated thoughts may often coincide with negative moods, this may not necessarily mean that mind-wandering causes negative moods. Instead, mind-wandering might be a way to repair negative moods.

Yet another study examined the effects of mind-wandering on mood when taking into account the valence of the activity individuals are engaged in while mind-wandering, based on the premise that mind-wandering can be a pleasant escape from boring or negative tasks. Indeed, the results showed that, during an unpleasant task, engaging in positive task-unrelated thoughts was associated with increased positive mood (Spronken, Dijksterhuis, Holland, & Figner, 2015), a finding that is consistent with the mood-repair hypothesis. Drawing on these findings, we theorize that the effects of mind-wandering on mood are likely also dependent on whether the mind-wandering is intentional or unintentional. Given that most people are motivated to maintain a positive mood, and to engage in mood repair when experiencing negative mood (Cialdini et al., 1987; Salovey et al., 1995), we think that deliberate mind-wandering can be a way to elevate one's mood by directing one's attention in a goal-directed way to pleasant or interesting thoughts. This may not be universally true. Chronic ruminators, for instance, who have a habit of engaging in repetitive, self-referential, and typically negative thought (Feldman, Joorman, & Johnson, 2008; Verhaeghen, Khan, & Joormann, 2005; Whitmer & Gotlib, 2013), sometimes report ruminating

deliberately, because they believe it will lead them to new and helpful insights about themselves (e.g., Lyubomirsky & Nolen-Hoeksema, 1993; Papageorgiou & Wells, 2003; Smallwood et al., 2003; Simpson, & Papageorgiou, 2003). For the majority of people, however, we expect that deliberate mind-wandering, be it during another primary task or while doing nothing, will be more positive or constructive. In future research, individual differences in people's motives and ruminative tendencies should be taken into account to gain a more complete picture of the effects of mind-wandering on mood.

How Types of Mind-Wandering Affect Creativity

While most research on mind-wandering has focused on demonstrating negative effects of task-unrelated thoughts, researchers have increasingly been considering the possibility that mind-wandering may at times be functional and constructive. Both in and outside the scientific community, it has long been speculated that mind-wandering may have a unique benefit for creativity. Countless anecdotes describe how creative ideas and sudden insights have emerged to artists and inventors from spontaneous mind-wandering. Early studies had found that, when people work on creative problems, taking a break and engaging in some other, unrelated task often improves subsequent creative thought, a phenomenon referred to as *incubation* (for a review, see Sio & Ormerod, 2009). Some have attributed this effect to spontaneous associative thoughts, which are seen as the route to creative insights, or "aha!" experiences (Bowden, Jung-Beeman, Fleck, & Kounios, 2005; Bowers, Regehr, Balthazard, & Parker, 1990; Fiore & Schooler, 2001; Mednick, 1962; Schooler & Melcher, 1995). Thus, implicitly, the effect has been linked to mind-wandering.

Building on this indirect evidence, Baird and colleagues (2012) tested the effect of task-unrelated thoughts on creative performance. In their study, participants performed a creative task—generating unusual uses for common objects—and were interrupted midway through the task to perform an unrelated "incubation" task. This incubation task was either an undemanding task, which left plenty of room for engaging in task-unrelated thoughts, or a more demanding task. Participants assigned to perform the undemanding task (compared to a demanding task) subsequently generated more, and more unique, uses. (They also reported greater task-unrelated thoughts during the incubation task.) Importantly, the increase in creative performance was specific to uses for objects encountered before the incubation period and did not extend to novel objects not encountered before. This suggests that letting the mind wander freely away from the task had a transformative impact on participants' mental representations of task-relevant information.

There is also evidence that mind-wandering at the trait level is associated with increased creativity. For instance, a greater self-reported tendency toward mind-wandering during everyday life activities was found to be associated with increased creative performance on the unusual uses task (Baird et al., 2012) and more self-reported engagement in creative activities (Baas, 2015). Moreover, individuals scoring high in fantasy proneness, defined as a tendency toward long and intense involvement in fantasy and imagination (Lynn & Rhue, 1988; Singer & Antrobus, 1972; Singer, 1975), have been found to be more creative than less fantasy-prone individuals (Lynn & Rhue, 1986). Finally, field research assessing mind-wandering and creative ideation in professional creative writers and elite physicists has shown that many real-life creative ideas indeed emerged in moments when the participants were not actively working on the project or topic the ideas related to, but instead were engaged in other activities (Gable, Hopper, & Schooler, 2017). This finding suggests that engaging in activities and presumably thoughts unrelated to a current project can provide fertile ground for sudden creative insights.

While these findings resonate with the many anecdotal accounts of sudden creative insights in mind-wandering, they appear surprising in the face of the mundane mind-wandering people engage in much of the time, which revolves mainly around current concerns (e.g., Baird et al., 2011; D'Argembeau, Renaud, & Van der Linden, 2011; Klinger, 2009; Klinger, 2013; Klinger & Cox, 1987; Poerio et al., 2015; Smallwood, Nind, & O'Connor, 2009). This type of mind-wandering isn't necessarily creative in nature, and doesn't seem particularly inspiring. In an attempt to resolve this apparent inconsistency, we have argued that mind-wandering can be—but isn't necessarily—facilitative of creativity, and that the relationship depends on the type of task-unrelated thought and the type of creative process a person engages in.

Creative ideas or solutions can be achieved in different ways. Sometimes, an idea or solution comes to mind spontaneously, in a "flash of insight," accompanied by an "aha!" experience

(Bowden et al., 2005). Alternatively, creative problems can be approached in an analytic fashion, through methodic, conscious thought (Smith & Kounios, 1996). In a recent study, we found that mind-wandering relates differently to these two creative processes (Zedelius & Schooler, 2015a). While the tendency to mind-wander frequently during everyday life predicted better performance on a verbal creative problem-solving task overall, this was driven by a benefit for creative insight. Frequent mind-wandering was negatively related to solving creative problems analytically.

Just as the relationship between mind-wandering and creativity seems to depend on the type of creative approach, we proposed that the relationship also depends on the content and style of mind-wandering one engages in (Zedelius & Schooler, 2015b). One important aspect of mind-wandering likely to moderate its impact on creativity is affective valence. Research suggests that positive affect as well as approach-oriented affective states (e.g., joy, but also anger, compared to avoidance-oriented states such as fear, tranquility, and contentment) enhance creative thinking (e.g., Greene & Noice, 1988; Isen, 1990; Isen, Daubman, & Nowicki, 1987; for a review, see Baas, De Dreu, & Nijstad, 2008). One of the reasons why these mood states are theorized to facilitate creativity is that positive mood and approach-oriented emotions are associated with a broadening of the focus of attention, which facilitates cognitive flexibility, or "thinking outside the box" (e.g., Ashby, Isen, & Turken; 1999; Kasof, 1997; Rowe, Hirsch, & Anderson, 2007).

Based on this literature, we expect that types of mind-wandering that are associated with positive affect and approach-oriented emotions should facilitate creativity. The first indirect evidence for this idea has come from a study by Zhiyan and Singer (1996), which showed that the positive-constructive daydreaming style, which is characterized by positive thoughts, is related to openness to experience, a personality trait that has been associated with creativity. However, this research does not directly examine whether there is a direct link between positive and/or approach-oriented task-unrelated thoughts and the facilitation of creative ideation. Moreover, this research does not distinguish between the affective-experiential aspects (i.e., positive mood or affect), and motivational components of mind-wandering, which may each facilitate creativity. In a recent study (Zedelius, Protzko, & Schooler, 2016) in which we assessed various different daydreaming styles, we distinguished between daydreaming that can be characterized as happy or pleasant (e.g., "My daydreams provide me with pleasant thoughts"), which is an aspect of Singer and Antrobus's (1963, 1970) positive constructive daydreaming, and daydreaming that is characterized as personally meaningful (e.g., "I daydream about things that are of great value or importance to me"; see Andrews-Hanna et al., 2013, for a similar treatment of these different aspects). We found that, whereas a tendency for pleasant daydreams did not predict self-reported creative behavior, meaningful daydreaming did. This suggests that daydreaming that can be summarized as positive may facilitate creativity by evoking personally meaningful content rather than positive affect per se, perhaps because meaningful content can be highly motivating (e.g., Elliot, 2006).

It is important to note that daydreaming or mind-wandering about meaningful things is different from rumination. Rumination is typically self-related, and often negative, but is most strongly characterized by its repetitive nature and narrow focus of attention (Grol, Hertel, Koster, & De Raedt, 2015; Smallwood, O'Connor, & Heim, 2006; Smallwood et al., 2003). Therefore, we would expect that types of mind-wandering that are characterized by ruminative thoughts should be negatively related to creativity.

Research on mind-wandering and creativity, thus far, has paid little attention to moderating factors such as the content, valence, and motivational aspects of stimulus- or task-unrelated thoughts. Based on the arguments laid out here, we think that such examination would introduce important nuance to the mind-wandering–creativity link.

How Types of Mind-Wandering Affect Future-Oriented Decision-Making

Mind-wandering, more often than not, involves thoughts about the future—a finding that has led researchers to theorize that it may serve a function for autobiographical planning and preparing for future events and decisions, and may thus not be as maladaptive as it is often made out to be (Baird et al., 2011; Klinger, 2009, 2013; Klinger & Cox, 1987; Poerio, Totterdell, Emerson, & Miles, 2015; Smallwood, Nind, & O'Connor, 2009; Smallwood, Schooler, Turk, Cunningham, Burns, & Macrae, 2011). Indeed, there is some evidence that mind-wandering can aid self-regulation by facilitating future-oriented decision-making (e.g., Smallwood, Ruby, & Singer, 2013). As with the previously discussed findings, however, it is likely that this effect

depends at least in part on what types of mind-wandering one engages in.

The benefit of mind-wandering for future-oriented decision-making has been illustrated in the context of delay discounting. Delay discounting is the tendency to prefer or to chose smaller immediate rewards over larger rewards one has to wait for (e.g., Frederick, Loewenstein, & O'Donoghue, 2002). What makes it hard to choose a delayed over an immediate reward, even if the delayed reward is objectively more valuable, is the strong appeal of the immediate reward that needs to be down-regulated. Such down-regulation is effortful and requires self-control (e.g., Metcalfe & Mischel, 1999; Reynolds, 2006). Interestingly, Smallwood et al. (2013) have found evidence that delay discounting is easier for people who mind-wander more. In their study, mind-wandering was measured through experience sampling during two different attention tasks, which differed in difficulty. Before or after the attention tasks, participants performed a delay-discounting task in which they repeatedly chose between two financial rewards, a smaller but immediate reward and a larger reward that was delayed by up to 180 days. The results showed that more frequent mind-wandering during the easy attention task was associated with a decreased tendency toward delay discounting. The authors speculated that habitually dreaming away from the here and now may enable people to forgo the temptation of immediate rewards.

Given that mind-wandering episodes often revolve around the future, the explanation Smallwood et al. (2013) gave for their findings was that individuals who mind-wander more spend more time mentally simulating the future, which makes them more sensitive to the value of future rewards. This explanation is supported by the observation that only mind-wandering during the *easy* but not the more difficult task was predictive of participants' tendency to choose future over immediate rewards. Previous research (Smallwood et al., 2009; Smallwood, Schooler, et al., 2011) has shown that future-related mind-wandering is much more prevalent during easy or passive tasks than during highly demanding tasks. Thus, it seems that task conditions that are conducive to future-related mind-wandering specifically are beneficial for future-oriented decision-making.

Indeed, other studies have found that engaging in episodic future thinking, as opposed to non-episodic thinking (Benoit, Gilbert, & Burgess, 2011) or thinking about things in the present (Lin & Epstein, 2014), leads to more future-oriented choices in delay discounting tasks. And again, other research has shown that engaging in spontaneous thoughts about the future during a delay-discounting task reduced preferences for immediate rewards (Peters & Büchel, 2010). Interestingly, in all those studies, the effect was not driven by future-related thoughts that were explicitly associated with the future reward itself. Lin and Epstein (2014) attributed the benefit of future-oriented thinking for future-oriented decision-making to an increased ability to predict one's own future emotions, a hypothesis that is in line with the findings by Smallwood et al. (2013).

Other research, however, suggests that engaging in positive and not necessarily future-related types of thoughts can also be an effective strategy to resist the temptation of immediate rewards in order to obtain delayed rewards. For instance, Mischel, Ebbesen, and Zeiss (1972) found that, when children could obtain a desired food item by resisting to eat a less desirable but immediately available food, instructions to engage in positive distracting thoughts (i.e., "anything that is fun to think of") substantially increased their ability to wait. Sad thoughts or thoughts directly related to the desired rewards, on the other hand, were not as helpful. The mechanism behind the benefit of positive mind-wandering may be different from that of future-related mind-wandering. Whereas future-related mind-wandering seems to influence how individuals think about or attend to future rewards, positive mind-wandering might instead reduce the relative appeal of the immediate reward. More research is needed to test this possibility. To sum up, the research discussed in this section illustrates that, under conditions giving rise to future-related or positive thoughts, the seemingly maladaptive tendency to escape from the here and now can be functional for planning and future-oriented decision-making.

Practicing Constructive Mind-Wandering

If some types of mind-wandering are less disruptive to performance than others, or are more helpful for attaining desired outcomes such as maintaining positive mood, being creative, or future-oriented decision-making, this raises the important question of whether we can learn to deliberately increase those "constructive" types of mind-wandering. The idea of deliberately and consciously engaging in mind-wandering may seem paradoxical; after all, mind-wandering is typically defined as spontaneous and often task-unrelated, and often occurs without

awareness. If one deliberately engages in a particular train of thought, with a desired outcome in mind, doesn't this make the thinking one's primary task, and anything but spontaneous? We think, on the contrary, that it is possible to give direction and purpose to a mind-wandering episode without necessarily removing all spontaneity from the experience. As Fox and Christoff (2014) have pointed out before, spontaneous thinking and meta-cognitive control are not necessarily in conflict, and the interplay of these two modes of thinking may facilitate creative cognition and other mental phenomena. We propose, for instance, that in order to facilitate creative thinking, you may decide to let your mind wander toward a positive or personally meaningful memory or an interesting thought, without controlling where your train of thought will go from there. Or you may let your mind wander freely, and redirect your attention only when you notice that you start to engage in repetitive, ruminative thought. In other words, we think that one can give broad direction to spontaneous thoughts without stifling their spontaneous, associative quality. This could be considered a "mindful" approach to mind-wandering, whereby one aims to be at least intermittently meta-aware of one's thought content (see Fox & Christoff, 2014).

The idea of engaging in deliberative stimulus-unrelated thinking for personal improvement is not new. In types of meditation that revolve around open monitoring, for instance, practitioners are encouraged to observe their spontaneous thoughts with a receptive, accepting attitude, giving no priority to any thought in particular (e.g., Lutz, Slagter, Dunne, & Davidson, 2008). In classic Freudian approaches to psychotherapy, free association has been used as a way to reveal unconscious thought processes (e.g., Kris, 1982). And in modern forms of cognitive or cognitive behavioral therapy, patients are encouraged to become aware of their habitual patterns of thoughts and to change their internal narrative in a more constructive way in order to create changes in their emotions and behaviors (e.g., Blagys, & Hilsenroth, 2002; Gonçalvs, Matos, & Santos, 2009; Hollon & Beck, 1994).

Experimental studies, too, have shown that interventions involving guided thought exercises can lead to benefits. For instance, recalling positive autobiographical memories or vividly imagining positive scenarios can help increase positive mood and reduce negative intrusive thoughts in ruminators or individuals with depressive symptoms (Gillihan, Kessler, & Farah, 2007; Hirsch, Perman, Hayes, Eagleson, & Mathews, 2015; Homes, Lang, & Shah, 2009; Josephson, Singer, & Salovey, 1996; Stokes & Hirsch, 2010). Here, too, different styles of thinking have been shown to have different effects. Hirsch et al. (2015), for instance, confronted ruminators with worrying scenarios and instructed them to either think about the potential negative or positive outcomes of each scenario. Moreover, suspecting that the attempt to fully suppress negative ruminative thoughts would likely backfire, they placed loose constraints on the style of participants' spontaneous thoughts; that is, they instructed them to either think about their worries in the form of mental images or in the form of verbal descriptions. Next, participants were instructed to focus on their breathing for a period of five minutes. After the breath focus period, intrusive thoughts were assessed. The results showed that both thinking in images and focusing on positive outcomes reduced negative intrusive thoughts. Interestingly, thinking in images reduced intrusions even when participants thought about negative outcomes, suggesting that thinking style had a greater impact than specific thought content.

In a similar study (Holmes, Coughtrey, & Connor, 2008), participants read descriptions of a number of positive scenarios and were asked to either reflect on the verbal qualities of the descriptions or vividly imagine the scenarios either from their own (first-person) perspective, or from an observer's (third-person) perspective. Imagination but not verbal analyses of the scenarios led to improved mood. Interestingly, this was true only when participants imagined events from their own perspective. This again suggests that guiding the style of people's mind-wandering can help increase constructive types of mind-wandering in order to increase positive moods.

Other research has examined whether exercises akin to deliberate mind-wandering can be used to improve creativity. Long, Hiebert, Nules, and Lalik (1985), for instance, developed guided "visualization" exercises—essentially instructed mind-wandering—with the goal of improving creativity and in particular creative writing in elementary school students. The students were randomly assigned to two conditions. In the experimental condition, the students engaged in three weekly sessions of guided imagination, in which they were encouraged to first vividly imagine any memories or current experiences that came to mind and then let these images spontaneously "trigger" further images and thoughts. In a control condition,

students listened to and wrote stories, without deliberately trying to engage in any related or spontaneous thoughts. After the intervention, students who had engaged in mind-wandering, compared to the control condition, showed improvement in the originality of their creative writing. In a similar study, Jampole, Methews, and Konopak (1994; see also Jampole, Konopak, Readance, & Mosher, 1991) tried to elicit vivid thoughts and mental images by encouraging students to imagine traveling to different places and to imagine all the smells, feelings, and other experiences associated with this travel. Again, compared to control conditions involving reading and writing exercises, students who participated in imaginative thought showed increased creativity.

Following a similar approach, future studies could explore the consequences of different types of mind-wandering for performance, mood, creativity, decision-making, and other outcomes. For instance, building on the evidence that recalling positive autobiographical memories or vividly imagining positive events improves mood (Josephson et al., 1996; Gillihan et al., 2007; Hirsch et al., 2015; Holmes, Lang, & Shah, 2009; Serrano, Latorre, Gatz, & Montanes, 2004; Stokes & Hirsch, 2010), could instructions to deliberately daydream about positive or personally meaningful events or memories be a strategy to improve a person's mood, well-being, and creativity? Could instructions to imagine future scenarios (versus recalling memories or thinking about current concerns) facilitate future-oriented decision-making? If so, this would not only be informative for research on the effects of mind-wandering, it would also have more practical applications. For instance, it may lead to intervention programs training people in recognizing the effects of their tendency to engage in different styles of mind-wandering and possibly invoking constructive types of mind-wandering dependent on current environmental or task demands.

There is currently a great interest in the benefits of mindfulness practices that focus on directing attention to present-moment experiences and increasing meta-awareness of one's experience (e.g., Chambers, Lo, & Allen, 2008; Grossmann, Niemann, Schmidt, & Walach, 2004; Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010; Mrazek et al., 2013). We think that increased meta-awareness may also benefit attempts to increase constructive mind-wandering. For one, becoming more meta-aware of one's spontaneous thoughts may be the first step to recognizing one's habitual style of mind-wandering and identifying how different types of mind-wandering affect one's mood or behavior. Recognition, as a first step to regulation, is not trivial. Research shows that people routinely fail to recognize when they engage in unwanted thoughts. For instance, in a study by Baird et al. (2013), participants were asked to monitor and catch spontaneous intrusive thoughts of past romantic relationships while performing a task. In addition, participants were probed at random moments and asked about their thoughts. The results showed that participants often reported thinking about the former partner when probed, yet rarely caught those thoughts themselves. There is evidence, however, that meta-awareness of spontaneous thoughts can be increased when people make a conscious effort to catch those thoughts (Zedelius et al., 2015). Thus, we think that making an effort to increase meta-awareness, for instance with the help of mindfulness practice, may enable people to recognize when they are engaging in dysfunctional types of mind-wandering and shift their thoughts toward more constructive types of mind-wandering. Given that people spend a considerable amount of time mind-wandering, such interventions may have potential as a tool for self-enhancement.

Summary and Conclusion

Mind-wandering occupies a large amount of our waking life, and has inspired decades of research examining why and when the mind escapes from the here and now, what the neural signatures of mind-wandering are, and how mind-wandering affects cognition and behavior. In much of this research, mind-wandering has been defined in the broadest sense, encompassing all types of spontaneous, stimulus- or task-unrelated thought, although several lines of research have shed more light on specific aspects of the contents and styles of mind-wandering. In the present chapter, we have focused on discerning distinct types of mind-wandering, characterized by different experiential qualities, emotions, and cognitive processes, and we have examined how these different types of mind-wandering affect cognition and behavior. We have focused on research on the effects of mind-wandering on performance, mood, creativity, and future-oriented decision-making, and have illustrated how differentiating between different types of thought can bring important nuances to our understanding of mind-wandering. We have pointed out what we think are gaps in the current mind-wandering literature and have proposed novel hypotheses for future research that may elucidate how distinct types of

mind-wandering—intentional mind-wandering, mind-wandering with meta-awareness, and positive, approach-oriented, personally meaningful, or future-oriented mind-wandering—may uniquely benefit stable performance, positive mood, creative thought, and future-oriented decisions. Finally, we have made a case for adding deliberate mind-wandering to our scientific toolkit to understand and harness the effects of different constructive kinds of mind-wandering. We are only beginning to unravel the richness of spontaneous thought and its diverse consequences.

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