

COMMENT

Disentangling Decoupling: Comment on Smallwood (2013)

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Smallwood (2013) made important contributions to the science of mind wandering by distinguishing between 2 aspects of the mind-wandering experience: (a) *how* the mind wanders, which entails the *process* of maintaining the continuity of a mind-wandering episode, and (b) *why* the mind wanders, which refers to those mechanisms that lead to the *occurrence* of a mind-wandering episode. This new process–occurrence framework offers a way to compare and contrast existing theories of mind wandering and highlights key questions to be addressed in future work; however, we suggest that in characterizing one of the core mechanisms of mind wandering, Smallwood conflated the occurrence of a phenomenon with its explanation. Specifically, the occurrence of perceptual decoupling (i.e., that mind wandering is associated with reduced attention to external stimuli) was conflated with an explanation for its occurrence (i.e., in order to insulate the internal train of thought). Disentangling the theory of perceptual decoupling raises questions regarding both its role in insulating the internal train of thought in mind wandering and its unique theoretical contributions to the *how/process* of mind wandering.

Keywords: mind-wandering, attention, perceptual decoupling, meta-awareness, self-generated thought

As you read this article, there will inevitably be moments when your eyes continue moving across the page yet your attention is diverted towards something completely unrelated. Indeed, it is estimated that of the time during which one is engaged in a particular task, nearly half is spent thinking about something else (Killingsworth & Gilbert, 2010). Although long overlooked by mainstream research, in recent years mind wandering has received widespread empirical and theoretical attention (Schooler et al., 2011). Smallwood (2013) summarized the progress that has been made in the study of mind wandering within the context of a new perspective aimed at integrating existing theories and providing a fresh conceptual framework for advancing its study. This perspective involves distinguishing the *how* from the *why*, or the *process* from the *occurrence*, of mind wandering. Smallwood suggested that understanding the *how/process* of mind wandering requires characterizing the mechanisms that maintain the continuity of a mind-wandering episode, whereas understanding the *why/occurrence* of mind wandering entails identifying the mechanisms leading to the onset of mind-wandering episodes. Smallwood argued that this distinction between the process and occurrence of mind

wandering helps to clarify the respective contributions of four current theories of mind wandering: current concerns (Klinger, 1978), decoupling (Smallwood et al., 2011), executive failure (McVay & Kane, 2010), and meta-awareness (Schooler et al., 2011).

We believe that Smallwood's (2013) review and analysis significantly advance our understanding of mind wandering by (a) identifying the core theoretical constructs in the mind-wandering literature and clarifying their unique contributions to the discussion, (b) highlighting the distinction between explanations that speak to the initiation of mind wandering versus its maintenance, (c) pinpointing the need for identifying the initiation of mind-wandering episodes as a methodological bottleneck that needs to be overcome in order to resolve many outstanding issues, and (d) introducing the hypothesis that the hippocampus may serve as an important spark for mind-wandering episodes. Although we applaud the article's significant advancement of the field, we nevertheless see several issues that may benefit from a different perspective. Our differences with Smallwood largely revolve around his discussion of the nature and unique status of the decoupling process in explaining mind wandering. In particular, we suggest that it is premature to conclude that perceptual decoupling actively supports the continuity of internal trains of thought by insulating them from external distraction.

Perceptual Decoupling

Perceptual decoupling corresponds to the notion that mind wandering is associated with a reduction in attention to the external environment. Importantly, there are two aspects of this construct that might be respectively characterized as (a) the occurrence of perceptual decoupling and (b) explanations for perceptual decou-

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pling. As detailed in Smallwood (2013) and elsewhere, documentations of the occurrence of perceptual decoupling are extensive. Attenuated resources to the external environment following mind wandering are revealed by a host of different lines of research including the observations that mind wandering leads to impaired performance on external tasks (Teasdale et al., 1995), reduced behavioral sensitivity to the properties of external events (Smallwood & Schooler, 2006), and dampened physiological responses to external stimuli (Kam et al., 2011; Smallwood et al., 2011). In short, the process of perceptual decoupling has been evidenced in numerous contexts. What remains a far more equivocal issue is the explanation of perceptual decoupling, that is, why is it that mind wandering so consistently leads to a reduction in sensitivity to external events? It is on this question that the issue becomes far murkier.

Original discussions of the reasons for perceptual decoupling proposed that reduction in attention to the external world following mind wandering is a consequence of competition between the executive resource demands of the external environment and those necessary for progress on the distal goals entailed in the mind-wandering episode itself. As Smallwood and Schooler (2006) observed, “mind wandering occurs when executive control leaves the primary task in favor of an alternative personally relevant goal” (p. 954). Smallwood (2010) similarly speculated that the resource demands of mind wandering stem from processes entailed in mind-wandering activity itself, noting, “mind wandering is resource demanding inasmuch as it occupies the global workspace necessary for consciousness” (p. 202). A simple resource competition account represents one straightforward and frequently cited reason for why mind wandering leads to a decoupling of attention from the external environment. In short, the thoughts entailed in mind-wandering episodes demand resources that result in fewer resources being available for external processing.

A second, not necessarily mutually exclusive account for perceptual decoupling is that there is some type of active process that is invoked during mind wandering in order to protect the inner stream of consciousness from distraction from the external world. It is this second alternative that Smallwood (2013) favored in his account of the decoupling process, observing, “when self-generated thought occurs, the process of perceptual decoupling associated with internal focus insulates self-generated cognition from external disruption” (p. 529). While protection of the inner stream of consciousness is certainly one potential reason for why mind wandering may draw resources away from the external environment, it is by no means the only possible reason. In fact, all of the evidence that Smallwood levied in support of this insulation mechanism could equally well be accounted for by the view that mind wandering draws resources in the service of addressing distal goals (Smallwood & Schooler, 2006) and/or occupying the global workspace (Smallwood, 2010). A brief review of the evidence that Smallwood listed in support of the insulation interpretation of perceptual decoupling illustrates this point.

Smallwood (2013) listed four sources of evidence that favor the insulation account of perceptual decoupling: (a) reduction in mind wandering with demanding task, (b) covert measures of executive function during mind wandering, (c) attention to distractor items during mind wandering, and (d) individual

differences and mind wandering. In each case, the competition view provides an equally compelling account to the insulation mechanism. First, according to a competition view, the reason why mind wandering is less likely with demanding tasks is that there are fewer resources available for carrying out the thoughts entailed in mind wandering. Second, the reason why covert measures reveal executive resource activation during mind wandering could be that the thoughts entailed in this process, such as thinking about future goals, are resource demanding. Third, the explanation for why mind wandering reduces processing of both external targets and external distractors might simply be that directing attention internally results in a concomitant decrease in perceptual processing.

Finally, the resource competition view provides a relatively straightforward account for the somewhat complex relationship between individual differences in executive resources and mind wandering. To date, the key findings in this albeit somewhat murky area are (a) with nondemanding tasks, working memory capacity is positively related to mind wandering (Levinson, Smallwood, & Davidson, 2012); (b) with demanding tasks, working memory is negatively related to mind wandering (Mrazek et al., 2012); and (c) more demanding tasks change the content of mind wandering by reducing thoughts about the future (Smallwood, Nind, & O’Connor, 2009). All of these findings naturally fall out from a resource competition view without requiring the additional assumption that executive resources are explicitly dedicated to the insulation and maintenance of an inner stream. Accordingly, under nondemanding situations, individuals with greater working memory capacity will have more resources to devote to distal goals and therefore will be more likely to mind-wander. Under more demanding situations, individuals with greater working memory capacity will have more resources available for metacognitive regulation and so will be better able to rein in mind wandering that would otherwise disrupt primary task performance. Finally, given that mind wandering about the future often entails thinking about goals (Baird, Smallwood, & Schooler, 2011) and therefore is likely to be especially resource demanding, it follows that individuals with high working memory capacity should be especially prone to mind wander about the future when they can do so without undue cost. In short, all of the evidence in favor of the decoupling hypothesis can readily be accounted for by a resource competition view that does not necessitate the assumption that decoupling involves insulating the inner stream from distraction. Thus, while the process of decoupling of attention from the external environment following mind wandering is beyond dispute, the precise reason for why this occurs remains an issue that awaits further research. Insulating the internal stream from external distraction is an intriguing hypothesis, but it is not the only or even necessarily the best explanation for why perceptual decoupling occurs.

The How of Mind Wandering

Smallwood (2013) characterized the how of mind wandering as addressing the question of how individuals successfully maintain an inner train of thought independent from distractions from the external environment. As Smallwood observed,

A second question that science could ask is, *How* is the mind able to support cognition whose content is unrelated to immediate perceptual input? This question requires the identification of the cognitive processes that allow an internally generated thought fragment to be transformed into a detailed internal train of thought and for this thought fragment to persist against external distraction. (Smallwood, 2013, p. 519)

However, as noted above, all of the evidence used to support the existence of an insulation process for the internal stream of thought can equally well be accounted for by a resource competition model that assumes that the internal stream outcompetes the external stream for limited resources when distal goals are of the highest priority. Thus, one potential answer to the question of what cognitive processes allow the internally generated thoughts associated with mind wandering to persist without disruption may simply be that there are none, the brain is not wired that way. Needless to say, we are not suggesting that this is necessarily the case; indeed, there are some hints of evidence that individuals may actively try to protect the inner stream when mind wandering. For example, this is one of several possible explanations for why individuals blink more during mind wandering (Smilek, Carriere, & Cheyne, 2010).¹ But to assume that protection against distraction from the external environment is the essential question underpinning understanding the how of mind wandering seems to be putting the cart before the horse.

Based on the view that the essence of understanding the process of mind wandering is accounting for the mechanisms that insulate the internal stream from external distraction, Smallwood concluded that of the four theoretical perspectives on mind wandering, only the decoupling hypothesis speaks to the how of mind wandering. As Smallwood (2013) observed, “*Continued attention on self-generated material depends upon the processes that aid the integrity of a train of thought. . . . Unlike the other approaches, therefore, the decoupling hypothesis is an explanation for the continuity of self-generated thought*” (p. 524). Smallwood further clarified why only the decoupling hypothesis pertains to the how of mind wandering, observing,

The fact that the decoupling hypothesis is the only theory covered in this article concerned with ensuring the continuity of the mind-wandering state, while the other theoretical approaches provide explanations for the occurrence of the state, simply reflects the fact that the question of *why* mind wandering occurs is a broader question than *how* it manifests in the waking brain. (Smallwood, 2013, p. 525, footnote 4)

We question this characterization of the how of mind wandering on several grounds. First, as noted, it remains to be demonstrated that perceptual decoupling is necessarily dedicated to ensuring the continuity of the mind-wandering state. Indeed, it has yet to be demonstrated that any process is specifically dedicated to insuring the integrity of internal trains of thought during mind wandering. Second, if we are going to conjecture about such a process, there are also reasons to speculate that the other theoretical mechanisms could be involved. For example, the current concerns hypothesis could accommodate the continuity of mind wandering by positing a mechanism that seeks out information with the greatest incentive value, with attention being maintained on the highest value information until a new piece of information supersedes it. Similarly, the executive failure hypothesis could posit that the continuity of internal trains of thought is maintained (a) by ongoing failures to reinstate task-relevant goals or (b) if the internal train of thought has become the new primary task, by executive functions working

to keep both perceptual and internal distractions at bay. Finally, the meta-awareness hypothesis naturally accommodates the notion that individuals could use self-regulation strategies to modulate whether attention remains focused on the internal stream. Indeed, various lines of research are consistent with this potential role of meta-awareness. For example, individuals who generally report being meta-aware of their mind-wandering episodes reveal fewer costs to mind wandering (Smallwood, McSpadden, & Schooler, 2007), suggesting that meta-awareness of mind wandering may enable individuals to carry on an internal train of thought when it is not disruptive and abort it when it is. Of course this is just one interpretation of such findings, but it illustrates that like the other accounts, meta-awareness theory offers potential mechanisms that could be dedicated to maintaining the continuity of mind wandering.

It is also debatable whether, as Smallwood (2013) suggested, domain-general executive processes are involved in maintaining the continuity of mind wandering. There are several alternative reasons for why executive processes could be engaged during mind wandering. One possibility, alluded to earlier, is that mind wandering demands executive resources in the service of thinking about distal goals (Smallwood & Schooler, 2006). Another possibility is that executive resources are required to maintain processing of the primary task while simultaneously mind wandering. For example, the left inferior frontal gyrus and bilateral dorsal lateral prefrontal cortex that are active during mind wandering are considered the hallmark brain centers of task-oriented cognitive control and are commonly activated in interference-resolution tasks such as the Stroop task (Langenecker, Nielson, & Rao, 2004; Vanderhasselt, De Raedt, & Baeken, 2009). Mind wandering could be considered akin to an interference-resolution task in that an external primary task continues despite competing internal thoughts, and although mind wandering does have behavioral consequences, it does not always completely derail performance. For example, it is possible to mind-wander while reading aloud and still maintain the appearance of normal prosody (Franklin, Mooneyham, Baird, & Schooler, 2012), and while lexical effects are attenuated during mindless reading, they do not completely diminish (Franklin, Smallwood, & Schooler, 2011). This suggests the possibility that the executive network could be related to the difficult job of keeping a task going in the face of internal distractions, rather than sustaining the mind-wandering episode. In short, while insulating the internal stream is certainly one candidate source of the executive resource demands associated with mind wandering, there are a variety of other potential processes that could alternatively be responsible.

Ultimately, given the uncertainties regarding the existence of processes uniquely dedicated to insulating the integrity of internal trains of distracted thought, it seems premature to define the how of mind wandering uniquely in terms of this particular construct. Rather, a more straightforward characterization of the how of mind wandering might ask, What are the processes involved in mind

¹ The observation that early stage psychophysiological responses to external stimuli are attenuated during mind-wandering episodes (e.g., Kam et al., 2011; Smallwood et al., 2011) is also consistent with the thesis that mind wandering invokes an active insulation process. However, such attenuations may simply reflect a change in the direction of attention rather than an active insulation of the internal stream.

wandering from its initiation through its termination? Such a view would logically entail three stages: (a) the processes involved in the initiation of mind wandering (what Smallwood, 2013, referred to as the why of mind wandering), (b) the processes (if they exist) involved in active maintenance of the mind-wandering train of thought, and (c) the processes entailed in the termination of mind wandering. All three of these stages, initiation, maintenance and termination, seem naturally to fall into the rubric of the process of mind wandering, and in all likelihood, all four of the theoretical models that Smallwood (2013) discussed could speak to these issues.

Although we diverge from Smallwood's (2013) specific characterization of the process of mind wandering and the theoretical constructs that may contribute to it, we concur with his conclusion that understanding the process of mind wandering will necessarily require more fine-grained covert measures of the time course of mind wandering. Without knowing when mind-wandering episodes begin and end, it is extremely difficult to understand what triggered them, how they were sustained, or what brought them to a close. There can be no question that covert measures will be needed to address this issue, and happily, there are a number of very promising measures in this regard (e.g., Franklin et al., 2011; Macdonald, Mathan, & Yeung, 2011) that may individually or potentially collectively break this current impasse.

Why the Mind Wanders

As Smallwood (2013) aptly noted, it is easy to conflate discussions that speak to the processes underpinning a phenomenon (the how) with the reasons why those processes take place (the why). Indeed, as we have noted, Smallwood himself may have conflated the existence of a well-established process (the dampening of perceptual processing following mind wandering) with a particular reason for its occurrence (i.e., to insulate the internal train of thought against external distraction). The conflation of a process with its explanation is an easy mistake. In fact, at least one of us (Schooler) could reasonably be accused of it in prior discussions. Schooler (2002) and Schooler, Reichle, and Halpern (2004) observed that mind wandering is less disruptive when it is self-caught (i.e., by meta-awareness) than when it is caught by the experimenter (i.e., in the absence of meta-awareness). From this observation, a further, more questionable assumption was made, namely, that the presence of meta-awareness is causally responsible for why this relationship is observed. Once again, a phenomenon (meta-awareness is associated with reduced mind-wandering deficits) was conflated with an explanation (meta-awareness is responsible for this reduction). However, as Smallwood noted (see also Schooler et al., 2011), the occurrence of meta-awareness in conjunction with the termination of a mind-wandering episode is not necessarily indicative that meta-awareness is the reason for its termination. The association of meta-awareness with reduced disruptions of mind wandering may or may not prove to implicate a causal relationship between the two. Once again, an occurrence was conflated with an explanation.

The implications of these confluations are important and may offer more general lessons regarding questions of why psychological phenomena occur. While Smallwood's (2013) discussion of the why of mind wandering largely focused on proximal causes of

specific mind-wandering episodes, it is also worth considering the broader question of why mind wandering exists, in terms of distal causes. Indeed, Smallwood also broached this broader meaning when he asked "why the mind has evolved to neglect the present in favor of ruminations on the past or imaginary musings of what may yet come to pass" (Smallwood, 2013, p. 519). In the following, we offer a few cautionary observations on the dangers of drawing conclusions regarding the ontological why of mind wandering.

It is easy to think that because mind wandering is such a central feature in our lives—constituting as much as 50% of our waking thoughts (Killingsworth & Gilbert, 2010)—that it must therefore exist for a reason. However, it is also possible that mind wandering came into existence not as an adaptation but instead as a by-product of an adaptation (such as the more general capacity for stimulus-independent thought). While we think this by-product explanation is unlikely, it is worth bearing in mind that claims regarding why mind wandering exists in an ontological sense require persuasive evidence.

Merely linking mind wandering to behaviors that themselves seem adaptive is a strong temptation when trying to identify why mind wandering exists in an ontological sense. For instance, the fact that the content of mind wandering often pertains to future goal-related concerns is consistent with the intuitive notion that mind wandering is adaptive (in terms of having a function) in part because it allows us to anticipate and plan the future (Baird et al., 2011). However, this association does not logically entail that mind wandering exists in order to productively plan the future. After all, mind wandering is also associated with depressive rumination and low mood (Killingsworth & Gilbert, 2010; Smallwood, O'Connor, Sudbery, & Obonsawin, 2007), yet few would be inclined to suggest that mind wandering exists in order to make us less happy (except perhaps diehard pessimists).

Trying to infer why mind wandering exists from demonstrations of putative benefits that derive from mind wandering is another strong temptation. For instance, mind wandering is associated with enhanced creative incubation (Baird, Smallwood, Mrazek, Franklin, & Schooler, in press), but this does not logically entail that enhanced creativity is the reason why mind wandering exists. If researchers wish to explain why mind wandering exists, it may be useful to apply criteria developed in evolutionary biology and evolutionary psychology to determine whether mind wandering can be considered an evolved adaptation and to specify whether the various characteristics of mind wandering are best explained as adaptations, by-products of adaptations, or noise (Tooby & Cosmides, 1992).

Just as there may be several contributing explanations for why mind wandering exists in an ontological sense, so there may also be a variety of reasons why mind wandering occurs in any particular instance. After all, mind wandering may serve a number of functions, including planning the future, facilitating creativity, or extracting informational value from memories. Other times, mind wandering may serve no useful function at all. This suggests that ongoing research will need to consider multiple different proximal reasons why an episode of mind wandering occurs. In line with the *hippocampus spark hypothesis*, one possibility is that when a particularly salient memory reaches a threshold of activation, it initiates a task-switch from an external task to internal reflection. Another possibility, in

line with the *executive failure view*, would be that when a lapse in goal maintenance disrupts task engagement, it allows a relatively low-salience thought to enter conscious awareness. Mind wandering occurs because of the salience of a personal concern in one case and because of a failure in cognitive control in another. Ongoing debates about the proximal causes of mind wandering (and, specifically, of the role of executive resources) may therefore benefit from greater consideration of whether task-unrelated thoughts arise in several different ways.

Final Remark

Although we may not agree with all specific conclusions drawn in Smallwood (2013), the process–occurrence framework offers a unique perspective on mind wandering, integrates existing theories, and illuminates some of the major questions in this area of research. Whereas recent debates have largely focused on the initiation of mind wandering (McVay & Kane, 2010; Smallwood, 2010), Smallwood (2013) drew needed attention to other dimensions of this phenomenon, particularly whether processes exist to insulate mind wandering from disruption. While we cannot yet conclude that perceptual decoupling serves an insulating function, the identification of processes involved in sustaining internal trains of thought offers clear direction for future research.

Importantly, the article also highlighted the major obstacle to further significant advances in mind-wandering research—determining the when of mind wandering. Current methodology confounds frequency of mind wandering with duration of a mind-wandering episode. As a result of the coarse temporal resolution of mind-wandering measures, it is not strictly possible to distinguish a process from an occurrence so that questions about the how and why of mind wandering can be more empirically based.

This key insight is one of the major contributions to be derived from the thought-provoking review by Smallwood (2013) and will likely drive future research to more accurately assess the moment when attention is diverted away from a task, which may allow us to better understand how to minimize the negative effects (e.g., poor task performance) while maximizing the positive effects (e.g., creative problem solving) of mind wandering.

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