

# Not all mind wandering is created equal: dissociating deliberate from spontaneous mind wandering

Paul Seli · Jonathan S. A. Carriere ·  
Daniel Smilek

Received: 5 March 2014 / Accepted: 23 September 2014  
© Springer-Verlag Berlin Heidelberg 2014

**Abstract** In two large samples we show a dissociation between trait-level tendencies to mind-wander spontaneously (unintentionally) and deliberately (intentionally). Participants completed online versions of the Mind Wandering Spontaneous (MW-S) and the Mind Wandering Deliberate (MW-D) self-report scales and the Five Facet Mindfulness Questionnaire (FFMQ). The results revealed that deliberate and spontaneous mind wandering were uniquely associated with some factors of the FFMQ. Notably, while the MW-D and the MW-S were positively associated with each other, the MW-D was uniquely positively associated with the ‘Non-Reactivity to Inner Experience’ factor of the FFMQ, whereas the MW-S was uniquely negatively associated with this factor. We also showed that conflating deliberate and spontaneous mind wandering can result in a misunderstanding of how mind wandering is related to other traits. We recommend that studies assessing individual differences in mind wandering should distinguish between deliberate and spontaneous subtypes of mind wandering to avoid possibly erroneous conclusions.

## Introduction

Imagine an individual who is capable of sustaining her attention to a task when necessary, but spends much of her time deliberately mind wandering. Now imagine an individual who, despite his best intentions, cannot keep his mind from spontaneously wandering away from his

everyday tasks. Here we have two individuals who frequently engage in mind wandering, but who do so for very different reasons. We refer to these two types of mind wandering as deliberate (intentional) and spontaneous (unintentional), respectively. Although there is reason to believe that these two types of mind wandering occur in everyday life (Carriere, Seli, & Smilek, 2013), recent investigations of mind wandering have largely neglected the distinction between deliberate and spontaneous types of mind wandering, and have used trait-level questionnaires that do not distinguish between these subtypes, but instead provide an “overall” assessment of mind-wandering propensity. Building on recent work that has argued for the utility of treating mind wandering as a heterogeneous class of experiences (Smallwood & Andrews-Hanna, 2013), in the present study we demonstrate the importance of distinguishing between deliberate and spontaneous experiences of mind wandering at the individual-difference level. In particular, we show that these two types of mind wandering are differentially associated with other individual traits and that conflating these types of mind wandering can lead to incorrect general conclusions about mind wandering and its associates.

The idea that mind wandering occurs in deliberate and spontaneous forms has been around for quite some time. Indeed, in his early work on the topic, Giambra (1995) noted that “TUITs (i.e., task-unrelated imagery and thoughts) may occupy awareness because they capture our attention—an uncontrolled shift—or because we have deliberately shifted our attention to them—a controlled shift” (p. 2). Despite this early distinction between spontaneous and deliberate mind wandering, almost all of the subsequent research on the topic has assessed reports of “overall” mind wandering (e.g., Baird et al., 2012; Killingsworth & Gilbert, 2010; McVay & Kane, 2009;

---

P. Seli (✉) · J. S. A. Carriere · D. Smilek  
Department of Psychology, University of Waterloo,  
200 University Ave. West, Waterloo, ON N2L 3G1, Canada  
e-mail: pseli@uwaterloo.ca

Mrazek, Phillips, Franklin, Broadway, & Schooler, 2013; Seli, Carriere, Levene, & Smilek, 2013; Seli et al., 2014; Smallwood, Baracaia, Lowe, & Obonsawin, 2003), overlooking the potentially interesting differences between deliberate and spontaneous mind wandering and their correlates. Critically, most of these researchers who have refrained from distinguishing between deliberate and spontaneous mind wandering have nevertheless discussed mind wandering in terms of (1) the *unintentional drifting* of one's thoughts from a focal task toward inner, task-unrelated thoughts (e.g., Smallwood & Schooler, 2006) and (2) *failures in executive control* (e.g., McVay & Kane, 2010), with the working assumption that reports of mind wandering are not reflective of intentional or deliberate shifts in attention toward internal thought. Of course, if, as we argue here, at least some of the mind wandering that is indexed by researchers is of the deliberate, intentional, type, then discussing mind wandering exclusively in terms of "unintentional shifts" and "failures in executive control" will necessarily fail to capture the full range of this cognitive experience (for further discussion of the issues involved in measuring complex constructs, see, e.g., Schneider, Hough, & Dunnette, 1996; Smith, Fischer, & Fister, 2003).

Although, to date, most researchers have overlooked Giambra's early distinction between deliberate and spontaneous mind wandering, in some recent work (Carriere et al., 2013) we sought to shed some light on this issue. In our study, we used an individual-differences approach to determine whether mind wandering relates to self-reported fidgeting. Our hypothesis was that fidgeting might be positively associated with mind wandering to the extent that both result when we no longer maintain attentive control over the mind. In the course of our investigation, we developed a questionnaire intended to measure a unitary construct of mind wandering at the trait level. Instead we found that the questionnaire had a two-factor structure, and those two factors were best captured by a distinction between spontaneous, uncontrolled mind wandering and deliberate, willful mind wandering. Although the two scales were highly positively correlated, when entered into a regression analysis as simultaneous predictors of fidgeting we found that spontaneous, but not deliberate, mind wandering was uniquely correlated with fidgeting. Moreover, we similarly observed that one's self-reported propensity to act without awareness (i.e., to act mindlessly) was uniquely associated with spontaneous, but not deliberate, mind wandering. Thus, consistent with Giambra's (1995) early claim, these findings lend support to the hypothesis that there are indeed two distinguishable forms of mind wandering.

While our recent work (Carriere et al., 2013) suggests that mind wandering can be separated into deliberate and

spontaneous types, it is important to note that, in our study, when removing the shared variance between spontaneous and deliberate mind wandering, we observed that it was always spontaneous, but not deliberate, mind wandering that was associated with the dependent variables of interest (i.e., fidgeting and acting without awareness). This suggests the possibility that, although the distinction between spontaneous and deliberate mind wandering is sound (as suggested by the factor analysis), this distinction might not be useful because both types of mind wandering might have similar—if not identical—consequences and associates. Moreover, of these two types of mind wandering, spontaneous may consistently be more strongly associated with other variables; if this is indeed the case, then, when removing the variance shared between both types of mind wandering, spontaneous would always remain as the only unique predictor of these variables, whereas deliberate mind wandering would not. Indeed, irrespective of whether one frequently engages in deliberate or spontaneous mind wandering, it is the case that, by definition, during both types of mind wandering one's thoughts are not focused on the task at hand; as a result, one might expect to observe performance decrements and other similar associates in both cases. Thus, to demonstrate the *practical utility* in distinguishing between deliberate and spontaneous mind wandering, one must demonstrate that these two types of mind wandering can *each* be uniquely associated with some variables of interest.

In our earlier work (Carriere et al., 2013) we focused on the association between mind wandering and mindlessness (acting without awareness), but mindlessness is just one aspect of the larger construct of mindfulness. Thus, in the present study we explored the possibility that deliberate and spontaneous mind wandering might differentially associate with some of the other important aspects of mindfulness, as assessed by the Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). True to its name, the FFMQ consists of five subscales measuring different facets of mindfulness, namely (1) *Non-Reactivity to One's Inner Experience*, (2) *Observing/Attending to One's Sensations, Perceptions, Thoughts, and Feelings*, (3) *Acting with Awareness*, (4) *Describing One's Feelings, Sensations, and Experience* (i.e., to oneself), and (5) *Not Judging One's Experiences* (see Baer et al., 2006). These five facets of mindfulness provide a potentially fruitful testing ground for dissociating deliberate and spontaneous mind wandering because the facets include aspects of mental control, which ought to be related to people's propensity to spontaneously mind wander, as well as aspects of deliberate exploration of inner experience, which ought to be related to people's propensity to deliberately mind wander. Admittedly, as our study was exploratory, we did not have any specific

hypotheses with regard to the relation between spontaneous and deliberate mind wandering and the five facets of mindfulness, except for the relation between mind wandering and the third facet, which closely overlaps with our assessment of mindlessness in our previous work (Carriere et al., 2013). We felt that specific hypotheses were not critical because we simply sought to explore the possibility that distinguishing between these two types of mind wandering is of practical use. Importantly, given the purely exploratory nature of this study, we sought to first observe the relations in a large sample and then replicate our observations in a second large sample.

## Method

### Participants

To demonstrate replication of our findings we analyzed data from two separate samples of students enrolled in undergraduate Psychology courses at the University of Waterloo. The first sample consisted of 716 participants, and the second of 762 participants, all of whom completed every item of each questionnaire included in the study. Also included among the scales of interest (i.e., Mind Wandering: Spontaneous (MW-S), Mind Wandering: Deliberate (MW-D), and the Five Facet Mindfulness Questionnaire; FFMQ) were various other questionnaires of interest to other researchers, but not analyzed for the present study. Collectively these questionnaires were given to participants in the first month of classes, and the order of presentation of the questionnaires was randomized across participants. Participants were, therefore, unaware of the relatedness of our scales. Participants received partial course credit for completing the questionnaires.

### Measures

As in our previous work (Carriere et al., 2013), here we used the 4-item Mind Wandering: Deliberate (MW-D) scale and the 4-item Mind Wandering: Spontaneous (MW-S) scale to index deliberate and spontaneous mind wandering, respectively. The MW-D includes items related to intentional mind wandering, such as “I allow my thoughts to wander on purpose,” and the MW-S includes items related to unintentional mind wandering, such as: “I find my thoughts wandering spontaneously.” Both are scored using a seven-point Likert scale.

In addition to administering the two mind-wandering questionnaires, we measured mindfulness using the Five-Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006), which is comprised of five different scales that index various aspects of mindfulness, including (1) *Non-Reactivity to*

*Inner Experience*, (2) *Observing/Attending to Sensations, Perceptions, Thoughts, and Feelings*, (3) *Acting with Awareness*, (4) *Describing One’s Feelings, Sensations, and Experience*, and (5) *Non-Judging of Experience*. The *Non-Reactivity to Inner Experience* scale includes items such as “I perceive my feelings and emotions without having to react to them”; the *Observing/Attending to Sensations* scale includes items such as “I pay attention to sensations, such as the wind in my hair or sun on my face”; the *Acting with Awareness* scale includes items such as “I find it difficult to stay focused on what’s happening in the present”; the *Describing One’s Feelings, Sensations, and Experience* scale consists of items such as “I’m good at finding the words to describe my feelings”; finally, the *Non-Judging of Experience* scale includes items such as “I criticize myself for having irrational or inappropriate emotions.” Each of the five factors from the FFMQ is scored using a five-point Likert scale. The Acting with awareness scale of the FFMQ is notably comprised almost entirely of items taken from the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) and all items on this scale are reverse-scored. We have previously used a similar subset of items from the MAAS as a measure of one’s general lack of attentiveness by simply refraining from reverse-scoring the items (Carriere et al., 2013). Likewise, as can be seen in the sample item, the *Non-Judging of Experience* scale of the FFMQ also consists entirely of reverse-scored items that actually measure judgment of one’s experiences.

## Results

### Descriptive analyses and correlations

Descriptive statistics and Cronbach’s Alphas for the MW-D, MW-S, and all five facets of the FFMQ are presented in Table 1. All measures demonstrated good psychometric properties and reliability across both samples. The Pearson product-moment correlation coefficients for all measures are presented in Table 2. As observed in previous work (Carriere et al., 2013), deliberate mind wandering (MW-D) showed a strong positive correlation with spontaneous mind wandering (MW-S). Moreover, the MW-D was associated with only three of the five mindfulness scales, whereas the MW-S was associated with all five of these scales. Finally, the correlation analysis showed strong relations of the MW-D and MW-S with the Acting with awareness scale of the FFMQ, as was initially demonstrated by (Carriere et al. 2013; using the roughly equivalent MAAS-LO). For studies showing similar associations of other mind wandering and mindfulness measures, see Ottaviani and Couyoumdjian (2013), and Mrazek, Smallwood and Schooler (2012).

**Table 1** Descriptive statistics and Cronbach's alpha for all measures (Sample 1:  $N = 716$ ; Sample 2:  $N = 762$ )

	Sample 1				Sample 2			
	Mean (SD)	Skew <sup>a</sup>	Kurtosis <sup>b</sup>	$\alpha$	Mean (SD)	Skew <sup>a</sup>	Kurtosis <sup>b</sup>	$\alpha$
MW-D	4.39 (1.49)	-0.23	-0.53	0.890	4.41 (1.44)	-0.24	-0.54	0.883
MW-S	4.03 (1.46)	-0.13	-0.50	0.879	4.31 (1.42)	-0.23	-0.34	0.881
Non-reactivity to inner experience	3.07 (0.79)	-0.06	-0.20	0.862	3.00 (0.81)	0.03	0.02	0.865
Observing/attending to sensations	3.36 (0.74)	-0.26	-0.13	0.813	3.28 (0.75)	-0.15	-0.26	0.812
Acting with awareness	2.32 (0.83)	-0.17	-0.34	0.890	2.17 (0.84)	0.01	-0.52	0.895
Describing one's feelings	3.10 (0.85)	0.04	-0.49	0.878	3.05 (0.83)	0.06	-0.47	0.878
Non-judging of experience	2.08 (0.97)	0.07	-0.66	0.920	2.01 (0.99)	0.15	-0.64	0.923

<sup>a</sup> SE = 0.09, <sup>b</sup> SE = 0.18

### Regression analyses

As the MW-D and MW-S continued to be strongly correlated in these samples, we next sought to determine their unique contributions to each of the five facets of the FFMQ.

#### Predicting the *Non-Reactivity to Inner Experience* facet

We first conducted a multiple regression analysis predicting the *Non-reactivity to Inner Experience* facet of the FFMQ (FFMQ-NR) with the MW-D and MW-S (see Table 3). In both samples the MW-D shows a significant, albeit small, positive semi-partial correlation with the FFMQ-NR. Given an essentially non-existent zero-order correlation, this suggests that the positive relation of the MW-D and FFMQ-NR was suppressed by the strong positive correlation of the MW-D and MW-S. Indeed, the MW-S continued to demonstrate a moderate negative semi-partial correlation with the FFMQ-NR in the multiple regression analysis. Furthermore, including the MW-D in the multiple regression allowed for a significant boost in predictive power over the MW-S alone (Sample 1:  $F_{\text{change}}(1, 713) = 17.79$ ,  $p < 0.001$ , Sample 2:  $F_{\text{change}}(1, 759) = 5.81$ ,  $p = 0.016$ ). This outcome is particularly interesting in that it demonstrates significant yet contradictory relations of the two forms of mind wandering with one's tendency to be non-reactive to inner experiences—with the tendency to deliberately mind-wander potentially facilitating this more detached perspective on one's experiences and the tendency to spontaneously mind-wander potentially inhibiting such detachment.

#### Predicting the *Observation/Attending to Sensations* facet

We next conducted a multiple regression analysis predicting the *Observing and Attending to Sensations, Perceptions, Thoughts, and Feelings* facet of the FFMQ

(FFMQ-O). Here, again we found significant unique semi-partial correlations for each the MW-D and MW-S when predicting the FFMQ-O, as shown in Table 4. In this case, unlike with the FFMQ-NR, both the MW-D and MW-S independently positively predict the FFMQ-O, and do so to an equal, albeit small, extent (indeed, the nominally larger of the two relations is flipped between the MW-D and MW-S across samples). Also, as was observed with the FFMQ-NR, including the MW-D provided a significant boost in predictive power over the MW-S alone (Sample 1:  $F_{\text{change}}(1, 713) = 9.65$ ,  $p = 0.002$ , Sample 2:  $F_{\text{change}}(1, 759) = 5.49$ ,  $p = 0.019$ ). Thus, one's tendency to be more observant of one's sensations, perceptions, thoughts, and feelings is associated with an increased tendency to engage in both deliberate and spontaneous mind wandering.

#### Predicting the *Acting with Awareness* facet

The relation of one's tendency to be aware of and attentive to one's body, behavior, and surroundings with the tendency to engage in deliberate and spontaneous mind wandering has already been reported by Carriere et al. (2013). In that paper we reported no significant unique contribution of the MW-D when predicting the MAAS-LO, the scale that comprises the majority of the items of the *Acting with Awareness* facet of the FFMQ (FFMQ-A). Nonetheless, as the FFMQ-A does contain some additional items and, therefore, may demonstrate a different pattern of relations, we conducted a similar multiple regression analysis predicting the FFMQ-A with the MW-D and MW-S. As shown in Table 5, we closely replicate the earlier findings, demonstrating no significant semi-partial correlation of the MW-D and FFMQ-A when controlling for the MW-S, despite again finding a moderate zero-order correlation of the MW-D and FFMQ-A in both samples. Likewise, we found the MW-S was a strong predictor of the FFMQ-A, once again demonstrating that spontaneous, but not deliberate mind wandering, is strongly associated

**Table 2** Pearson product-moment correlation coefficients of all measures (Sample 1:  $N = 716$ , Sample 2:  $N = 762$ )

	Sample 1			Sample 2		
	MW-S	Non-reactivity	Non-judging	MW-S	Non-reactivity	Non-judging
MW-D	0.45***	0.03	0.17***	0.40***	0.00	0.14***
MW-S	-	-0.23***	0.14***	-	-0.19***	0.17***
Non-reactivity to inner experience	-	-	0.15***	-	-	0.11**
Observing/attending to sensations	-	-	-	-	-	-
Acting with awareness	-	-	-	-	-	-
Describing one's feelings	-	-	0.27***	-	-	0.26**
Non-judging of experience	-	-	0.17***	-	-	0.15**

\*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , 2-tailed

**Table 3** Multiple regression testing for unique contributions to non-reactivity to inner experience by deliberate mind wandering (MW-D), spontaneous mind wandering (MW-S) (Sample 1:  $N = 716$ , Sample 2:  $N = 762$ )

	Sample 1			Sample 2		
	sr	t	p	sr	t	p
Dependent variable: non-reactivity to inner experience						
MW-D	0.15	4.22	<0.001	0.09	2.41	0.016
MW-S	-0.28	7.72	<0.001	-0.21	5.81	<0.001
Final model: $R = 0.28$ , $F(2, 713) = 28.96$ , $p < 0.001$			Final model: $R = 0.21$ , $F(2, 759) = 17.02$ , $p < 0.001$			

**Table 4** Multiple regression testing for unique contributions to attending to sensations, perceptions, thoughts, and feelings by deliberate mind wandering (MW-D), spontaneous mind wandering (MW-S) (Sample 1:  $N = 716$ , Sample 2:  $N = 762$ )

	Sample 1			Sample 2		
	sr	t	p	sr	t	p
Dependent variable: observing and attending to sensations, perceptions, thoughts, and feelings						
MW-D	0.11	3.11	0.002	0.08	2.34	0.019
MW-S	0.07	2.02	0.044	0.12	3.32	0.001
Final model: $R = .18$ , $F(2, 713) = 11.38$ , $p < 0.001$			Final model: $R = 0.18$ , $F(2, 759) = 12.18$ , $p < 0.001$			

**Table 5** Multiple regression testing for unique contributions to acting with awareness by deliberate mind wandering (MW-D), spontaneous mind wandering (MW-S) (Sample 1:  $N = 716$ , Sample 2:  $N = 762$ )

	Sample 1			Sample 2		
	sr	t	p	sr	t	p
Dependent variable: acting with awareness						
MW-D	-0.01	0.20	0.838	-0.02	0.80	0.424
MW-S	-0.53	17.54	<0.001	-0.53	17.98	<0.001
Final model: $R = 0.60$ , $F(2, 713) = 195.45$ , $p < 0.001$			Final model: $R = 0.59$ , $F(2, 759) = 199.20$ , $p < 0.001$			

with the tendency to be inattentive and unaware of one's body, behavior, and surroundings.

Predicting the *Describing One's Feelings* facet

Continuing on with the fourth facet of mindfulness assessed by the FFMQ, *Describing One's Feelings, Sensations, and Experience* (FFMQ-D), we again predicted the FFMQ-D with both the MW-D and MW-S in a multiple regression analysis. Shown in Table 6, and

similar to the findings with the FFMQ-A, a small-to-moderate semi-partial correlation was observed with only the MW-S. Thus, it seems only the tendency to spontaneously engage in mind wandering is associated with a decreased tendency to (internally) describe one's feelings, sensations, and experiences to oneself. One notable difference between the current relations and those observed with the FFMQ-A is that, in this case, both the semi-partial and zero-order correlations of the MW-D were non-significant; thus, controlling for the MW-S had no practical effect on the outcome of the analysis (in the same way, controlling for the MW-D did not change the relation of the FFMQ-D and MW-S).

**Table 6** Multiple regression testing for unique contributions to describing one's feelings, sensations, and experience by deliberate mind wandering (MW-D), spontaneous mind wandering (MW-S) (Sample 1:  $N = 716$ , Sample 2:  $N = 762$ )

	Sample 1			Sample 2		
	<i>sr</i>	<i>t</i>	<i>p</i>	<i>sr</i>	<i>t</i>	<i>p</i>
Dependent variable: describing one's feelings, sensations, and experience						
MW-D	0.03	0.86	0.388	0.02	0.69	0.488
MW-S	-0.16	4.64	<0.001	-0.21	6.04	<0.001
	Final model: $R = 0.17$ , $F(2, 713) = 10.80$ , $p < 0.001$			Final model: $R = 0.23$ , $F(2, 759) = 20.23$ , $p < 0.001$		

**Table 7** Multiple regression testing for unique contributions to non-judging of experience by deliberate mind wandering (MW-D), spontaneous mind wandering (MW-S) (Sample 1:  $N = 716$ , Sample 2:  $N = 762$ )

	Sample 1			Sample 2		
	<i>sr</i>	<i>t</i>	<i>p</i>	<i>sr</i>	<i>t</i>	<i>p</i>
Dependent variable: non-judging of experience						
MW-D	-0.03	0.77	0.441	0.03	0.90	0.367
MW-S	0.32	9.39	<0.001	0.29	8.36	<0.001
	Final model: $R = 0.36$ , $F(2, 713) = 51.65$ , $p < 0.001$			Final model: $R = 0.33$ , $F(2, 759) = 45.54$ , $p < 0.001$		

**Table 8** Pearson product-moment correlation coefficients of FFMQ measures with overall mind wandering (combining MW-D and MW-S) (Sample 1:  $N = 716$ , Sample 2:  $N = 762$ )

	Non-reactivity	Observing	Awareness	Describing	Non-judging
Overall mind wandering (Sample 1)	-0.12**	0.18***	-0.51***	-0.13**	0.29***
Overall mind wandering (Sample 2)	-0.11**	0.18***	-0.50***	-0.17***	0.29***

\*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , 2-tailed

### Predicting the *Non-Judging of Experience* facet

The final facet of mindfulness assessed by the FFMQ is *Non-Judging of Experience* (FFMQ-NJ). A multiple regression analysis predicting the FFMQ-NJ with the MW-D and MW-S, shown in Table 7, revealed a familiar finding that only the semi-partial correlation of the MW-S and FFMQ-NJ, controlling for MW-D, was statistically significant; this finding indicates that spontaneous mind wandering is associated with a decreased ability to be non-judgmental of one's experiences. The pattern of findings here is notable in that it closely echoes our observations with the FFMQ-A (having attentive awareness of one's experiences). In both cases we observed a significant zero-order correlation with the MW-D, but did not find a significant semi-partial correlation after controlling for the MW-S.

### Correlations with combined MW-S and MW-D

In a recent study, Mrazek et al. (2013) developed and validated a trait-level scale of mind wandering (the Mind-Wandering Questionnaire; MWQ) that was intended to index the frequency of mind wandering "irrespective of whether mind-wandering is deliberate or spontaneous" (p. 2). One important question to ask when considering the aforementioned analyses is what would happen if, rather than separate deliberate and spontaneous mind wandering, a researcher were to combine the two into one "overall" measure of mind wandering, thus treating mind wandering as unitary construct. To shed some light on this question, we calculated the average of the combined reports of both spontaneous and deliberate mind wandering for each participant and correlated these overall reports of mind wandering with the five facets of the FFMQ. The Pearson product-moment correlation coefficients for overall mind wandering and all five facets of the FFMQ are presented in Table 8. As can be seen in Table 8, all of the facets of the FFMQ were significantly correlated with overall mind wandering. Of particular importance, however, is the negative correlation of overall mind wandering and the FFMQ-NR facet. The reason that this is noteworthy is because when conflating deliberate and spontaneous mind wandering, we miss out on the details surrounding MW-

D's association with non-reactivity (FFMQ-NR); indeed, recall that the MW-D was found to be significantly positively associated with the FFMQ-NR after controlling for the MW-S, whereas the combined measure of mind wandering demonstrates a negative relation with the FFMQ-NR. Thus, this practice of conflating deliberate and spontaneous mind wandering would result in limited conclusions about the relation of mind wandering and non-reactivity to inner experiences, and would completely mask the real underlying associations of deliberate and spontaneous mind wandering with non-reactivity.

## Discussion

The results of the present study demonstrate that (1) deliberate and spontaneous mind wandering are dissociable and (2) conflating deliberate and spontaneous mind wandering might lead to underspecified and sometimes even false conclusions. Critically, we observed that, whereas spontaneous mind wandering was uniquely and negatively associated with difficulty taking a non-reactive stance toward internal experience (i.e., the FFMQ-NR), deliberate mind wandering was uniquely and positively associated with the same trait. We also observed that both spontaneous and deliberate mind wandering uniquely predicted an increased propensity to observe and/or attend to one's sensations, perceptions, thoughts, and feelings (the FFMQ-O). In addition, and perhaps most importantly, we showed that the correlation of "overall" (conflated) mind wandering with the FFMQ-NR was negative, even though deliberate mind wandering was, on its own, shown to positively correlate with this variable. Thus, on the basis of the overall correlation alone, one would be led to draw limited conclusions about the relation of mind wandering and non-reactivity. In fact, in smaller (more typical) samples, one might not even be able to detect a relation of overall mind wandering and non-reactivity (or some variable of interest) because deliberate and spontaneous mind wandering might be oppositely associated with the variable of interest, and their combination will dampen the overall correlation.

To date, numerous researchers of mind wandering (including ourselves) have inferred that reports of mind wandering are reflective of (1) *unintentional* shifts in thought away from a focal task and/or (2) *failures of executive control* (e.g., Kane et al., 2007; Killingsworth & Gilbert, 2010; McVay & Kane, 2010; Seli, Cheyne, & Smilek, 2013; Smallwood & Schooler, 2006; but see Smallwood, 2013). One necessary assumption underlying this view is that individuals who are high in trait-level mind wandering engage in mind wandering because they cannot stop themselves from doing so. However, based on the present results, we suggest that trait-level reports of mind

wandering might not exclusively capture spontaneous, unintentional thoughts, but might instead also include those that are deliberate. Thus, we suggest that if researchers seek to examine and understand the role of unintentional, spontaneous mind wandering, then it is paramount that they dissociate spontaneous from deliberate mind wandering.

In treating mind wandering as a non-uniform experience that can differ in terms of intentionality, the present work is consistent with and extends upon other work that has construed mind wandering as a heterogeneous—rather than a homogeneous—construct (Smallwood & Andrews-Hanna, 2013). In their recent article, Smallwood and Andrews-Hanna highlighted some of the contradictory findings in the extant literature on mind wandering. They then moved on to argue that these contradictions have arisen because there are multiple types of mind wandering that vary on the basis of their content and that these different types of mind wandering might have their own unique consequences and associates. As an example of one such contradiction, they point to the fact that, whereas some research has argued that mind wandering is a *detrimental state* associated with negative outcomes such as depression and unhappiness (e.g., Killingsworth & Gilbert, 2010), other work has shown that mind wandering can, at times, be conceived of a *beneficial state*, as it has been associated with positive outcomes such as increased creativity (Baird et al., 2012) and increases in one's propensity to plan future events (Baird et al., 2011). According to Smallwood and Andrews-Hanna, the foregoing contradiction likely resulted because researchers have focused on different types of mind wandering without constraining their interpretations to the specific type under investigation. For instance, it is possible that mind wandering that involves positively valenced content might be associated with beneficial outcomes, whereas mind wandering that involves negatively valenced content might be associated with detrimental outcomes. If, however, researchers do not distinguish between these different types of mind wandering then it is inevitable that contradictions will arise because these different types of mind wandering will share different associates.

While Smallwood and Andrews-Hanna (2013) argue that distinguishing between types of mind wandering on the basis of content might resolve contradictions in the literature, it also seems likely that distinguishing between spontaneous and deliberate types of mind wandering might likewise resolve some contradictions. Whereas Smallwood and Andrews-Hanna suggest that mind wandering episodes might differ in content, our suggestion is that episodes of mind wandering might differ in terms of process (relating to spontaneous versus deliberate mechanisms). Indeed, episodes of spontaneous and deliberate mind wandering might, at times, both consist of identical trains of thought

(i.e., the content can be exactly the same), but these types of mind wandering would nevertheless be distinct in that one would be engaged with intention, and the other without intention. For example, as noted in the previous paragraph, mind wandering has been referred to as both a beneficial state (e.g., it is associated with future planning; Baird et al., 2011) and a detrimental state (e.g., it can be a cause of unhappiness; Killingsworth & Gilbert, 2010). When considering this apparent contradiction, it is plausible that future planning might be associated with deliberate, controlled mind wandering, whereas unhappiness might be the result of ruminative, unwanted mind wandering that occurs spontaneously. In this case, what might appear to be a contradiction would merely be the result of different types of mind wandering—each of which involves distinct cognitive processes—yielding different outcomes.

The present findings are also relevant to studies showing that people can exhibit some degree of control over their levels of mind wandering (see Bernhardt, Smallwood et al., 2014; Levinson, Smallwood, & Davidson, 2012; Smallwood, Ruby, & Singer, 2013; Thomson, Besner, & Smilek, 2013). For instance, Thomson et al. (2013) showed that people more frequently mind-wander during easier congruent Stroop trials than during harder incongruent Stroop trials, and that, in both cases, people are able to effectively adjust their levels of mind wandering to prevent any noticeable costs on performance. Based on these results, Thomson et al. posited that, as task difficulty varies, people are able to adjust their level of mind wandering, which thereby allows them to optimize both their performance on the task as well as their level of mind wandering (for a similar suggestion, see also Levinson et al., 2012). Given that, by definition, deliberate mind wandering is under one's control, whereas spontaneous mind wandering is not under one's control, the present findings suggest that in the abovementioned studies, the manner in which people might be adjusting their levels of mind wandering is by specifically regulating their levels of deliberate (as opposed to spontaneous) mind wandering.

Although here we explored the unique contributions of deliberate and spontaneous mind wandering at a *trait level*, it will be important for future research to examine these types of mind wandering at a *state level*, as participants are completing a given task (see Shaw & Giambra, 1993), where there is also the possibility that experiences of mind wandering might be spontaneous and deliberate. An implicit assumption made by numerous researchers studying mind wandering is that their participants are motivated to perform well on the tasks that they are given in the laboratory and that they do their best to refrain from engaging in task-unrelated thought. However, because research on mind wandering often involves exceptionally monotonous and boring tasks, it might very well be the

case that many participants seek to “escape” the task and to alleviate boredom by deliberately engaging in mind wandering. If this is in fact the case, then this will pose a serious problem for researchers; indeed, it may be the case that the majority of research purported to examine unintentional, spontaneous shifts in attention has in fact been inadvertently examining the mental behavior of the unmotivated, deliberately mind-wandering participant. Thus, we believe that our deliberate and spontaneous mind-wandering scales, as well as their state-level counterparts, will prove to be important tools for elucidating the nature of mind wandering in both laboratory and real-world settings.

**Acknowledgments** This research was supported by a Natural Sciences and Engineering Research Council of Canada (NSERC) discovery grant to Daniel Smilek and an NSERC Vanier Canada Graduate Scholarship to Paul Seli.

## References

- Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27–45.
- Baird, B., Smallwood, J., Mrazek, M. D., Kam, J. W., Franklin, M. S., & Schooler, J. W. (2012). Inspired by distraction mind wandering facilitates creative incubation. *Psychological Science, 23*, 1117–1122.
- Baird, B., Smallwood, J., & Schooler, J. W. (2011). Back to the future: autobiographical planning and the functionality of mind-wandering. *Consciousness and Cognition, 20*, 1604–1611.
- Bernhardt, B. C., Smallwood, J., Tusche, A., Ruby, F. J., Engen, H. G., Steinbeis, N., Singer, T. (2014). Medial prefrontal and anterior cingulate cortical thickness predicts shared individual differences in self-generated thought and temporal discounting. *NeuroImage, 90*, 290–297.
- Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848.
- Carriere, J. S. A., Seli, P., & Smilek, D. (2013). Wandering in both mind and body: individual differences in self-reported mind wandering and inattention predict fidgeting. *Canadian Journal of Experimental Psychology, 67*, 19–31.
- Giambra, L. M. (1995). A laboratory method for investigating influences on switching attention to task-unrelated imagery and thought. *Consciousness and Cognition, 4*, 1–21.
- Kane, M. J., Brown, L. H., McVay, J. C., Silvia, P. J., Myin-Germeys, I., & Kwapil, T. R. (2007). For whom the mind wanders, and when an experience-sampling study of working memory and executive control in daily life. *Psychological Science, 18*, 614–621.
- Killingsworth, M. A., & Gilbert, D. T. (2010). A wandering mind is an unhappy mind. *Science, 330*, 932.
- Levinson, D. B., Smallwood, J., & Davidson, R. J. (2012). The persistence of thought evidence for a role of working memory in the maintenance of task-unrelated thinking. *Psychological Science, 23*, 375–380.
- McVay, J. C., & Kane, M. J. (2009). Conducting the train of thought: working memory capacity, goal neglect, and mind wandering in an executive-control task. *Journal of Experimental Psychology. Learning, Memory, and Cognition, 35*, 196.



- McVay, J. C., & Kane, M. J. (2010). Does mind wandering reflect executive function or executive failure? Comment on Smallwood and Schooler (2006) and Watkins (2008). *Psychological Bulletin*, *136*, 188–197.
- Mrazek, M. D., Phillips, D. T., Franklin, M. S., Broadway, J. M., & Schooler, J. W. (2013). Young and restless: validation of the Mind-Wandering Questionnaire (MWQ) reveals disruptive impact of mind-wandering for youth. *Frontiers in Psychology*, doi:10.3389/fpsyg.2013.00560.
- Mrazek, M. D., Smallwood, J., & Schooler, J. W. (2012). Mindfulness and mind-wandering: finding convergence through opposing constructs. *Emotion*, *12*, 442.
- Ottaviani, C., & Couyoumdjian, A. (2013). Pros and cons of a wandering mind: a prospective study. *Frontiers in Psychology*, doi:10.3389/fpsyg.2013.00524.
- Schneider, R. J., Hough, L. M., & Dunnette, M. D. (1996). Broadsided by broad traits: how to sink science in five dimensions or less. *Journal of Organizational Behavior*, *17*, 639–655.
- Seli, P., Carriere, J. S., Levene, M., & Smilek, D. (2013). How few and far between? Examining the effects of probe rate on self-reported mind wandering. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2013.00430
- Seli, P., Carriere, J. S. A., Thomson, D. R., Cheyne, J. A., Ehgoetz Martens., K. A., & Smilek, D. (2014). Restless mind, restless body. *Journal of Experimental Psychology: Learning, Memory, and Cognition*. doi:10.1037/a0035260
- Seli, P., Cheyne, J. A., & Smilek, D. (2013b). Wandering minds and wavering rhythms: linking mind wandering and behavioral variability. *Journal of Experimental Psychology: Human Perception and Performance*, *1*, 1–5.
- Shaw, G. A., & Giambra, L. (1993). Task-unrelated thoughts of college students diagnosed as hyperactive in childhood. *Developmental Neuropsychology*, *9*, 17–30.
- Smallwood, J. (2013). Distinguishing how from why the mind wanders: a process—occurrence framework for self-generated mental activity. *Psychological Bulletin*, *139*, 519–535.
- Smallwood, J., & Andrews-Hanna, J. (2013). Not all minds that wander are lost: the importance of a balanced perspective on the mind-wandering state. *Frontiers in Psychology*,. doi:10.3389/fpsyg.2013.00441.
- Smallwood, J., Baracaia, S. F., Lowe, M., & Obonsawin, M. C. (2003). Task-unrelated-thought whilst encoding information. *Consciousness and Cognition*, *12*, 452–484.
- Smallwood, J., Ruby, F. J., & Singer, T. (2013). Letting go of the present: mind-wandering is associated with reduced delay discounting. *Consciousness and Cognition*, *22*, 1–7.
- Smallwood, J., & Schooler, J. W. (2006). The restless mind. *Psychological Bulletin*, *132*, 946.
- Smith, G. T., Fischer, S., & Fister, S. M. (2003). Incremental validity principles in test construction. *Psychological Assessment*, *4*, 467–477.
- Thomson, D. R., Besner, D., & Smilek, D. (2013). In pursuit of off-task thought: mind wandering-performance trade-offs while reading aloud and color naming. *Frontiers in Psychology*,. doi:10.3389/fpsyg.2013.00360.