# Influencing the occurrence of mind wandering while reading

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## ABSTRACT

The current concerns hypothesis suggests that directing attention towards unfulfilled plans of the individual prior to a task would result in more off-task thoughts (or mind wandering). In this experiment, participants were asked to read a scientific text and self-report instances of mind wandering by indicating when they were experiencing task-unrelated thoughts (TUTs) or task-related interferences (TRIs). Prior to reading, participants in the *individual plans* experimental condition were asked to reflect upon their short-term plans by making a "to do" list while participants in a control condition were asked to make a list of the components of an automobile. In support of the current concerns hypothesis, directing attention towards the short-term plans resulted in significantly more TUTs, but not TRIs. Furthermore, participants in the individual plans condition had significantly lower scores on an assessment of reading comprehension, and this relationship was mediated by the frequency of TUTs.

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## 1. Introduction

"*As one reads a dialogue of Plato, one's mind often wanders far from the printed page; indeed, this happens so frequently that there is created a feeling of difficulty in concentrating the attention on the dialogues*…" – Marion Jewitt Austin; The Classical Journal (1922)

If you have ever had the opportunity to read Plato, then you may have experienced it as described above. It is not uncommon to "zone out" or mind wander while doing any task. Mind wandering is defined here as an involuntary attentional shift away from the primary task towards internal thoughts unrelated to the task (Smallwood, McSpadden, & Schooler, 2007; Smallwood & Schooler, 2006). The study of mind wandering, while not new, has recently received an increased amount of attention and has yielded several important insights (McVay & Kane, 2010; Mooneyham & Schooler, 2013; Smallwood, 2013; Smallwood, Fishman, & Schooler, 2007; Szpunar, Moulton, & Schacter, 2013). For example, the occurrence of mind wandering has been shown to differ depending on the complexity of the task (Smallwood & Andrews-Hanna, 2013). Many studies have placed individuals in situations that are minimally or moderately taxing of executive resources and assessed the amount and content of mind wandering episodes (e.g., Baird, Smallwood, & Schooler, 2011; Smallwood, Nind, & O'Connor, 2009). These experimental situations are analogous to our everyday routines in that we are not constantly engaged in tasks that require deep levels of attention (Smallwood & Andrews-Hanna, 2013). Assessing mind wandering in such contexts has helped to identify and explain how internally-influenced thought fluctuates and acts to aid in mental activities, such as future planning towards unfulfilled goals (Baird et al., 2011; Mooneyham & Schooler, 2013; Stawarczyk, Majerus, Maj, Van der Linden, & D'Argembeau, 2011). However, mind wandering is not exclusive to minimally demanding

tasks. Mind wandering also occurs during complex tasks such as reading and can be detrimental to comprehension (Feng, D'Mello, & Graesser, 2013; Schooler, Reichle, & Halpern, 2004).

What is it that we are thinking about when the mind wanders? One theory posits that mind wandering is an act of our mind defaulting to a baseline condition (Christoff, Gordon, Smallwood, Smith, & Schooler, 2009; Killingsworth & Gilbert, 2010; Klinger, 1971; Mason, Bar, & Macrae, 2008; Mason et al., 2007; Raichle & Snyder, 2007; Raichle et al., 2001; Smallwood, 2010). That is, our mind never stops producing thought; it is only when a task demands our attention that the mind is consumed by the external task-related stimuli. When executive control fails to suppress off-task baseline thoughts, the default or baseline thoughts emerge into consciousness and direct attention away from external stimuli (McVay & Kane, 2010). This view is consistent with the Global Workspace Theory of Consciousness (Baars, 1988, 2005), which posits that coalitions of unconscious processes continually compete to gain access to the conscious global workspace, which is a limited resource. Thus, mind wandering would occur when baseline or off-task thoughts win the competition for consciousness, due to their inherent relevance and/or failure of being suppressed (Smallwood, 2010).

If baseline thought consists of information regarding something one did or something one needs to do, then it would stand to reason that off-task thoughts will likely be directed towards that information. In line with this, Klinger (1978, 1999) posited that off-task thoughts would have a high propensity to be about concerns of the individual (i.e., current concerns). The current concerns hypothesis suggests that personally relevant information (e.g., unfulfilled goals) constitutes the majority of baseline thoughts. Correlational studies have provided evidence to support this theory through experience-sampling methods. For example, instances of mind wandering have been shown to have a high likelihood to include thoughts pertaining to personal goals or things that need to get done (Klinger, Barta, & Maxeiner, 1980; McVay, Kane, & Kwapil, 2009). Based on the above discussion, a straightforward prediction of the current concerns hypothesis is that cueing current concerns would act to influence the amount of off-task thought.

There has been one successful attempt to influence mind wandering by cuing the current concerns of the individual *during* a task (McVay & Kane, 2013). McVay and Kane (2013) induced mind wandering while participants engaged in the perceptual version of the Sustained Attention to Response Task (SART; McVay & Kane, 2009), where participants viewed words and made judgments (i.e., identify words presented in lower case only). Two days prior to engaging in the SART, participants completed a personal concerns inventory. The SART was then personalized for each participant by inserting words from the concerns inventory into the SART as target stimuli to act as cues to trigger off-task thoughts. The cues were comprised of word triplets that reflected the personal goals that the individual reported (e.g., WASH – TWO – PETS). As a control, yoked goals that were not expressed by the participants were also presented as SART stimuli (e.g., CLOSE – WOODEN – DOOR). Across four experiments, there was an overall significant yet subtle effect of participants reporting more instances of mind wandering when cued with information regarding their current concerns ($M$ = .46) compared to the control condition ($M$ = .43) (see Table 1 for effect size).

Studies that have attempted to manipulate mind wandering by influencing the attention of the individual *prior* to a task have been successful in influencing the content of mind wandering but not the overall amount. For example, Smallwood et al. (2011) placed pre-task focus on the autobiographical information of the individual. Participants were placed into one of four conditions in which they either rated themselves, a friend, or an arbitrary political figure on a scale for personal attributes (vs. a no rating control condition) prior to engaging in a choice reaction time task. The focus on the *individual* rather than others did have an influence on the types of mind wandering reported; there was a higher propensity to have thoughts regarding the future compared to the past. However, there were no statistically significant differences in overall mind wandering when comparing the condition where participants rated themselves (30%) to the no rating control condition (34%). A similar trend was found for a working memory task (rate self = 25%, control = 27%).

More in line with the current concerns hypothesis, Stawarczyk, Majerus, Maj, Van der Linden, and D'Argembeau (2011) placed an emphasis on the goals of the individual prior to engaging in the SART (Robertson, Manly, Andrade, Baddeley, & Yiend, 1997). Participants in one condition wrote an essay on a current project and their plans required for completion of that project. In a control condition, participants were asked to produce a set of directions from their current location to a distant location. Compared to the control condition, there were more future related thoughts for those who wrote about their current plans, but there were no statistically significant differences in overall mind wandering reports (i.e., current plans = 22%, control = 19%).

**Table 1**
Estimated effect sizes for studies that assessed mind wandering differences between experimental and control conditions.

| Study | Manipulation | Effect sizes | Total $N$ | Task |
|---|---|---|---|---|
| McVay and Kane (2013) | Personalized vs. non-personalized SART | $d$ = .23[*] | 251 | SART |
| Smallwood et al. (2011) | Pre-task: Rate self vs. no rating | $d$ = .14 | 28 | CRT |
| Stawarczyk et al. (2011) | Pre-task: List current project along with plans for completion vs. list directions | $d$ = .04 | 46 | SART |
| Masicampo and Baumeister (2011) | Pre-task: List tasks that need completion and: | | 73 | Reading |
| | – Plan vs. Control | $d$ = .34 | | |
| | – No plan vs. Control | $d$ = .17 | | |

Note: SART = Sustained Attention to Response Task; CRT = Choice Reaction Time Task.
[*] $p < .05$.