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The Role of Mind Wandering in Affective States

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Abstract

Mind wandering is a common cognitive phenomenon often associated with detrimental effects. However, the existing literature lacks consensus on its precise role in affective states. An examination of the literature reveals a potential overrepresentation of mind wandering's association with negative affect compared to positive affect, risking an incomplete understanding of the specific mechanisms underlying this relationship. This thesis addresses this by reviewing and comparing diverse perspectives and empirical findings to demonstrate mind wandering's relation to both negative and positive affective states. The analysis highlights that although mind wandering is generally associated with negative affect, it can predict positive affect under specific conditions, such as during episodes with future-oriented, positive emotional valence or high-interest thoughts. This insight implies that mind wandering is not fundamentally detrimental to affective states. Moreover, it emphasizes the importance of accounting for potential moderating and mediating factors and the characteristics of mind wandering episodes when examining its role in affective states.

Keywords: mind wandering, affective states, positive affect, negative affect

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1. Introduction

The goal of this paper is to explore the role of mind wandering in affective states by reviewing existing literature and contrasting theoretical perspectives. The introduction provides background information about key concepts such as mind wandering and affective states and explains related terminology. Subsequent chapters will present empirical findings supporting associations with both positive and negative affect, suggesting that such variability may be influenced by additional factors.

Mind wandering is described as “a shift in the contents of thought away from an ongoing task and/or from events in the external environment to self-generated thoughts and feelings” (Smallwood & Schooler, 2015, p. 488). This definition highlights *self-generated thought*, which is further explained as the capacity to produce mental content independent of immediate perceptual inputs. While self-generated thought is central to mind wandering, its scope extends beyond this phenomenon. Smallwood and Schooler (2015) indicate that it encompasses a broader category of mental content not primarily driven by external stimuli.

Furthermore, Smallwood and Schooler (2015) highlight a fundamental difference between self-generated thought and external distractions: task-unrelated self-generated thoughts produce characteristic errors distinct from those caused by external distractions. They attribute one of the reasons for this distinction to the association of task-unrelated self-generated thought with *perceptual decoupling*, where attention disengages from external sensory input.

Perceptual decoupling raises questions about whether and how individuals notice their mind wandering. Schooler (2002) describes the situation when an individual realizes that their mind is wandering as *meta-awareness* and uses this term interchangeably with *meta-consciousness*. Meta-awareness involves actively monitoring the present contents of consciousness. A related construct, *mindfulness*, refers to the sustained attentional focus on the present moment and the environmental context (Smallwood & Schooler, 2015). Critically, Smallwood and Schooler (2015) suggest that individuals often fail to detect mind wandering episodes, with lower levels of meta-awareness positively correlating with more prominent indicators of these lapses.

As mind wandering episodes can go undetected, individuals may not be aware of how commonly they occur. Empirical studies indicate that mind wandering represents not merely an occasional phenomenon but a fundamental component of our thought processes. Research

demonstrates that individuals typically engage in mind wandering for a substantial part of their waking hours, with estimates ranging from 30% to nearly 50% of their time (Kane et al., 2007; Killingsworth & Gilbert, 2010). This high prevalence highlights the significance of examining both the adaptive and maladaptive consequences of mind wandering.

The potential functions of mind wandering have been extensively investigated by many researchers. Mooneyham and Schooler (2013) systematically analyzed its advantages and disadvantages, considering various aspects including mood-related consequences. Their findings confirm that mind wandering remains prevalent despite its association with performance declines in reading and cognitive ability tasks, as well as increased negative affect. This indicates that mind wandering is not merely a tendency to keep the mind busy, but a process that persists even during demanding tasks.

Mooneyham and Schooler (2013) emphasized the significant costs of mind wandering by demonstrating that its consequences range between minor problems (e.g., missing details of conversations) and severe outcomes (e.g., traffic accidents, medical malpractice). On the other hand, the authors stated that mind wandering can be useful in domains such as autobiographical planning, creative problem solving, and relief from boredom (see also Smallwood & Schooler, 2015). However, Mooneyham and Schooler (2013) noted that empirical findings supporting these benefits do not provide causal evidence as strong as that provided by studies emphasizing the costs of mind wandering.

Beyond its effects on attention and behavior, mind wandering has also been studied for its potential influence on affective states. Existing research on its association with affective states provides mixed findings. Some studies (e.g., Killingsworth & Gilbert, 2010) primarily associated mind wandering with detrimental effects on mood and emotional well-being, while subsequent research has identified conditions under which it may relate to positive affect (e.g., Ruby et al., 2013). Since the emotional dimensions of mind wandering will be examined in more detail later in this paper, it is essential first to clarify how affective states are commonly defined in the literature.

The American Psychological Association (2018a) defines *affect* as any experience of feeling or emotion, and it categorizes both mood and emotion as affective states. *Positive and negative affect* are described as the internal feeling states related to factors such as success or

failure in achieving a goal, avoiding threat or satisfaction with one's current situation (American Psychological Association, 2018c; 2018d).

Watson et al. (1988) highlight the distinction between positive and negative affect. While the labels might suggest these are opposing concepts, the authors emphasize that they are distinct and independent constructs, not merely two ends of a single continuum. This distinction demonstrates that positive and negative affect states are not necessarily inversely related. Positive affect is associated with a state of high energy, alertness, and enthusiasm. Individuals high in positive affect tend to experience greater concentration and pleasurable engagement, whereas low positive affect is linked to sadness and lethargy: a state of low energy and motivation (Watson et al., 1988). On the other hand, negative affect is categorized as a broad dimension of emotional distress and unpleasurable engagement that includes mood states such as anger, contempt, and nervousness. Individuals low in negative affect experience tranquility and emotional stability.

Furthermore, Watson et al. (1988) demonstrate the distinct roles of these affective dimensions in psychological functioning. Only negative affect is associated with higher levels of self-reported stress, poor coping, health complaints, and a greater frequency of unpleasurable events, whereas positive affect is not associated with them. In contrast to negative affect, only positive affect is associated with social engagement, life satisfaction, and the frequency of pleasant experiences.

Given the prevalence of mind wandering and the conflicting findings on its relationship with affective states in the existing literature, it is essential to examine key empirical studies to better understand the mechanisms underlying this association. The following chapter reviews the influential large-scale study by Killingsworth and Gilbert (2010), which suggested an association between mind wandering and unhappiness. Their findings not only highlight the emotional costs of mind wandering but also raise critical questions about the underlying mechanisms and additional factors that may shape this relationship. These questions will be examined in subsequent sections of this paper

2. Mind Wandering as a Predictor of Unhappiness

“A human mind is a wandering mind, and a wandering mind is an unhappy mind.” This concluding statement by Killingsworth and Gilbert (2010, p. 932) provides an insightful

introduction to the examination of mind wandering in relation to affective states. Their study became foundational in the field and has been cited almost 2000 times according to Scopus as of May 2025. It is worth noting that various review articles that explore the functional role and potential costs and benefits of mind wandering, such as Mooneyham and Schooler (2013), reference Killingsworth and Gilbert's (2010) findings as a primary reference when addressing its affective consequences. Given this influence, a thorough analysis of their study is essential to better understand how their findings may have shaped researchers' perspectives on whether mind wandering contributes to positive or negative affective states.

The goal of Killingsworth and Gilbert (2010) was to identify mind wandering's prevalence, possible contents, and the influence on mood. Thus, they collected reports about participants' thoughts and feelings during their daily activities via a web application they developed. Participants were presented with questions such as "How are you feeling right now?", "What are you doing right now?", and "Are you thinking about something other than what you're currently doing?" during random moments of their waking hours through this application. These questions respectively referred to a happiness question rated on a scale of 0 (bad) to 100 (very good), an activity question which participants were asked to choose one or more activities from a list of 22 options, and a mind wandering question with four response options: "no; yes, something pleasant; yes, something neutral; or yes, something unpleasant".

This web application is an example of an experience sampling method. Smallwood and Schooler (2015) described this method as the assessment of ongoing thoughts by intermittently and unpredictably asking individuals to report their current thoughts and feelings during their daily activities. The specific type of experience sampling used by Killingsworth and Gilbert can be categorized as a probe-caught method, which involves prompting participants at random or semi-random intervals to report the content of their thoughts and feelings (Smallwood & Schooler, 2015).

Killingsworth and Gilbert (2010) stated that the experience sampling method is the most reliable method to examine affect in real-world situations. On the other hand, Smallwood and Schooler (2015) suggested that experience sampling only captures specific moments of consciousness rather than tracking how mental states unfold over time, although researchers may wish to explore how consciousness shifts from one mental state to another. As an additional limitation, Killingsworth and Gilbert (2010) highlighted the high cost of collecting real-time data

from a large number of participants, and, as a consequence, the infrequent use of the experience sampling method in research. However, the web application developed by the authors reduced both the cost and time required for data collection by enabling automatic contact with participants through the application rather than individual collection of reports.

This method enabled Killingsworth and Gilbert (2010) to collect a large dataset from 2250 participants, and the analysis of samples revealed three main findings. First, the authors found that mind wandering was frequent regardless of the activity and higher in their real-world sample compared to typical laboratory findings. The type of activity had a modest impact on the occurrence of mind wandering and an insignificant effect on the pleasantness of its content.

Second, participants reported being less happy during mind wandering compared to periods when they were focused on the present task across all activities (Killingsworth & Gilbert, 2010). Mind wandering with pleasant content (42.5% of samples) was more frequent than with unpleasant (26.5% of samples) or neutral content (31% of samples). There were no significant differences in happiness between the mind wandering state with pleasant content and being engaged in the current activity. However, participants reported being less happy during mind wandering with unpleasant or neutral content than when engaged in the current activity. In general, mind wandering was found to be the cause of negative moods rather than the consequence of unhappiness according to Killingsworth and Gilbert (2010).

Third, mind wandering and current activity independently influenced happiness, with the content of thought serving as a stronger predictor of happiness than the activity itself. Killingsworth and Gilbert (2010) concluded that mind wandering is associated with unhappiness and underscored its negative emotional consequences.

Although Killingsworth and Gilbert (2010) acknowledged the potential benefits of mind wandering in learning, reasoning, and planning, their findings and analyses mentioned above imply that mind wandering is accompanied by an emotional cost. The authors further highlighted that many philosophical and religious traditions support the practice of minimizing mind wandering and redirecting attention to the present moment to enhance happiness.

Since Killingsworth and Gilbert (2010) indicated mind wandering as a cause of unhappiness, rather than a result of it, their findings provide a potential pathway for investigating the relationship between mind wandering and negative affect by raising critical questions: Does one precede the other? Is this association unidirectional or bidirectional, direct or indirect? Could

one act as a risk factor, moderator, or mediator in this dynamic? The next chapter will examine further research investigating these dynamics between mind wandering and affective states.

3. Which Comes First: Mind Wandering or Negative Affect?

Investigating the directionality between mind wandering and affective states may provide insight into potential functions of mind wandering along with the mechanisms underlying its association with affective states. One of the studies examining these dynamics was reported by Ruby et al. (2013). Their goal was first to replicate the findings that self-generated thought can occur both before and after an unhappy mood. They also aimed to investigate whether the association between self-generated thought and negative mood is influenced by the content of thought.

Ruby et al. (2013) first presented participants with online questionnaires, such as the Beck Depression Inventory (BDI), which is a 21-item self-report measure of depression severity (American Psychological Association, 2018b), to assess participants' longer-term negative affect. Furthermore, mood and self-generated thought were assessed during a choice reaction time task (CRT), where participants were asked to view a series of black and colored digits on a computer screen and report whether the digit was odd or even only when the digit was colored (Ruby et al., 2013). While performing CRT, the caught-probe method was employed: participants were interrupted and prompted to report their current thoughts by answering questions using a 9-point Likert scale (1: not at all, 9: completely). The questions assessed participants' current mood and the content of their thoughts regarding task-relatedness, temporal focus (past/future), social context (involved self/others), emotional valence (positive or negative). Reports from the probe-caught method were decomposed using Principal Component Analysis (PCA) based on the patterns of covariance. PCA is a dimensionality reduction method that enhances data interpretability while minimizing information loss (Jolliffe & Cadima, 2016). This process enables the categorization of different types of thoughts. Two socio-temporal (ST) factors and one affective factor of self-generated thought emerged from the data of Ruby et al. (2013): Socio-Temporal Past-Other Component (ST-PO) refers to thought content involving past memories and other people, Socio-Temporal Future-Self Component (ST-FS) refers to the thought content related to the future and self, and the Affect Component refers to the positive and negative dimensions, with high scores indicating negative self-generated thought.

Moreover, Ruby et al. (2013) used lag analyses, which are a statistical method to assess the temporal relationship between variables, to examine the relationship between self-generated thoughts and mood. Linear Mixed Models (LMMs) were used as they enable the estimation of both *fixed effects*, which represent variables of primary interest such as the effect of mind wandering on subsequent mood, and *random effects*, which are caused by grouping in the data, such as repeated measures from the same participants. The socio-temporal content based approach enabled Ruby et al. (2013) to reveal the complex mechanisms underlying the relationship between self-generated thought and mood. Lag analyses of PCA factors illustrated the effect of the Affect Component, indicating that positive content of mind wandering is linked to subsequent positive mood and negative content of mind wandering is linked to subsequent negative mood. Nevertheless, socio-temporal thought contents modulated this direct relationship. Socio-Temporal Past-Other Component (ST-PO) predicted a more negative mood even when the content of the thought is positive. In contrast, Socio-Temporal Future-Self Component (ST-FS) predicted a more positive mood even when the thought content is negative. These findings further suggest that mind wandering is not always associated with low moods. Furthermore, Ruby et al. (2013) found that negative mood is associated with a higher level of mind wandering. In contrast, self-generated thought is associated with later negative mood, but only when the situation was preceded by positive mood. These findings indicate a bidirectional relationship between mind wandering and mood, implying that each can precede the other. Nonetheless, the researchers underlined that the design of their study only provides understanding of correlational relations but not a basis for causal relationship.

Another study that aimed to explore the direction of the association between negative mood and mind wandering, conducted by Poerio et al. (2013), examined three main questions. They investigated whether mind wandering occurs before or after negative mood, to what extent and how negative mood may impact the characteristics of mind wandering, and whether characteristics of mind wandering influence subsequent mood. For the characteristics of mind wandering, they focused on its affective content, temporal orientation, and relevance to current life concerns. To evaluate these associations, Poerio et al. (2013) used experience sampling methodology, where they prompted participants 6 times a day for 7 days. The participants were first asked whether they currently experience mind wandering: “Are you thinking about anything other than what you are doing?” Then participants who experienced mind wandering indicated

its affective content on two dimensions (i.e. happy-sad and anxious-calm) on a 5-point scale (e.g. 1: anxious; 5: calm). These participants were further asked to indicate the temporal orientation of mind wandering on a 5-point scale (e.g. 1: distant past; 5: distant future). Then, they rated the relevance of mind wandering in relation to their current life concerns on a 5-point scale (e.g. 1: not at all relevant; 5: extremely relevant).

After participants answered the questions about the characteristics of mind wandering, they were asked to report how they felt 15 minutes earlier (Poerio et al., 2013). The dimensions (i.e. happy-sad and anxious-calm) and the scale (e.g. 1: anxious; 5: calm) that were utilized to assess the mood were the same as the one used for the affective content of mind wandering. As a final step, the participants received a questionnaire 15 minutes after the initial prompt to report how they currently feel based on the same dimensions and the scale for the assessment of mood. This methodology enabled Poerio et al. (2013) to measure mood both before and after episodes of mind wandering. Thus, the findings of this study can be explored in two parts: first whether mood predicts mind wandering and second whether mind wandering predicts subsequent mood.

The results of Poerio et al. (2013) highlighted that feeling sad significantly predicted mind wandering; however, there were no significant findings indicating that feeling anxious predicts mind wandering. Moreover, they also found associations between the mood and characteristics of mind wandering. Sadness corresponded to mind wandering with sad but not anxious content. Similarly, feeling anxious corresponded to mind wandering with anxious but not sad content. Another difference between feeling sad and anxious is that sadness was associated with past-focused mind wandering, whereas, feeling anxious was associated with future-focused mind wandering. These findings may imply that sadness prior to mind wandering may correspond to retrospective thoughts during mind wandering; in contrast, feeling anxious may correspond to focusing on future related concerns. As a final note to the directionality from mood to mind wandering, both feeling sad and anxious significantly predicted mind wandering in relation to current life concerns.

To start the second part of the findings where the directionality from mind wandering to subsequent mood is explored, Poerio et al. (2013) did not observe significant findings about mind wandering predicting subsequent feelings of sadness or anxiety. However, they found associations between the characteristics of mind wandering and negative affect. Mind wandering with sad content was associated with sadness 15 minutes after the mind wandering episode.

Similarly, mind wandering with anxious content was associated with feeling anxious 15 minutes after. In addition, mind wandering with content related to current life concerns predicted subsequent sadness. However, temporal orientation of mind wandering did not have any significant impact on negative affect.

These findings of Poerio et al. (2013) contradict those of Killingsworth and Gilbert (2010). While Killingsworth and Gilbert (2010) suggested mind wandering as a cause of unhappiness, Poerio et al. (2013) indicated that higher levels of preceding sadness were significantly associated with mind wandering; however, mind wandering was not associated with lower mood over a 15-minute period. Furthermore, Poerio et al. (2013) described a more precise mechanism for how mind wandering is associated with negative affect, suggesting that current mood predicts the affective content of mind wandering, which in turn predicts subsequent mood. For instance, higher levels of sadness preceding mind wandering predict mind wandering with sad content, which in turn is related to later negative mood.

Since the results suggest that individuals are more likely to report negative mood after mind wandering with sad or anxious content, independent of prior mood, Poerio et al. (2013) concluded that the mood-lowering effects are likely linked to the negative content of the mind wandering rather than mind wandering itself. On the other hand, the findings indicate that sadness typically precedes mind wandering, suggesting it may play a leading or exacerbating role in its occurrence.

It is important to note that Poerio et al. (2013) stated that their experimental design cannot definitively determine a causal relationship between prior negative mood and mind wandering. Nevertheless, the observation that only mind wandering with negative affective content precedes negative mood reinforces the significance of affective content of mind wandering on affective consequences. This further implies that mind wandering is not entirely a detrimental phenomenon.

Although the findings of Killingsworth and Gilbert (2010), Ruby et al. (2013), and Poerio et al. (2013) provide significant insights into the mechanisms underlying the directionality of mind wandering and affective states, their correlational designs prevent causal conclusions. To examine the causality of the relationship between mind wandering and affective states, it is necessary to explore research that experimentally manipulated variables. Therefore, the following chapter will explore the study by Smallwood et al. (2009), which offers such an

approach by manipulating mood to observe its influence on mind wandering.

4. Causal Relationship: Induced Mood States and Indicators of Mind Wandering

The goal of Smallwood et al. (2009) was to explore the influence of an induced mood state on mind wandering's subjective and objective indicators. They first assessed the participants' baseline mood by using the Positive Affect and Negative Affect Schedule (PANAS; Watson et al., 1988), which is a 20-item self-report measure with two 10-item subscales. The Positive Affect (PA) subscale includes items such as "interested," while the Negative Affect (NA) subscale includes items such as "irritable," and participants are asked to rate the extent to which they have experienced each feeling on a scale from 1 (very slightly or not at all) to 5 (extremely). After the assessment of baseline mood, Smallwood et al. (2009) presented participants with a 5-minute video which consisted of either a nature documentary to induce a neutral mood, a humorous situation from a sitcom to induce positive mood, or clip of a seriously ill dog to induce negative mood. A second PANAS measurement was administered after viewing the video. Participants then performed the Sustained Attention to Response Task (SART; Robertson et al., 1997). SART is a go/no go sustained attention task, where participants are asked to respond to frequent non-target digits by pressing a key on the keyboard but to withhold responses to rare targets. Smallwood et al. (2009) utilized the SART as an objective method to examine the association between affective states and ongoing mind wandering. The SART was considered a suitable tool for detecting objective indicators of mind wandering due to its monotonous structure and infrequent no-go targets that require response inhibition. Performance on this task is sensitive to task-unrelated thoughts; therefore, errors made by participants are interpreted as objective indicators of mind wandering.

Finally, Smallwood et al. (2009) described that subjective and retrospective reports of mind wandering were evaluated using the Thinking Content component of Dundee Stress State Questionnaire. The authors stated that this scale consists of a 16-item questionnaire with two 8-item factors: Task-unrelated thought (TUT) refers to thoughts that are not related to the main task (e.g. "I thought about something that happened earlier today"), whereas task-related interference (TRI) refers to thoughts that interfere with the main task by focusing on one's performance (e.g. "I thought about how I should work more carefully").

An analysis of variance (ANOVA), a statistical method used to evaluate differences between group means, demonstrated a significant effect of the induced mood conditions (i.e., neutral, negative, and positive) on the proportion of errors in the SART (Smallwood et al., 2009). Post hoc least significant difference (LSD) tests, which were used to identify which specific group means differ significantly following ANOVA, indicated that the only statistically significant difference is that participants in the negative mood condition made more errors than those in the positive mood condition.

Smallwood et al. (2009) further analyzed the impact of mood on the reaction times before and after presenting a target. Post hoc tests demonstrated that inducing a positive mood was associated with greater post-error slowing compared to negative and neutral mood conditions. The authors suggested that post-error slowing is a predictable delay in response after noticing an error. This phenomenon demonstrates the reestablishment of attention on the task.

Finally, participants allocated to the neutral and positive mood condition adjusted their response time in relation to their performance accuracy, whereas those in the negative mood condition did not exhibit any significant change (Smallwood et al., 2009). Furthermore, post hoc LSD tests demonstrated that participants with negative mood engaged in more TUT and TRI compared to participants with positive mood.

These findings indicate that inducing a negative mood increases the errors on the SART, hinders participants' ability to adjust behavior after lapses, and leads to greater engagement in TUT and TRI. Higher TRI results imply that participants in the negative mood condition dwell on their errors and allocate less attention to the task. It is important to note that Smallwood et al. (2009) did not report a significant difference between the negative and neutral mood conditions on the SART performance.

While Smallwood et al. (2009) demonstrate that an induced mood can influence the incidence of mind wandering, a more comprehensive understanding of the mind wandering-mood relationship requires further investigation into how specific features of mind wandering influence affective states. The following section explores the studies conducted by Franklin et al. (2013) and Welz et al. (2018) and provides insight on the influence of different characteristics of mind wandering.

5. How Thought Content Underlies Variability in Mind Wandering's Affective Consequences

Franklin et al. (2013) aimed to investigate two key questions: first, whether Killingsworth and Gilbert's (2010) conclusion that all mind wandering episodes are associated with equal or higher ratings of unhappiness compared to on-task episodes can be confirmed; and second, whether any association exists between a certain type of mind wandering and positive mood.

Franklin et al. (2013) used experience sampling, in which participants received random prompts and rated their mind wandering episodes. Participants first responded to the question, "Were you off-task?" Those who answered yes then rated (1: not at all, 5: extremely) their off-task thoughts on three dimensions related to the interest level, perceived usefulness, and novelty. Then, all participants rated how positive and how negative they felt at that moment.

The findings suggested that participants typically report higher levels of positive mood when they are on-task compared to when they are off-task (Franklin et al., 2013). This finding is in line with Killingsworth and Gilbert's (2010) conclusion. However, high/low grouping of mind wandering in interest and usefulness dimensions had a significant influence on positive mood ratings (Franklin et al., 2013). Participants who experienced high levels of interest or usefulness during their mind wandering episodes reported increased positive mood compared to participants who experienced low levels of interest or usefulness during their mind wandering episodes. The findings for the novelty group for the influence of high/low grouping were not significant.

Further analysis of Franklin et al. (2013) indicated that high-interest mind wandering episodes are associated with a more positive mood compared to on-task episodes. This finding reveals that certain forms of mind wandering are associated with an increase in positive mood compared to on-task episodes although mind wandering generally correlates with a lower mood states. Thus, Franklin et al. (2013) offered insights that challenge the view of mind wandering as entirely detrimental.

Another study that can clarify whether or not mind wandering is always negative regarding its relationship with affective states is reported by Welz et al. (2018). Their goal was to examine whether mind wandering influences positive and negative affect states in daily life. They further investigated potential moderating effects of dispositional rumination, which is repetitive thinking about symptoms, causes and consequences of depressive symptoms

(Nolen-Hoeksema, 1991), and mindfulness regarding the association between mind wandering and mood.

The ambulatory assessment, which involved real-time acquisition of self-reported data in ecological settings, was conducted over five consecutive days, including three weekdays and two weekend days (Welz et al., 2018). Sequence effects were avoided by having participants start the experiment on different days of the week. Participants were prompted with: “At the time of the beep, were you thinking about something other than what you are currently doing?”, rated on a 7-point scale (1: I was completely on task, 7: I was completely off task) (Welz et al., 2018). Then, they were asked to rate the valence of these thoughts (1: unpleasant, 4: neutral, 7: pleasant). Welz et al. (2018) utilized the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) to assess the current mood of participants regarding the valence (i.e., positive and negative) and arousal (i.e., the level of activation). Moreover, Welz et al. (2018) used the Center for Epidemiological Studies-Depression Scale (CES-D), which is a self-report scale consisting of 20 items developed to assess depressive symptomatology (Radloff, 1977), to measure risk for depression. Furthermore, the German version of the Response Styles Questionnaire (RSQ-10D), a 10-item questionnaire (Treyner et al., 2003), was used to assess dispositional rumination. Finally, the German version of the Mindful Attention and Awareness Scale (MAAS), a 15-item scale (Brown & Ryan, 2003), was used to measure trait mindfulness.

The findings of Welz et al. (2018) revealed that increased mind wandering was a significant predictor of subsequent rise in positive affect and a decrease in negative affect. Further analyses illustrated the critical role of the emotional valence of mind wandering thoughts. Greater mind wandering weighted with thought valence was a significant predictor of lower subsequent negative affect. Critically, negative affect decreased further as the valence of mind wandering became more pleasant. However, there was no significant finding demonstrating the effect of mind wandering weighted with thought valence on positive affect. The researchers also found that although weekday status and a heightened risk for depression were associated with overall affective states, neither factor influenced the predictive effects of mind wandering on affective states. Furthermore, there were no significant moderating effects found for either trait rumination, the stable or dispositional form of rumination, or trait mindfulness on the relationship between mind wandering and affective states.

Based on these results, Welz et al. (2018) concluded that mind wandering is not fundamentally negative. Instead, it can have beneficial consequences including mood improvements. This conclusion conflicts with the findings of Killingsworth and Gilbert (2010), who characterized mind-wandering as a cause of unhappiness. Welz et al. (2018) addressed this discrepancy by emphasizing that the participants in Killingsworth and Gilbert's (2010) study were particularly unhappy when their mind wandering content was neutral or negative. In contrast, their happiness ratings during mind-wandering with positive content were comparable to those in on-task situations. This aligns with the present study's emphasis on the valence of mind-wandering content as a factor in its affective outcomes.

6. Discussion

Although mind wandering is a common feature of cognition and thought processes, existing literature lacks a consensus on its relationship with affective states. The precise nature of this association is unclear with evidence suggesting links to both negative and positive affective states (e.g., Killingsworth & Gilbert, 2010; Poerio et al., 2013). This paper explored conflicting perspectives and demonstrated different findings regarding the role of mind wandering in affective states.

The topic is introduced by exploring the findings of Killingsworth and Gilbert (2010) due to their influence in the literature. They associated the influence of mind wandering with lower levels of happiness compared to being on-task. Although they noted that mind wandering with pleasant content does not significantly differ from on-task happiness, their overall conclusion is that “A wandering mind is an unhappy mind.” Their findings suggest that mind wandering is typically a cause of lower levels of happiness rather than its consequence.

The association Killingsworth and Gilbert (2010) illustrated between mind wandering and negative affect, coupled with its frequent citation as a primary source in various review articles (e.g., Mooneyham & Schooler, 2013) addressing mind-wandering's affective consequences, raises a critical concern. While review articles aim for a holistic view, a reliance on a limited number of studies can hinder the understanding of mechanisms underlying mind wandering's affective dimension. For instance, Mooneyham and Schooler (2013) explored only a few studies on mind wandering's influence on mood and utilized Killingsworth and Gilbert (2010) as a main reference. Relying heavily on highly cited studies like Killingsworth and

Gilbert (2010) risks overrepresenting one perspective. Thus, this may potentially overstate the negative emotional consequences of mind wandering.

The description of Killingsworth and Gilbert (2010) of mind wandering as a cause of unhappiness raises questions about the directionality of this relationship. Logically, cause precedes the effect. Therefore, the idea of mind wandering as a cause of unhappiness suggests that mind wandering should precede unhappiness. Since Killingsworth and Gilbert (2010) further indicate that mind wandering is generally not the consequence of unhappiness, they would not expect unhappiness to precede mind wandering. However, this conclusion is not consistent with findings of Poerio et al. (2013) and Ruby et al. (2013).

In contrast to Killingsworth and Gilbert's (2010) emphasis on mind-wandering as a cause of unhappiness, Poerio et al. (2013) illustrated a more complex bidirectional relationship. The first part of this bidirectional relationship, the influence of mood on mind wandering, indicates that preceding sadness can predict subsequent mind-wandering. The other part of this bidirectional relationship, the influence of mind wandering on mood, highlights that mind wandering itself does not significantly predict subsequent feelings of sadness or anxiety. However, the affective content of mind wandering, such as sad mind wandering, predicts subsequent negative affect states like sadness. Building on the logic that the cause precedes the effect, these findings challenge the notion of mind wandering as a cause of unhappiness. Instead, the findings of Poerio et al. (2013) underscore the importance of affective content of mind-wandering as an additional factor in its affective consequences.

Further findings of Poerio et al. (2013) reveal the details of the mechanism underlying the relationship between the affective content of mind wandering and affective states. They reported that sadness is related specifically to sad content of mind wandering and feeling anxious is related specifically to anxious content of mind wandering. These findings point to a relatively more complex relationship where sadness as the current affective state may predict sad content of mind wandering which subsequently may predict future negative affective state of sadness.

The discrepancy between Killingsworth and Gilbert's (2010) conclusion that mind-wandering causes unhappiness and Poerio et al.'s (2013) findings for a bidirectional relationship where mind wandering's content is essential for affective outcomes, highlight the critical need to consider the specific characteristics of mind wandering. This also indicates that experiments that neglect the analysis of specific characteristics of mind wandering may not be

able to account for the specific pathways of its association with affective states. This could be one of the reasons that some studies such as Killingsworth and Gilbert (2010) consider mind wandering fundamentally detrimental to mood. In contrast, the study of Poerio et al. (2013) illustrates that the emotional consequences of mind wandering are not inevitable, rather potentially predictable contingent on prior affective states and the characteristics of the current mind wandering episodes.

The findings of Ruby et al. (2013) support the significance of examining the characteristics of mind wandering content and provide insight into the mechanisms underlying how the affective and temporal dimensions of mind wandering shape subsequent affective outcomes. Based on these dimensions, they identified three distinct components of self-generated thought: an Affect Component (reflecting positive/negative valence), a Socio-Temporal Past-Other Component (ST-PO), and a Socio-Temporal Future-Self Component (ST-FS). Considering the Affect Component, they suggest that positive content of mind wandering is associated with positive mood, whereas negative content is associated negative mood. However, the findings illustrate an association between future-self-focused thoughts (ST-FS) and positive mood, even when their content is negative. In contrast, past-other-focused thoughts (ST-PO) are associated with negative mood, regardless of whether their content is positive. Thus, Ruby et al. (2013) concluded that the temporal orientation of mind wandering modulates the influence of the affective content of the thought. While Poerio et al. (2013) elucidated a specific mechanism suggesting a directionality from negative mood to negative content of mind wandering, and subsequently to negative mood, the findings of Ruby et al. (2013) further refine this understanding by highlighting the modulating effect of temporal orientation on the influence of mind wandering's affective content. This reveals a more comprehensive mechanism underlying the relationship between mind wandering and emotional outcomes.

Furthermore, Ruby et al. (2013) indicated that negative mood corresponds to high levels of mind wandering. On the other hand, mind wandering corresponds to higher levels of negative mood only when it is preceded by a positive mood. These findings imply a bidirectional relationship between mind wandering and negative affect. However, regarding the finding that mind wandering can precede negative mood, the authors called attention to a potential ceiling effect, suggesting that subsequent negative affect may only emerge when the prior mood is not too low. As an additional potential explanation, they indicated that the subsequent decrease in the

mood might be associated with the regression of the positive mood preceding the mind wandering episode to the mean level. These alternative explanations highlight some limitations in the internal validity of their findings.

Moreover, both Ruby et al. (2013) and Poerio et al. (2013) noted that their designs reveal correlations, not causation. Nevertheless, the studies remain informative since they illustrate that specific types of mind wandering may relate to positive affect, and thus mind wandering is not a negative concept overall. As Ruby et al. (2013) and Poerio et al. (2013) cannot definitely exclude third variables because of their correlational design, Smallwood et al.'s (2009) experimental design provides essential insight into the causal mechanisms of mind wandering and affective state. Inducing negative, neutral, or positive mood prior to assessment of objective and subjective indicators of mind wandering enabled Smallwood et al. (2009) to investigate the causal influence of mood on mind wandering. Smallwood et al.'s (2009) findings indicate that a negative mood induction causes increased objective (more SART errors) and subjective (more TUT and TRI) indicators of mind wandering compared to a positive mood state. Furthermore, they found that participants in the induced positive mood condition demonstrated higher levels of post-error slowing, implying re-engagement with the task. In contrast, induced negative mood hindered participants' ability to adjust their behavior in response to their ongoing performance. These findings collectively suggest that negative mood prior to mind wandering episodes can lead to a higher incidence of mind wandering and a decrease in attentional control.

The findings of Smallwood et al. (2009) provide significant experimental evidence complementing Ruby et al.'s (2013) and Poerio et al.'s (2013) correlational findings, which illustrate that negative affect predicts higher mind wandering. Another advantage of Smallwood et al. (2009) is that they exemplified a different type of methodology and set of instruments compared to the experience sampling method used in Killingsworth and Gilbert (2010), Ruby et al. (2013), and Poerio et al. (2013). While consistent methodology across studies allows for direct comparison and replication of findings, the inclusion of diverse methodological approaches enables researchers to address different dynamics of the relationship between mind wandering and affective states.

Smallwood and Schooler (2015) suggested that the experience sampling method is limited to momentary assessments of mind wandering, which constrains the ability to continuously examine the transitions of mental states over time. On the other hand, Smallwood et

al. (2009) were able to observe the objective indicators of mind wandering in real time as they associate it to the errors on the SART. This methodological difference enabled them to reveal a potential mechanism: the increase in TUT and TRI may indicate that participants in the negative mood condition dwell on their lower performance rather than reorienting their attention to the task.

Further investigation of the influence of specific thought content of mind wandering revealed under which conditions mind wandering can predict affective states. For instance, Franklin et al. (2013) examined the affective consequences of mind wandering, specifically investigating the influence of three dimensions of these episodes: interest level, perceived usefulness, and novelty. Their findings initially aligned with those of Killingsworth and Gilbert (2010), indicating higher positive affect during on-task periods compared to mind wandering. However, further analysis revealed that mind wandering rated as highly interesting or useful was associated with significantly more positive affect than mind wandering rated low on these dimensions. Moreover, mind wandering rated highly interesting was also associated with higher positive affect compared to on-task periods. These latter findings challenge the view that mind wandering is inherently associated with lower mood.

Building on the findings of Franklin et al. (2013) that mind wandering may precede higher positive affect under the condition of high-interest thought episodes, Welz et al. (2018) supported the potential benefits of mind wandering regarding positive affective outcomes. Their findings suggest that increased mind wandering can significantly predict a subsequent rise in positive affect and a decrease in negative affect. Further analysis underscores that a greater pleasantness in the emotional content of mind wandering thoughts is associated with a more pronounced decrease in negative affect. However, the level of pleasantness in the emotional content of mind wandering did not significantly influence positive affective outcomes.

Given the correlational nature of Welz et al.'s (2018) design, which cannot exclude the influence of unmeasured third variables, one potential explanation for the difference in the impact of mind wandering content on negative versus positive affect might be the presence of such confounding variables. Furthermore, this difference might also be attributed to the nature of the positive and negative affective states. As Watson et al. (1988) underscored, positive affect and negative affect are independent constructs rather than two ends of a continuum. Therefore,

they are not inversely related, and the mind wandering content might have distinct effects on them.

7. Conclusion

This thesis aimed to investigate the connection between mind wandering and affective states through a review of existing literature. Although the studies explored in this paper offer different perspectives and sometimes inconsistent results, their findings collectively suggest that mind wandering is generally associated with negative affective states. However, under certain conditions, such as when mind wandering is future-self-oriented, high-interest, or positive-valenced, it may instead predict positive affective outcomes.

This thesis contributes to the literature by highlighting a potential overrepresentation of negative emotional outcomes of mind wandering and comparing different mechanisms underlying its relationship with affective states. Consequently, it provides insight into the view that mind wandering is not fundamentally detrimental to affective states.

This conclusion underscores the importance of considering the specific characteristics of mind wandering episodes, as well as potential moderating factors, when investigating their emotional consequences. It is important to acknowledge that although this thesis aimed to represent diverse perspectives, its scope was limited to a selection of papers. Consequently, not all perspectives or findings could be explored in depth. Future research on additional characteristics of mind wandering and factors that may influence its relationship with affective states is required to reveal the mechanisms and pathways further clarifying this connection.

This conclusion also suggests that, to address the negative emotional consequences of mind wandering, interventions could promote behaviors that encourage forms of mind wandering associated with positive affective states (e.g., focusing on future-self-related thoughts). If proven effective, such interventions might serve as valuable alternatives to traditional approaches focused on reducing the frequency of mind wandering.

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