**Vigilance and mind wandering[[1]](#footnote-1)\***

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*Abstract*

Mind wandering is a pervasive feature of subjective experience. But why does the mind tend to wriggle about rather than always staying focused? To answer this question, this paper defends the claim that mind wandering consists in task-unrelated thought. Despite being the standard view of mind wandering in cognitive psychology, there has been no systematic elaboration or defense of the task-unrelated thought view of mind wandering. Here, I argue for the task-unrelated thought view by showing how mind wandering reflects a distinctive form of non-vigilant thinking. When the relationship between mind wandering and vigilance is clarified, several objections to the task-unrelated thought view can be defused. Not only does this provide a novel defense of the task-unrelated thought view of mind wandering, but it also presents an account of mind wandering that is compatible with a naturalistic account of subjectivity.

Keywords: *Mind wandering, vigilance, task-unrelated thought, action theory*

1. **Introduction**

In his *Philosophy of Right*, Hegel writes: “Philosophy…always comes on the scene too late to give [advice]” (1952, p. 12). Say what you will about the underlying philosophy of history, but the sentiment captures something about philosophy’s relationship to cognitive science. Philosophers have played an important role in synthesizing large bodies of empirical research, making integrative and substantive proposals about the nature of concepts (Machery, 2009), attention (Wu, 2014), and memory (De Brigard, 2014, 2023), among other things. But these proposals were built on mountains of pre-existing research—too late, as it were, to advise the early stages of scientific knowledge production.

 Notably, research on mind wandering presents an exception to this rule. The cognitive science of mind wandering can trace its lineage back to the Dark Ages of 2006, with Smallwood and Schooler’s (2006) proposal for unifying disparate lines of research on lapses of attention and executive function under the label of ‘mind wandering’.[[2]](#footnote-2) Smallwood and Schooler recommended operationalizing mind wandering as having thoughts that are unrelated to ongoing task performance. One benefit of this operationalization is that mind wandering could be measured within experimental procedures that were integral to broader research programs on executive functioning (see §1 below).

 While Smallwood and Schooler’s (2006) proposal was highly influential (Mills et al., 2018; Murray et al., 2020), several strong challenges were raised against the claim that mind wandering consisted in task-unrelated thought. Leading the charge were philosophers of mind and cognitive science, who detailed serious conceptual and methodological problems with the task-unrelated thought conception of mind wandering (Carruthers, 2015; Dorsch, 2015; Irving, 2016; Metzinger, 2013). These challenges received some uptake within the scientific community, yielding alternative frameworks articulated in high-impact venues (Christoff et al., 2016; Seli et al., 2018-a; Murray et al., 2020). Each of these frameworks included a philosopher as co-author (Irving, Metzinger, and Murray, respectively). For example, the *dynamic framework* of mind wandering derived from the criticism that mind wandering has a distinctive wandering phenomenology that the task-unrelated characterization does not explain (Irving, 2016; Irving & Thompson, 2018). For this reason, the dynamic framework proposed understanding mind wandering in terms of relatively unconstrained thinking (Christoff et al., 2016). Details aside, the key point is that *philosophers* played a crucial role in agenda setting for research in cognitive science.

 Taking this philosophical advice is not without some cost. The problem is this: there is now a vast amount of data collected on the causes and correlates of mind wandering. If we take the philosophical criticisms at face value, then most of this data has been collected through measures and procedures that assume an ontologically suspect notion of mind wandering, thereby calling into question the empirical validity of the data. One could accept the theoretical alternatives proposed by philosophers, but there has been little work validating the measures derived from these alternatives (Alperin et al., 2021; Irving et al., 2022; Mills et al., 2018; Kam et al., 2021; Rafaelli et al., 2021).[[3]](#footnote-3) The dilemma is whether to accept data without theory or theory without data.

 The present essay rejects the dilemma by showing that more theory can be supplied to the task-unrelated thought characterization. The criticisms of the task-unrelated thought conception of mind wandering presume an overly flat-footed version of the view. My proposal is that when we understand mind wandering as a particular manifestation of our temporally-extended agency, the task-unrelated thought conception of mind wandering can be articulated in a philosophically and empirically rigorous manner. By providing a metaphysical foundation for the predominant operationalization of mind wandering, we can justify the use of standard experimental measures and procedures while avoiding the major criticisms posed by philosophers and philosophically-minded cognitive scientists. The benefit of the exercise is that we can vindicate the empirical credentials of about 20 years’ worth of research using the task-unrelated thought methodology. This, in turn, provides an object lesson in how the metaphysics of agency can be deployed usefully in cognitive science to help steer the process of scientific knowledge production.

 The plan, in what follows, is this: §1 outlines the basics of the task-unrelated thought (hereafter, TUT) conception of mind wandering and the major criticisms of it. §2 provides a philosophical defense of the TUT view within a broader framework of temporally-extended agency. I argue that mind wandering is a manifestation of *non-vigilant thought*, where vigilance is understood as a capacity for managing the flow of information in mind related to temporally scattered goals. The notion of vigilance—and, by extension, vigilant thought—can be used to define key elements of the TUT view, including what makes a thought *task-related* and when a thought *contributes* to task-performance. §3 explains why mind wandering is possible in seemingly “task-free scenarios”, such as riding the bus or lounging on the beach. §4 solves Irving’s Puzzle of the Purposeful Wanderer (see Irving, 2016) using the conceptual resources of the amended TUT view.[[4]](#footnote-4)

**1. Mind wandering and task-unrelated thought**

Many of us have, at some point, had the experience of ‘being in the zone’: those magical moments wherein everything is under control and complete focus is singularly directed at pursuing a goal. Of course, this is not what thinking is always like. If anything, we more frequently find our minds wandering, unable to stay focused on what we are doing. It is a puzzling feature of the mind that it often wanders away from what one intends to focus on. Or, as Dan Wegner (1997, p. 295) once put it: “Why can’t we just push the psychological equivalent of a ‘still frame’ button on a videotape recorder and stop all this wriggling and hopping about?” Despite the mystery, many cognitive psychologists consider the *wandering* characteristic of experience a feature, not a bug (Baars, 1988; Johnson-Laird, 1988). Thus, any complete scientific account of subjectivity—if such an account is possible—must explain the mind’s frequent wriggling and hopping.

 But to answer the question of *why* the mind wanders, it is helpful to know *what mind wandering is*. Alas, an account of what mind wandering is has proved to be elusive. In part, this is because mind wandering has mostly been studied by experimental psychologists and cognitive neuroscientists and the conceptual foundations of this research were never clearly laid. Despite some papers on mind wandering or daydreaming scattered over the past 50 years (Antrobus, 1966; Klinger, 1971; Giambra, 1995; Wegner, 1997), research on mind wandering did not fully take off until Smallwood and Schooler’s (2006) review article situated the study of mind wandering within a broader framework of executive functions. In their review, Smallwood and Schooler proposed a now influential account of mind wandering: “We all experience our minds drifting *away* *from a task* toward *unrelated* inner thoughts, fantasies, feelings, and other musings” (2006: 946; emphasis added). This expresses the core tenet of the predominant account of mind wandering: namely, that mind wandering consists in task-unrelated and stimulus-independent thought (TUT, for short). That is, mind wandering consists in shifting attention *inward* toward contents unrelated to an ongoing task or one’s immediate environment.

 Since 2006, hundreds of studies have been devoted to studying the wandering mind, with the TUT view looming as the industry standard (Murray et al., 2020). While a full account of TUT’s popularity requires separate treatment (see Callard et al., 2013; Murray et al., 2022), there are two reasons why most cognitive scientists readily accepted the TUT view. First, the TUT view operationalizes mind wandering in ways that are amenable to laboratory research. On the TUT view, mind wandering can be detected through a combination of self-reports, behavioral measures, and physiological responses that are validated against years of research on attention, working memory, and other kinds of executive processing (Kane et al., 2021). Second, the TUT view incorporates mind wandering into a broadly naturalistic picture of human subjectivity. If mind wandering is task-unrelated thought, then the intermittent “wriggling” of experience can be assimilated into empirically respectable accounts of attentional shifting and executive resource theory (Randall et al., 2014; Shepherd, 2019). This means that the TUT view provides us with an answer to both *what* mind wandering is and *why* the mind wanders.

 The magnitude of research might suggest that the TUT view reflects scientific consensus. That’s partly correct: most articles on mind wandering presume, either implicitly or explicitly, the TUT view. However, a groundswell of opposition has recently emerged, calling into question the sovereign status of the TUT view. By my count, the criticisms of TUT number as follows:

1. *Stimulus independence is not necessary for mind wandering*.
	* Example: You are sitting at dinner when you begin thinking about a recent fight with a sibling who is sitting directly across from you (Seli et al., 2018-a).
	* Problem: The sibling thought might constitute mind wandering, but the content of the thought is stimulus-dependent.
2. *Stimulus independence is not sufficient for mind wandering*.
	* Example: You are standing in line at the post office while thinking about how to formulate a thought experiment to best illustrate a point for an upcoming presentation (Irving & Thompson, 2018).
	* Problem: The thoughts are stimulus-independent, but they appear to be instances of goal-directed thinking, not mind wandering.
3. *Task-unrelatedness is not sufficient for mind wandering*.
	* Example: You are trying to read, but you are continually drawn back to a hurtful exchange with a colleague from the previous day (Irving, 2016).
	* Problem: Your thoughts aren’t task-related, but they also don’t appear to be *wandering*.
4. *Task-unrelatedness is not necessary for mind wandering.*
	* Example: You’re standing on the subway headed home, where your thoughts drift between thinking about how to write the introduction for a paper, a funny joke you heard earlier, and what you’re going to make for next week’s department picnic (Irving et al., 2020).
	* Problem: Your mind is wandering, but some of your thoughts appear task-related.
5. *Mind wandering can occur in task-free scenarios.*
	* Example: You’re lounging on the beach, thinking about this and that and, from time to time, nothing at all (Murray et al., 2020).
	* Problem: There’s no task, but you’re mind wandering (this is another version of the claim that task-unrelatedness is not necessary for mind wandering).
6. *Mind wandering can be intentionally initiated.*
	* Example: You decide to let your thoughts unfold as they will, without focusing on any particular topic (Murray & Krasich, 2022).
	* Problem: You intend to let your mind wander, but the ensuing thoughts are not task-unrelated.

The criticisms share a common core. The TUT view characterizes mind wandering as passive, off-task, and contra-motivational. But there are cases where mind wandering appears active, task-related, and goal-relevant. The TUT view is inadequate precisely because it rules out such cases as genuine instances of mind wandering.

 Alternatives to the TUT view have been proposed (Christoff et al., 2016; Irving, 2021; Metzinger, 2013; Seli et al., 2018-a), but no attempt has been made to defend it. This is surprising because the TUT view is methodologically ubiquitous: most scientific studies of mind wandering operationalize it as task-unrelated thought. But the alternatives suggest that the TUT view is not *conceptually* ubiquitous. Most of the influential papers—from philosophers and cognitive scientists—on mind wandering over the past decade explicitly reject the TUT view. This raises the central question of this paper: can a conceptual defense of the TUT view be offered that justifies the methodological ubiquity?

Because the TUT view has never been adequately articulated—much less defended—criticisms of it have exploited oversimplifications and mischaracterizations. This paper attempts a systematic exposition and defense of the TUT view with an eye toward answering the criticisms.[[5]](#footnote-5) The key element of the TUT view, as I present it, is that mind wandering manifests a lack of vigilance. To that end, §2 articulates the TUT view within a broader theory of temporally-extended agency that accords a central role to vigilance. Once the connection between vigilance and mind wandering is clarified, key aspects of the TUT view can be refined and defended.

**2. The TUT View**

The TUT view defines mind wandering in terms of three characteristics: task, task-unrelatedness, and thought. Each element merits further discussion.

2.1 *Task*

An account of task-relatedness depends on an account of tasks. It is not the case that for any task, an individual might have task-unrelated thoughts while performing it. Thus, not every task is such that an individual might be susceptible to mind wandering while performing it. What tasks, then, can prompt the mind to wander (let’s call these *mind wandering-apt tasks*)?

 Suppose there’s a graduate student preparing dessert for a dinner party he’s hosting with his fiancée. He wants to get the cake baking before preparing a cranberry-orange frosting. So he turns on the oven to preheat, starts the mixer to beat the eggs, and then hand mixes some dough. What, in this scenario, might elicit mind wandering?

 Neither heating the oven nor turning on the mixer count as mind wandering-apt tasks for two reasons. First, neither task takes much time. Of course, it takes time for the oven to heat and the eggs to beat. But the precise tasks of *turning on the oven* and *turning on the mixer* last as long as it takes to click a button. Mind wandering requires some (likely vague) interval of time between starting the task and completing the task. Second, there’s no distinction between means and ends. There is (plausibly) only one way to push the relevant buttons associated with the oven and mixer, and, once started, the devices do not require sustained attention. Relatedly, this is why basic actions do not qualify as mind wandering-apt. There are not distinct means associated with raising your left hand, for example, and thus no way to mind wander with respect to raising your left hand. Hence, mind wandering-apt tasks are extended in time and have distinct means and aims.

 Preparing the dessert certainly takes time, at least more than a few seconds. So too, for that matter, does preparing for marriage and earning a doctoral degree. But these aren’t mind wandering-apt either because they are never pursued *directly*; instead, one pursues these large-scale activities by performing smaller-scale activities constitutive of the large-scale activity (e.g., baking the cake, writing the dissertation, etc.). These large-scale activities are *projects*, and accomplishing a project just is performing all the tasks that compose it. Thus, these activities are not mind wandering-apt simply because they are not tasks.[[6]](#footnote-6)

 Even though the preceding discussion has rejected several candidates for mind wandering-apt tasks, some properties common to them have emerged. The task must be such that there’s a real distinction between realizing the goal of the task and undertaking certain means to pursue realizing the goal.[[7]](#footnote-7) Because there is a distinction between means and ends, mind wandering-apt tasks are such that intending to perform the task entails adopting certain attentional commitments to focus on regulating task performance. These attentional commitments are needed because pursuing the goal unfolds over time and the means adopted for goal pursuit might need adjusting to adapt to changing environmental contingencies (Murray et al., 2020).

 Mixing the dough, to return to our example, is a mind wandering-apt task. The activity can be pursued directly, the means and ends of the activity are distinct, and the activity takes time to complete. This generalizes to other kinds of tasks, and the resulting picture makes some intuitive sense. Mind wandering-apt tasks are those tasks that take time, require attention, and are pursued directly. In other words, they are tasks that demand vigilance. They require monitoring, implementing a particular task schema, and regulating one’s behavior over time as task demands change. Mind wandering, then, manifests a lack of vigilance.

2.2 *Vigilance*

Vigilance partially constitutes a global capacity for effective self-governance. In particular, vigilance is necessary for temporally extended plural goal pursuit. Human beings are planning creatures who aim to do many complex things simultaneously. On top of these complex aims, human beings are blessed with vastly limited brains that cannot actively manage lots of information simultaneously. So, human beings need a way to manage information to support plural goal pursuit while also respecting the limits of bounded rationality. Vigilance enables this management. In fact, vigilance functions as a higher-order management system of lower-order psychological capacities and processes. The whole set of plans and goals for some individual informs how their vigilance manages their psychology (Murray, 2024). The capacity for vigilance disposes individuals to select an appropriate task relative to the whole set of one’s plans and allocate sufficient attention to the task. Thus, exercises of vigilance draw on metacognitive, executive control, and attentional processes in facilitating action over time.[[8]](#footnote-8)

 Our engaged graduate student wants to get the cake in the oven before making the frosting. Cake and frosting prep cannot be done simultaneously, so he decides first to bake the cake, then to prepare the frosting. This requires three things. First, the graduate student must *monitor* for the right opportunity to begin baking the cake and, upon the occasion of attempting to bake it, he must also assess whether his performance is coming up to relevant standards of cake baking. Monitoring, then, includes an awareness of when to begin acting as well as an ongoing assessment of one’s acting. This account of monitoring implies two further operations of vigilance. When the graduate student detects the opportunity to bake the cake, he must recall the intention from memory and *implement* the intention to bake the cake (of course, recall might be externally triggered, as when his fiancée asks: “What’s up with the cake?”). However, when the graduate student monitors his current cake baking and detects an error, he must implement relevant changes to adjust his baking or stop baking altogether (perhaps he ruined the eggs and doesn’t have enough to start another batch). Monitoring alone, however, does not issue in adjustment. The student also *regulates* his cake baking. Monitoring and regulating are closely linked. When the student monitors current performance, this monitoring informs regulative components that determine whether to adjust or abandon current activity. So, error detection likely initiates a decision process about whether to give up or how to adjust one’s behavior.

 Monitoring is not confined to a single activity. The student might realize that cake preparation is taking too long and that the frosting needs to sit before being ready. This might initiate a switch from cake baking to frosting preparation. However, the conditions for task switching are not wholly dependent on the graduate student’s own plans and desires. Suppose his fiancée clearly needs help chopping some onions because her hands are full with a tricky vinegar reduction. Noticing this might initiate wholesale plan revision with a jump from cake baking to onion chopping. However, implementing this new intention does not eliminate the need to bake the cake or prep the frosting. The student must store these intentions in memory and monitor for further opportunities to take up the original plan again.

 Being vigilant is realized in virtue of three mental events that facilitate plan-directed awareness: (1) monitoring for circumstantial and task-relevant information that, when perceived (2) triggers implementing task-appropriate representations that are (3) maintained through the completion of the task (or task-segment) or until the agent revises their intention. Being vigilant is realized whenever these operations aim to produce task-congruent temporally extended action.

2.3 *Mind wandering as non-vigilant thought*

 Recall that mind wandering-apt tasks are those some agent pursues directly. Thus, in order to be susceptible to mind wandering, the agent must have some task *from which* the agent’s mind might wander. There are two different ways some agent can engage a task: reactively and proactively (Braver, 2012). Reactive engagement consists in cue-driven orientation to a task. For example, the student might set a timer for some aspect of the cake-baking. This might prompt a complete shift of attention to something else, with the timer eliciting a return to the next part of the baking process. When reactively engaging a task, one has a standing intention to perform the task (something akin to a disposition to adopt a proximal intention to perform the task only when the relevant cue is perceived). Proactive engagement consists in holding a task in mind until the task is completed or put on hold.[[9]](#footnote-9) An agent can intend to proactively engage a task in two different ways, either by adopting a distal or proximal intention. A proximal intention is a mental state the having of which engages sensorimotor systems in a way that contributes immediately to its own execution (see Mele, 2019). A distal intention is a mental state the having of which organizes practical deliberation and controls conduct in service of realizing some end at a later time. In short, proximal intentions concern what one is to do *now*, while distal intentions concern what one is to do in the future (see Mele, 1992: 158).[[10]](#footnote-10)

When tasks are engaged proactively, one holds the intention in mind until the time of its execution. This means that proactive engagement generates commitments to guide attention toward considerations or task features relevant to performing the intended task and to structure practical deliberation in a way that coheres with the agent’s plan to perform the activity. Such commitments might include focusing on a specific routine constitutive of the activity (in the case of proximal intentions) or attending to relevant cues that signal the need to act (in the case of distal intentions). For reactive engagement, such commitments might include nothing more than holding the activity as a fixed point in practical deliberation.

For example, suppose our graduate student plans to get milk from the store at 5pm before heading over to help with cooking. There are three different ways to execute the plan. The student might form a proximal intention, which guides his present conduct. In this case, the student is committed to monitoring for the store, thinking about where the milk is kept, etc. The student might form a distal intention—at, say, 1pm—which then requires monitoring for the context relevant to acquiring a proximal intention. Both ways reflect proactive modes of engagement and imply the need for perceptual monitoring. The student might also form an intention to get milk, but then not keep the plan in mind until later, using context to trigger the acquisition of the appropriate proximal intention. This might consist in not thinking about the milk until noticing that it’s 4:58pm. While there is no explicit attentional commitment, there is still a practical commitment that shapes deliberation (the student, for example, should not make plans to meet a friend at the bar at 5pm). Thus, while there is no commitment to external monitoring in the reactive case, there is still a commitment to monitor in practical deliberation.

Reliably successful task performance requires some form of monitoring, whether this is perceptual or deliberative, as the example shows. Monitoring is one aspect of the regulative function of vigilance discussed above. Failure to maintain these commitments, for instance, can lead to failures of vigilance (assuming that the individual is unimpeded and has neither revised nor abandoned the intention).

 This makes explicit the connection between mind wandering and vigilance. Mind wandering-apt tasks are those that require vigilance for reliably successful task performance. Mind wandering is non-vigilant—and, hence, can cause failures of vigilance—insofar as it involves failure to maintain practical commitments necessary for reliably successful task performance (lack of vigilance might still be locally useful; see §4).[[11]](#footnote-11)

2.4 *Task-relatedness*

Task performance requires action-guiding cognitive states (Shepherd, 2014). The thoughts constitutive of task-unrelated thought, then, must be something that interferes with action guidance. This insight forms the basis of an account of task-unrelatedness.

Consider the following account of what makes a thought task-related:

(R1) A thought that *p* is related to S’s A-ing when S’s thinking that *p* contributes to her A-ing.

This is a simple causal account of task-relatedness. Some thought contributes to someone’s activity when the individual’s having that thought is part of the causal profile underlying successful task performance.

 Many tasks can be routinized and off-loaded to habits. However, given dynamic and unpredictable changes to the environment, routinized task performance requires monitoring for changes that signal the need to shift parameters of performance. Monitoring, then, enables flexible task performance. And monitoring, as mentioned before, is a central function of vigilance. Agents exhibit vigilance when they are disposed to acquire cognitive states that contribute to goal-directed behavior. Mind wandering, in manifesting a lack of vigilance, diminishes an agent’s monitoring and, hence, decreases the likelihood that the agent acquires cognitive states that contribute to goal-directed behavior.

 The task-relatedness of a thought is a function of whether that thought is such that a vigilant agent would, when appropriate, acquire that thought. Thus, a task-unrelated thought is one that precludes *monitoring*. In other words, what makes a thought task-unrelated is not that the thought crowds out or precludes other thoughts; rather, a thought is task-unrelated in virtue of affecting one’s underlying *propensity* to acquire certain kinds of thought.[[12]](#footnote-12)

 Specifying this relation is difficult, partly because much remains unknown about monitoring, and partly because it is an empirical question what might preclude monitoring. A recently articulated model of cognitive control, the shared resources model, outlines the empirical program that may settle some of the empirical questions (see Cohen, 2017; Feng et al., 2014). On the shared resources model, interference between cognitive processes derives from those processes utilizing shared representational resources. For example, incongruent Stroop tasks generate interference effects because the processes underlying color naming draw on the same representational resources as the processes underlying word recognition. Both aspects of monitoring utilize representational resources, either to match features of the task representation with current performance or to detect cues that trigger recall and implementation of a previously acquired intention. So, some process might interfere with monitoring when both processes utilize the same representational resource.

 Thus, when engaging a particular process that utilizes representational resources from a particular set {R}, it is more difficult to monitor when monitoring requires representational resources in {R} relative to monitoring that utilizes items semantically unrelated to elements in {R}. This provides a precise (albeit speculative) statement of mind wandering as task-unrelated thought:

(MW) If S performs T, where T requires thoughts that draw on representational resources in (R), then S is mind wandering when and only when S has some thought that does not contribute to performing T and the content of this thought is sufficiently semantically related to members of (R).

The precise nature of task-unrelatedness presumes some understanding of the basic representational format of cognition and how the brain allocates representational resources over time. This sort of computational program is currently in its infancy (however, see Eliasmith et al., 2012 and Gershman et al., 2015), but over time we should gain a more concrete understanding of what makes certain states task-unrelated given the parameters of individual tasks.

 The connection between monitoring and mind wandering enables us to define ‘contribution’ in terms of vigilance:

(C) A thought that *p* contributes to S’s A-ing when S’s thinking that *p* manifests vigilance with respect to her A-ing.

If manifesting vigilance with respect to some activity amounts to reliable performance of that activity, then we can amend (R1) along the following lines:

(R2) A thought that *p* is related to S’s A-ing when S’s thinking that *p* is part of S’s A-ing reliably.

This implies a less empirically speculative account of what makes some thought task-unrelated:

(U) A thought that *p* is unrelated to S’s A-ing when S’s thinking that *p* manifests a lack of vigilance with respect to her A-ing.

Or, more precisely:

(U2) A thought that *p* is unrelated to S’s A-ing when S’s thinking that *p* precludes her from monitoring for consideration C, where C is such that, were C detected, it would result in S’s having some thought that *w*, where the thought that *w* contributes to S’s A-ing reliably.

This proposal has several virtues. First, an account of the thoughts relevant to mind wandering falls out of the proposal. The thoughts constitutive of mind wandering are those that preclude monitoring. Second, (U2) indexes task-unrelatedness to individual performances rather than nomological relations between thoughts and tasks. What precludes one individual from monitoring might not preclude another individual from monitoring. This fits well with research on trait-level variables associated with the propensity to mind wander (Seli et al., 2016) and the relationship between working memory capacity and mind wandering (McVay & Kane, 2010). Third, (U2) explains why some methods are useful for studying mind wandering. In particular, (U2) makes sense of the fact that: (a) psychologists use iterated tasks in mind wandering experiments in order to test reliable performance; (b) these tasks unpredictably shift conditions for successful performance throughout the experiment (thereby testing monitoring), and; (c) most cognitive scientists operationalize mind wandering in accordance with the TUT view.

 The TUT view states that mind wandering manifests a failure of vigilance. As explained above, this means that an individual is mind wandering only if the individual has some task-unrelated thought. Is this also a sufficient condition for mind wandering? Not quite. Sometimes, task-unrelated thought results from attentional capture, and these instances do not seem to be cases of mind wandering.

 Attentional capture is a phenomenon where some stimulus forces a reaction that shifts focus toward the suspected source of the stimulus. For example, if you’re sitting in a café or restaurant and hear a loud bang, your attention is immediately drawn to the suspected source of the noise. This is automatic in the same way that your leg automatically kicks out when the doctor hits your knee with a reflex hammer.

 The TUT view rules out instances of attentional capture as episodes of mind wandering. This makes sense, on the current view, because mind wandering manifests a lack of vigilance, whereas attentional capture manifests an exercise of vigilance. Orienting toward surprising or unexpected stimuli to assess potential threats likely counts as exemplary monitoring. Hence, on the TUT view, task-unrelated thought is not sufficient for mind wandering. To get that, we need to add a stimulus-independence condition. What is distinctive about attentional capture is that perceived stimuli bring about instances of attentional capture. Mind wandering, on the other hand, is a kind of self-generated thought. So, adding a stimulus-independence condition rules out attentional capture from counting as mind wandering. On this modified TUT view, then, an individual is mind wandering if and only if the individual has a stimulus independent task-unrelated thought (Dorsch, 2015, p. 802 also defines mind wandering as a kind of stimulus independent thought).

 The stimulus independence condition deserves some clarification. Oftentimes, experience contains a mixture of stimulus-dependent and –independent thought. Mind wandering is *connected* to stimulus-dependent thought, but these stimulus-dependent thoughts are not themselves constitutive of mind wandering. For example, suppose I’m listening to a lecture and I see someone eating an orange. That makes me think of Florida, which makes me think of my late grandfather and the time I drove him from Lancaster, Pennsylvania to Boynton Beach, Florida (true story, by the way). In this case, a stimulus-dependent thought results in my thoughts drifting, but the mind wandering does not begin until I think of Florida. While we can draw a theoretical distinction between stimulus-dependent and stimulus-independent thought, however, in practice mind wandering likely often results from episodes of stimulus-dependent thought.

2.5 *Multi-tasking and the structure of tasks*

The task-relatedness of some thought can be explained in terms of the contribution that having the thought makes to the performance of one’s task. The account generates the relatively simple result that thoughts which do not contribute to task performance are those that constitute mind wandering. These thoughts do not contribute to task performance because they undermine the propensity to acquire action-relevant cognitive states while one is performing a task.

 Sometimes, agents do two things at once. We can imagine a slightly different graduate student—on a more accelerated timeline—who commits to comforting his infant daughter while also mixing some dough. We can also imagine that attending to the baby precludes attending to the dough and vice versa. This generates the odd result that no matter what the graduate student attends to, he will count as mind wandering, because his baby-related thoughts preclude monitoring for dough-related considerations and his dough-related thoughts preclude monitoring for baby-related considerations. This objection can be made stronger. Suppose that the graduate student is mixing dough and becomes fixated on looking for air bubbles (which, he believes, indicates the readiness of the dough). This precludes him from monitoring for consistency and stiffness (both of which are better indicators of readiness). As a result of fixating on a less important consideration, the graduate student is unable to monitor for more important considerations.

 Both versions of this example illustrate a potential shortcoming of defining task-unrelated thought in terms of contribution. In both cases, the graduate student has thoughts that do not contribute to task performance. The TUT view developed here seems to count these as episodes of mind wandering, despite the fact that the graduate student is engaged in focused, goal-directed cognition in both situations.

 At an abstract level, multi-tasking consists in agglomerating task sets and simultaneous monitoring. So, multi-tasking with respect to T1 and T2 generates a new task set {T1, T2}. Tasks have inherent hierarchical structures of considerations related to performing the task successfully over time. Thus, multi-tasking generates a complex hierarchy of considerations that reflects the combination of considerations related to both T1 and T2.

 The objection brings out the need to draw a distinction between non-vigilant task-related thought and non-vigilant task-unrelated thought. Characterizing contribution in terms of vigilance allows us to characterize both forms of non-vigilant thought in terms of contribution, albeit along different dimensions. Non-vigilant *task-related* thoughts result from a failure of implementation, where this consists in failing to appropriately apportion one’s action plan over time. In focusing on some considerations at the expense of others, agents can succumb to implementation failures. But, these failures are not constitutive of mind wandering, as mind wandering is a failure of monitoring.

 Some tasks are bound to produce implementation failures because the considerations cannot be simultaneously processed. This might not be knowable until undertaking to multi-task (for example, one might not know that caring for the baby and mixing the dough are incompatible until one sets out to do both simultaneously). In other cases, there could be implementation failures that arise from how one goes about performing the task. For example, it might be possible for our graduate student to make the frosting and mix the dough, but the way he goes about performing the multi-task ends up in an implementation failure (perhaps the dough is over-mixed or the frosting is left sitting too long). Non-vigilant thought might arise in the context of multi-tasking, but this reflects a failure of implementation. As mind wandering reflects a failure of monitoring, the two are distinct.

 The problem of multi-tasking is itself a variation on Irving’s criticism that the TUT view incorrectly counts rumination as a kind of mind wandering (see Irving, 2016: 559-61). In general, the rumination argument presents an inconsistent triad: (1) mind wandering is task-unrelated thought; (2) ruminative thought is task-unrelated thought, and; (3) ruminative thought is not mind wandering. The argument for (3) is that rumination is perseverative and singularly focused, but being stuck on a single thing is incongruent with *wandering*. However, this begs the question against the TUT view, which characterizes mind wandering in terms of the content of thoughts rather than their dynamics. Thus, the TUT view counts rumination as mind wandering because of its task-unrelatedness, even if such episodes are perseverative and marked by feelings of intrusiveness. This is motivated by the underlying account of vigilance. Ruminative thoughts do not contribute to task performance in the same way that other episodes of mind wandering do. Thus, the TUT view rejects (3) of the triad while proponents of the Dynamic Framework reject (1).

We now have criteria for identifying mind wandering-apt tasks, task-relatedness (and, likewise, task-unrelatedness), and the kinds of thoughts constitutive of mind wandering episodes. Mind wandering-apt tasks are those that require vigilance for reliable performance. Following on this, what makes certain thoughts task-unrelated (and, hence, partly constitutive of mind wandering) is that one’s having such thoughts precludes one from monitoring in ways that support task performance.

**3. Task Free Scenarios and Mind Wandering**

Suppose our graduate student has just finished co-hosting the party and decides to take a well-deserved break on the porch. Watching the sunset, he might let his thoughts drift, recalling past sunsets, wistfully humming a tune, or thinking about the upcoming wedding. Yet, though our graduate student is mind wandering, his thoughts are not task-unrelated because there’s no task being performed at the moment.

 The TUT view entails that an individual is mind wandering when and only when that individual has at least one task-unrelated stimulus-independent thought. The relaxing graduate student is not performing a task (unless we construe tasks so liberally that almost anything counts as a task). The TUT view seemingly rules out the possibility that the graduate student can mind wander on the porch (Irving, 2016, p. 554). As noted in §1, this is a counterintuitive upshot of the TUT view. If anything, the porch seems like an ideal place to mind wander!

 The objection mistakenly argues that the TUT view precludes the possibility of mind wandering because there is no task being performed. This misconstrues the TUT view as entailing that if an individual is mind wandering, then the individual is performing a task and the individual has at least one task-unrelated thought. The TUT view is instead best understood as claiming that mind wandering manifests a failure of vigilance. Certain patterns of thought preclude monitoring, and these patterns are partially constitutive of mind wandering episodes. This lack of monitoring entails a diminished propensity to acquire action-relevant cognitive states. An individual could have this diminished propensity even in task free scenarios. For example, the lounging student might have certain standing intentions to acquire proximal intentions in particular circumstances (Mele, 2007: 736-38). When these circumstances obtain, the mind wandering graduate student is less likely to detect this and acquire the relevant intentions. This is one way in which an individual in a task-free scenario might exhibit non-vigilant task-unrelated thinking.

 This elaboration of the TUT view, when applied to mind wandering in task free scenarios, explains the way in which mind wandering is a form of disengaged cognition. Task-unrelated thought is characterized by the agent’s diminished reactivity to dynamic environments. This is important because it implies that task-unrelated thought is not a matter of being in a particular mental state; rather, task-unrelated thought is a kind of inflexibility or difficulty in switching focus and acquiring cognitive states related to alternative task sets.

 The precise amendment to the TUT view to account for the relaxing graduate student is tricky to pin down. Roughly, the idea is that one could have a policy to form proximal intentions to A when in C (e.g., helping the fiancée when asked). So, an individual might be in a state that greatly lowers the likelihood of detecting being in C, and thereby unwittingly fail to acquire an intention to A (e.g., not noticing that the fiancée needs or is asking for help).[[13]](#footnote-13) This failure counts as a form of task-unrelated thought because we can construe policies as generalized task kinds. Hence, this might be the kind of task-unrelated thought that the relaxing graduate student exhibits. Even though he is not currently performing some focal task, he still fails to manifest vigilance and, partly in virtue of that, counts as mind wandering.

**4. Mind wandering and control**

The Puzzle of the Purposeful Wanderer (Irving, 2016) is a challenge that any theory of mind wandering should resolve. The puzzle consists of two claims: (1) mind wandering is a purposeless activity insofar as episodes of mind wandering are not driven by our goals, and; (2) mind wandering frequently advances our goals (Irving, 2016: 552). Evidence for (1) comes from the fact that mind wandering is associated with deficits across a range of different activities and that paradigmatic instances of mind wandering tend to be unrelated to tasks one is currently performing. Evidence for (2) comes from research that reveals numerous beneficial consequences of mind wandering in some situations. Mind wandering, in some contexts, is associated with planning benefits (Baird et al., 2011). That is, mind wandering frequently drifts to one’s future goals, and simulation of activities needed to achieve those goals results in better performance, and this simulation seems to occur during episodes of mind wandering (Sripada, 2018). Additionally, mind wandering is associated with overcoming impasses on creative problem solving (Gable et al., 2019; Irving et al., 2023) and benefits to goal-directed thinking (Gorgolewski et al., 2014). Hence, mind wandering *does*, at least in some contexts, generate practical benefits, especially for temporally extended agency. This leaves raises two questions. First, how might mind wandering contribute to temporally extended agency given that it manifests a form of non-vigilant thought? Second, how does the TUT view resolve the Puzzle of the Purposeful Wanderer? On the TUT view, the purposelessness of mind wandering falls out of it being composed of task-unrelated thoughts. Instances of mind wandering, then, are purposeless in the sense of lacking end-directedness. There is no such thing as completing one’s mind wandering and no distinction between successful and unsuccessful mind wandering.

 On the TUT view, mind wandering is neither an exercise of mental agency nor an intentional activity. However, mind wandering is associated with a kind of control, and this association explains the relationship between values, goal-directed behavior, and mind wandering. Consider a normal planning agent with a hierarchy of values, goals, and commitments to be pursued over time. Now suppose that there are various configurations available for that individual, where a configuration corresponds to a particular allocation of cognitive control in service of goal-directed behavior (Murray, 2023). Each configuration is associated with an intrinsic cost, where that cost is a function of the value of one configuration weighed against other possible configurations (assuming that configurations are non-overlapping). One possible configuration is a disengaged plural pursuit stage, where the individual does not focus on performing one task at the exclusion of others, but rather drifts between focusing on multiple goals. For some individual engaging in goal-directed behavior, the opportunity costs associated with that behavior fluctuate over time, where opportunity costs increase monotonically as a function of time on task (Kool & Botvinick, 2014). These changes explain transitions between episodic contents. When the opportunity cost of maintaining a specific configuration falls below a certain threshold, and the opportunity cost associated with plural pursuit rises above a certain threshold, the probability of plural pursuit increases. This state of plural pursuit corresponds to mind wandering insofar as plural pursuit is a relatively unstructured mode of cognition. That is, when opportunity costs change and begin to favor the plural pursuit configuration, there is a higher likelihood that control is reallocated to favor a configuration conducive to mind wandering.

 The opportunity cost model of cognitive mode transition furnishes an explanation for how mind wandering sometimes benefits planning agency. Opportunity cost calculations are structured by one’s commitments, goals, and values. Hence, allocations of control are informed by commitments, goals, and values. In turn, whether one is mind wandering, and the content of that mind wandering, is partly determined by one’s values, goals, and commitments (Carruthers, 2015: 170-71). While this provides a good start on explaining the value-directed benefits of mind wandering, there is still the issue of why individuals mind wander at all. Given the benefits of structured, goal-directed, focused cognition, why would we develop the tendency to mind wander in the first place?

 Reflecting on the nature of overlearned activity helps to answer this question. Repeated performance of some activity makes that activity overlearned. When some activity is overlearned, executing the activity as a task actually hinders performance. Here, a task is an activity performed under the guidance of executive processes, such as attention and working memory (Mole, 2011: 51). Christopher Mole (2011: 62) explains:

It is typically harder to give sustained attention to familiar, well-understood tasks than it is to give attention to tasks that are poorly understood. The thought…is that giving one’s attention to a well-understood task involves marshalling a large set of resources, just because the task is so well-understood.

When there are too many available executive resources available, executing an activity as a task (where this implies guided, attentive performance) hinders optimal performance. Thus, in these cases, switching focus to something else provides some benefit. This might result in shifting focus to some other well-defined, discrete activity, but it might also result in a disengaged plural pursuit cognitive mode. Within this mode, people might exhibit a random search for future activities to entertain for purposes of simulation or consolidation (Carruthers, 2015: 171, Sripada, 2016).[[14]](#footnote-14) Consider an example of walking across campus from your car to your office. You don’t need to think about every step you take or move you make because you’ve done it a million times before. So it’s useful to disengage and let that activity be governed by one’s habits and routines while focus shifts to other goals. This explains why, with respect to one’s walking, it is sometimes beneficial to mind wander while walking despite mind wandering being a form of non-vigilant thought.[[15]](#footnote-15) That is, it can be beneficial to manifest a particular form of inattentiveness. The function of this inattentiveness, on the TUT view, is that in having a diminished propensity to acquire action-relevant cognitive states, one increases the likelihood of thinking about topics that benefit from increased time to think. For example, while walking, one might begin thinking about writing a response to a tricky objection posed by a colleague. The benefit of mind wandering, in this case, is that I am more likely to think about the response, thereby facilitating a breakthrough, than I am to think about walking. This explains the role of current concerns in mind wandering (Klinger, 1971): the content of one’s current concerns acts as a center of mental gravity such that in mind wandering one ends up thinking about some of these concerns rather than about one’s current focal activity. These topics constitute one’s current concerns just because they are topics that are likely to benefit from increased time to think about them. This explains why mind wandering is associated with practical benefits for creativity and planning. Notably, the TUT view locates the function of mind wandering in manifesting a useful form of inattentiveness that tends to lead people to think more about issues that fall under the broad umbrella of “current concerns.” This is distinct from other accounts that explain the function of mind wandering in terms of exploration (Sripada, 2018; Irving, 2023). On the TUT view defended here, mind wandering facilitates thinking about certain kinds of goals rather than thinking about certain kinds of goals in a particular (exploratory) way.[[16]](#footnote-16)

 One benefit of this account of mind wandering is that it is continuous with recently articulated opportunity cost models of self-control (Inzlicht et al., 2014; Kurzban et al., 2013; Shenhav et al., 2013; Shepherd, 2019). Mind wandering, on this view, does not manifest a lack of control, but rather a redeployment of control that is distinct from focused, goal-directed cognition (Dreisbach & Fröber, 2019; Hommel, 2015). In this way, the TUT view of mind wandering is continuous with other computational accounts of self-governance (Railton, 2017).

 This view also accounts for instances of strategic mind wandering. For example, Seli et al. (2018-b) found that, in predictable experimental conditions, individuals concentrate their mind wandering in periods of low demand. Seli and colleagues take this to be evidence for intentional mind wandering, but the current framework provides an alternative interpretation. If mind wandering reflects a particular allocation of control, and allocations of control are sensitive to computations of opportunity cost, then we should expect to see mind wandering in conditions where plural pursuit has the lowest relative opportunity cost. Hence, the view outlined here explains how mind wandering is controlled without conceding that there is such a thing as intentional mind wandering.

 Finally, this account solves the Puzzle of the Purposeful Wanderer using the conceptual tools of the TUT view. We can make sense of the fact that mind wandering is purposeless (and task-unrelated), while also explaining the practical benefits of mind wandering. Additionally, we can see why mind wandering is useful for planning agents even though it manifests a lack of vigilance.

**5. Conclusion**

This paper provides a defense of the TUT view of mind wandering by explaining it in terms of the metaphysics of temporally extended agency. Agents that act over time use vigilance to monitor information related to different plans, implement contextually appropriate intentions at the right time, and regulate task performance over time. Mind wandering manifests a form of non-vigilant thought. That is, mind wandering consists in task-unrelated thought, where this means having thoughts that preclude monitoring for plan-relevant considerations. Thus, by situating mind wandering in relation to the capacity for vigilance, key claims of the TUT view can be clarified and defended.

 One benefit of this view is that it assimilates mind wandering with computationally tractable accounts of self-governance. Shifts of attention away from an ongoing task can be explained by opportunity costs associated with the time spent thinking about any particular task. Mind wandering reflects self-generated (stimulus-independent) shifts toward internal contents. This, in turn, accounts for some of the known practical benefits of mind wandering related to planning and creative thinking.

**References**

Amaya, S. and Murray, S. Manuscript. Vigilance.

Baird, B., Smallwood, J., and Schooler, J.W. 2011. “Back to the future: autobiographical planning and the functionality of mind-wandering,” *Consciousness and Cognition* 20:4, 1604-1611.

Braver T. S. (2012). The variable nature of cognitive control: a dual mechanisms framework. *Trends in cognitive sciences*, *16*(2), 106–113. https://doi.org/10.1016/j.tics.2011.12.010

Carruthers, P. 2015. *The Centered Mind*: *What the science of working memory shows about the nature of human thought* (Oxford: Oxford University Press).

Christoff, K., Irving, Z., Fox, K., Spreng, R.N., Andrews-Hanna, J. 2016. “Mind-wandering as spontaneous thought: a dynamic framework,” *Nature Reviews Neuroscience* 17, 718-31.

Cohen, J.D. 2017. “Cognitive Control: Core Constructs and Current Considerations,” *Wiley Handbook of Cognitive Control*, Ed. T. Egner (London: Wiley), 3-28.

De Brigard, F. (2014). Is memory for remembering? Recollection as a form of episodic hypothetical thinking. *Synthese*, *191*(2), 155-185.

De Brigard, F. (2023). *Memory and remembering* (Cambridge: Cambridge University Press).

De Brigard, F., Khoudary, M., & Murray, S. (2022). Times Imagined and Remembered. *Temporal Asymmetries in Philosophy and Psychology*, 272.

Dorsch, F. 2015. “Focused Daydreaming and Mind-Wandering,” *Review of Philosophy and Psychology* 6:4, 791-813.

Eliasmith, C., Stewart, T.C., Choo, X., Bekolay, T., DeWolf, T., Tang, Y., and Rasmussen, D. 2012. “A Large-Scale Model of the Functioning Brain,” *Science* 338:6111, 1202-1205.

Feng, S.F., Schwemmer, M., Gershman, S.J., and Cohen, J.D. 2014. “Multitasking vs. multiplexing: Toward a normative account of limitations in the simultaneous execution of control-demanding behaviors,” *Cognitive, Affective and Behavioral Neuroscience* 14:1, 129-46.

Gable, S.L., Hopper, E.A., and Schooler, J.W. 2019. “When the Muses Strike: Creative Ideas of Physicists and Writers Routinely Occur During Mind Wandering,” *Psychological Science* 30:3, 396-404.

Gershman, S.J., Horvitz, E.J., and Tenenbaum, T.B. 2015. “Computational rationality: A converging paradigm for intelligence in brains, minds, and machines,” *Science* 349:6245, 273-278.

Giambra, L.M. 1995. “A laboratory method for investigating influences on switching attention to task-unrelated imagery and thought,” *Consciousness and Cognition* 4:1, 1-21.

Gorgolewski, K., Lurie, D., Urchs, S., Kipping, J., Craddock, R., Milham, M., Marguiles, D., and Smallwood, J. 2014. “A Correspondence between Individual Differences in the Brain’s Intrinsic Functional Architecture and the Content and Form of Self-Generated Thoughts,” *PLoS ONE* 9:5, e97176.

Inzlicht, M., Schmeichel, B.J., and Macrae, C.N. 2014. “Why self-control seems (but may not be) limited,” *Trends in Cognitive Sciences* 18, 127-33.

Irving, Z. 2016. “Mind-wandering is unguided attention: accounting for the “purposeful wanderer,” *Philosophical Studies* 173, 547-571.

Irving, Z. C., McGrath, C., Flynn, L., Glasser, A., & Mills, C. (2022). The shower effect: Mind wandering facilitates creative incubation during moderately engaging activities. *Psychology of Aesthetics, Creativity, and the Arts*.

Irving, Z.C. & Thompson, E. 2018. “The Philosophy of Mind Wandering,” *Oxford Handbook of Spontaneous Thought*.

Killingsworth, M. A., & Gilbert, D. T. (2010). A wandering mind is an unhappy mind. *Science*, *330*(6006), 932-932

Kool, W. and Botvinick, M.M. 2014. “A labor/leisure tradeoff in cognitive control,” *Journal of Experimental Psychology: General* 143:1, 131-41.

Kurzban, R., Duckworth, A., Kable, J.W., and Myers, J. 2013. “An opportunity cost model of subjective effort and task performance,” *Behavioral and Brain Sciences* 36, 661-679.

Machery, E. 2009. *Doing without concepts* (Oxford: Oxford University Press).

McVay, J. and Kane, M. 2010. “Does Mind Wandering Reflect Executive Function or Excutive Failure? Comment on Smallwood and Schooler (2006) and Watkins (2008),” *Psychological Bulletin* 136:2, 188-207.

Mele, A.R. 1992. *Springs of Action* (Oxford: Oxford University Press).

Mele, A. 2007. “Action,” In F. Jackson and M. Smith (eds.) *The Oxford Handbook of Contemporary Philosophy* (Oxford: Oxford University Press), 334-358.

Mele, A.R. 2019 On snubbing proximal intentions. *Philosophical Studies* **176**, 2833–2853. https://doi.org/10.1007/s11098-018-1153-0

Metzinger T. (2013). The myth of cognitive agency: subpersonal thinking as a cyclically recurring loss of mental autonomy. *Frontiers in psychology*, *4*, 931. https://doi.org/10.3389/fpsyg.2013.00931

Mills, C., Raffaelli, Q., Irving, Z.C., Stan, D., and Christoff, K. 2018. “Is an off-task mind a freely-moving mind? Examining the relationship between different dimensions of thought,” *Consciousness & Cognition* 58, 20-33.

Mole, C. 2011. *Attention as Cognitive Unison* (Oxford: Oxford University Press).

Murray, S. 2023. Bringing self-control into the future. In P. Henne and S. Murray (eds.) *Advances in Experimental Philosophy of Action* (London: Bloomsbury), 51 – 72.

Murray, S. 2024. The nature and norms of vigilance. *American Philosophical Quarterly* 61:3.

Murray, S., & De Brigard, F. (2021). The neurocognitive mechanisms of responsibility: A framework for normatively relevant neuroscience. In *Developments in Neuroethics and Bioethics* (Vol. 4, pp. 19-40). Academic Press.

Murray, S., Krasich, K., Schooler, J. W., & Seli, P. (2020). What's in a Task? Complications in the Study of the Task-Unrelated-Thought Variety of Mind Wandering. *Perspectives on Psychological Science*, *15*(3), 572–588. <https://doi.org/10.1177/1745691619897966>.

Murray, S., Irving, Z., and Krasich, K. 2022. The scientific study of passive thinking. In W. Sinnott-Armstrong and F. De Brigard (eds.) *Neuroscience and Philosophy* (Cambridge: MIT Press).

Railton, P. (2017). At the core of our capacity to act for a reason: The affective system and evaluative model-based learning and control. *Emotion Review*, *9*(4), 335-342.

Seli, P., Risko, E., and Smilek, D. 2016. “On the Necessity of Distinguishing Between Unintentional and Intentional Mind Wandering,” *Psychological Science* 27:5, 685-91.

Seli, P., Kane, M., Smallwood, J., Schacter, D., Maillet, D., Schooler, J., and Smilek, D. 2018-a. “Mind-wandering as a natural kind: A family-resemblances view,” *Trends in Cognitive Sciences* 22:6, 479-490.

Seli, P., Carriere, J.S.A., Wammes, J.D., Risko, E.F., Schacter, D.L., and Smilek, D. 2018-b. “On the Clock: Evidence for the Rapid and Strategic Modulation of Mind Wandering,” *Psychological Science* 29:8, 1247-1256.

Shenhav, A., Botvinick, M.M., and Cohen, J.D. 2013. “The expected value of control: An integrative theory of anterior cingulate cortex function,” *Neuron* 79, 217-240.

Shepherd, J. 2014. “The contours of control,” *Philosophical Studies* 170:3, 395-411.

Shepherd, J. (2019). Why does the mind wander?. *Neuroscience of Consciousness*, *2019*(1), niz014.

Smallwood, J. M., Baracaia, S. F., Lowe, M., & Obonsawin, M. (2003). Task unrelated thought whilst encoding information. *Consciousness and cognition*, *12*(3), 452-484.

Smallwood, J. and Schooler, J. 2006. “The restless mind,” *Psychological Bulletin* 132:6, 946-958.

Smallwood, J. and Schooler, J. 2015. “The Science of Mind Wandering: Empirically Navigating the Stream of Consciousness,” *Annual Review of Psychology* 66, 487-518.

Sripada, C. 2018. “An Exploration/Exploitation Tradeoff Between Mind Wandering and Goal-Directed Thinking,” In Christoff, K. and Fox, K. (eds.) *The Oxford Handbook on Spontaneous Thought* (Oxford: Oxford University Press).

Stawarczyk, D., Majerus, S., and D’Argembeau, A. 2013. “Concern-induced negative affect is associated with the occurrence and content of mind-wandering,” *Consciousness and Cognition* 22, 442-448.

Wammes, J.D, Ralph, B.C.W., Mills, C., Bosch, N., Duncan, T.L., and Smilek, D. 2019. “Disengagement during lectures: Media multitasking and mind wandering in university classrooms,” *Computers & Education* 132, 76-89.

Warm, J.S., Parasuraman, R., and Matthews, G. 2008. “Vigilance requires hard mental work and is stressful,” *Human Factors* 50:3, 433-441.

Wong, Y. S., Willoughby, A. R., & Machado, L. (2023). Reconceptualizing mind wandering from a switching perspective. *Psychological research*, *87*(2), 357-372.

Wu, W. 2014. *Attention* (London: Routledge).

Yanik, M. and Spalek, T. 2014. “Driving with the Wandering Mind: The Effect that Mind-Wandering Has on Driving,” *Human Factors* 56:2, 260-269.

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2. To be fair, prominent members of the associationist tradition in philosophy of mind (notably, Hobbes and Hume) make several observations about the structure of the stream of consciousness and note the occasionally disjointed relations between subsequent ideas in one’s train of thought. But these remarks have had little impact on the scientific study of mind wandering. [↑](#footnote-ref-2)
3. Some recent experimental work has suggested that these alternative measures lack divergent validity from standard measures that presume the task-unrelated thought conception of mind wandering (Smith et al., 2022). However, the point about validity should be interpreted cautiously. Validation of task-unrelated thought measures of mind wandering did not arrive until Kane et al. (2021). Thus, the lack of validation studies for dynamic measures of mind wandering is not a reason to reject the framework outright; instead, the point is that one benefit of the task-unrelated thought framework is the vast amount of experimental research combined with validated empirical measures of the core construct. [↑](#footnote-ref-3)
4. This paper puts off the task of comparing the TUT view to other proposals, such as the Dynamic Framework (Christoff et al., 2016), Family Resemblances View (Seli et al., 2018-a), the disunified thought view (Carruthers, 2015), and the “personal blink” view (Metzinger, 2013). This is because there has been no articulation of the TUT view and so no balanced way to compare it to its philosophically sophisticated peers. This is relevant to the overarching dialectic about how best to define mind wandering. One important proposal argues that there is no good definition of mind wandering and that mind wandering is a heterogeneous construct with multiple, overlapping attributes that no single instance of mind wandering fully exemplifies (Seli et al., 2018-a: 482 – 84). However, this is a meta-theoretical claim about the adequacy of first-order views of mind wandering (Irving & Thompson, 2018). That is, because there is no adequate first-order view, we should think of different kinds of mind wandering (each of which is partly captured by different first-order views) in terms of relations of family resemblance. The key premise about the adequacy of first-order views cannot be evaluated until the relevant first-order views are articulated. Thus, this paper attempts to register a sophisticated TUT view with an eye toward thinking about comparing its empirical adequacy with other first-order proposals. That comparison step is a different project. [↑](#footnote-ref-4)
5. The only criticism I do not discuss here is the purported intentionality of some mind wandering. Others have argued that intentional task-unrelated thought is not possible and offered alternative interpretations of evidence for intentional mind wandering that is consistent with the TUT view of mind wandering (Murray & Krasich, 2022). In §4, I argue that the TUT view can explain how mind wandering is controlled without conceding that mind wandering is ever intentional. That is the closest we will come to addressing the issue of intentional mind wandering. [↑](#footnote-ref-5)
6. This might seem ad hoc, but the ontological differences between projects and tasks makes this a substantive claim. It is consistent with having a project that one could be “working” on the project without doing anything explicitly project-related. It is true of our exemplary graduate student that he is working on his degree even though currently he’s struggling to make a cake (which is not, we can safely assume, part of earning his degree). Tasks are not like this; instead, tasks are such that performing them requires actively intending some means toward accomplishing the task. For example, it would be infelicitous for the graduate student to say he is setting the table when he is checking his email. Put differently, one counts as performing a task when some aspect of the task is currently ‘conduct-controlling’, while this is not the case for projects. Projects are superordinate categories that organize lower-level activities under different goals. These categories provide meaningful organization to practical thinking and action even when one’s current activity is such that it is governed by a different project. This ontological difference between tasks and projects explains why the latter are not mind wandering-apt. Projects do not admit of unrelated thoughts, because it is the nature of projects that they continue to structure our practical agency even when we are not thinking about them. Notably, this is one place where the account of tasks presupposes some elements of the account of task-unrelatedness. [↑](#footnote-ref-6)
7. ‘Goal’ is broadly construed here to encompass telic and atelic activity. Some activities are end-directed, whereas other activities are directed toward sustaining the activity (consider, for example, the difference between composing a tune and whistling a tune). Both activities can have constitutive norms that constrain the activity (the atelic activity of whistling a tune can be constrained by maintaining consistent pitch) even if there is no inherent end-directed structure that guides performance of the activity. The account here presumes that the activity must have some way of being *intrinsically* disrupted simply in virtue of what the individual performing the task is thinking about. [↑](#footnote-ref-7)
8. This account draws on recently articulated philosophical views of vigilance (Amaya & Murray, ms.; Murray, 2023, 2024; Murray & De Brigard, 2021). This departs from accounts of vigilance in cognitive psychology and neuroscience, which equates vigilance with sustained attention. The notion of vigilance employed here is broader, encompassing the capacity for sustained attention. See Amaya & Murray (ms.) for an interpretation of the central empirical paradigms used to study vigilance in terms of temporally extended planning agency. [↑](#footnote-ref-8)
9. This proactive engagement utilizes working memory-mediated task representations that serve to enhance goal shielding and lower the probability of goal neglect (Dreisbach & Fröber, 2019). [↑](#footnote-ref-9)
10. This highlights a different reason why projects are not mind wandering-apt: projects are not something anyone can proximally intend to do. [↑](#footnote-ref-10)
11. Mind wandering is not itself a failure of vigilance, although episodes of mind wandering can result in failures of vigilance. Breakdowns in the core operations of vigilance are failures of vigilance. There are four possible breakdowns: failure to recall a task set, failure to preserve a task set, failure to coordinate two task sets, and failure to coordinate tasks with known information. In the former two, the agent fails to apprehend presently available considerations that are relevant given some previously adopted plan. In the latter two, there is a failure to coordinate between one’s present and future self. All of these share a common feature, namely the agent failing to move from an adopted plan to relevant features of an action context (see Murray, 2023). When mind wandering, individuals are more susceptible to each of these failures. That is why mind wandering is a form of non-vigilant thought. [↑](#footnote-ref-11)
12. It is not enough, then, to say that mind wandering consists in disunified thinking that is not controlled by a single goal (Carruthers, 2015: 171). Mind wandering requires that one’s thoughts interfere with goal pursuit, not just that there is no single goal directing the flow of thought. [↑](#footnote-ref-12)
13. I say the formulation is tricky to pin down for this reason. There are many factors that alter the likelihood of some individual noticing or being aware of some change in the environment. In order to determine which factors are relevant, one would need to set a baseline probability for detecting changes that determines which factors cause a downward shift in probability. Then, there would need to be some principle that excludes external factors, such as drug use, acts of God, and so on. The proposal draws on the intuitive claim that there are standards of success in being aware that set our expectations for what people notice about their surroundings. Intrinsic properties of the agent that *diminish* the probability of someone living up to those standards are candidates for being constitutive elements of mind wandering episodes. However, they are merely candidates because other intrinsic properties might diminish the probability of successful monitoring, such as sleepiness and strong emotions. There are two different ways to fill out the TUT view on this point. One possibility is that tokens of any *kind* of state that tends to interfere with monitoring should count as mind wandering. The other possibility is that tokens of only some kinds of states should count as mind wandering, while others are merely close causal affiliates. Thus, having an intense emotional reaction might not directly interfere with monitoring, though such reactions might induce an individual to acquire states that do interfere with monitoring. Either way, an implication of the TUT view is that people will often count as mind wandering on the and diverse causes can bring about states of mind wandering. Whether this counts as counter-intuitive is unclear. By some estimates, mind wandering occupies about 35 – 50% of waking thoughts (Killingsworth & Gilbert, 2010; Mills et al., 2018). The TUT view seems to predict the prevalence of mind wandering. Thus, perhaps this implication of the TUT view is less counter-intuitive than at first glance. [↑](#footnote-ref-13)
14. In this way, the plural pursuit account of mind wandering outlined here is congruent with a functional account of mental simulation, where the adaptive value of episodic future thinking and episodic counterfactual thinking consists in simulating either past- or future-oriented contents that enable learning (De Brigard et al., 2022). Mind wandering might be adaptive for mental simulation in two ways: (1) mind wandering might enable further simulation of some content to further refine one’s model of the decision space for the scenario represented by the content, and; (2) mind wandering, due to the semi-random variability in transitions between content, might enable unpredictable pairs of contents, thereby facilitating insights that would be difficult to obtain within a focused cognitive mode (these benefits map to Sripada’s (2016) deep learning account of the function of mind wandering). [↑](#footnote-ref-14)
15. This is similar to Shepherd’s (2019) cognitive control proposal about the etiology and benefits of mind wandering Shepherd claims: “…it would certainly be useful if the cognitive control system [selected control signals in ‘low-reward’ settings that lead to exploration]…Fixation on one goal alone, or working towards the satisfaction of one goal at a time, is not a great strategy for flourishing” (p. 5). One difference between Shepherd’s proposal and the current account is that on the TUT view, mind wandering consists in having task-unrelated thoughts. These might occur during periods of exploration—which is one kind of plural goal pursuit—but it also might occur during periods of explicit task-switching (Wong et al., 2023). Insofar as one can switch from a focal task to an internal (future) task, such task-switching can constitute mind wandering on the present account even though it is not exploratory. [↑](#footnote-ref-15)
16. Thanks to Zac Irving for suggesting this formulation. [↑](#footnote-ref-16)