


Extended mind-wandering

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Abstract

Smartphone use plays an increasingly important role in our daily lives. Philosophical research that has used first wave or second wave theories of extended cognition in order to understand our engagement with digital technologies has focused on the contribution of these technologies to the completion of specific cognitive tasks (e.g., remembering, reasoning, problem-solving, navigation). However, in a considerable number of cases, everyday smartphone use is task-unrelated. In psychological research, these cases have been captured by notions such as absent-minded smartphone use (Marty-Dugas et al., 2018) or smartphone-related inattentiveness (Liebherr et al., 2020). Given the prevalence of these cases, we develop a conceptual framework that can accommodate the functional and phenomenological characteristics of task-unrelated smartphone use. To this end, we will integrate research on second wave extended cognition with mind-wandering research and introduce the concept of ‘extended mind-wandering’. Elaborating the family resemblances approach to mind-wandering (Seli, Kane, Smallwood, et al., 2018), we will argue that task-unrelated smartphone use shares many characteristics with mind-wandering. We will suggest that an empirically informed conceptual analysis of cases of extended mind-wandering can enrich current work on digitally extended cognition by specifying the influence of the attention economy on our cognitive dynamics.

Keywords

Extended mind · Mind-wandering · Smartphone use · Attention economy

1 Introduction

The *extended mind thesis* holds that many cognitive processes and mental states can extend to entities external to the subject (Clark, 2008; Clark & Chalmers, 1998). Research on the extended mind has investigated how environmental resources make crucial functional contributions to a variety of cognitive tasks, ranging from reasoning and problem-solving to remembering and spatial navigation (Menary, 2010b).

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Since the initial formulation of the extended mind thesis in 1995, the amount and complexity of smartphones and other digital technologies in our daily environment have skyrocketed. It is sometimes asserted that if not true in 1995, the extended mind thesis has certainly become true in the course of the 2010s (Chalmers, 2019). Indeed, smartphones seem to be exemplary mind-extenders: small, personal and portable devices that support a variety of cognitive tasks (information retrieval, communication, navigation, remembering, calculation, etc.) Research on extended cognition has started to explore the philosophical implications of these recent technological developments (e.g., Clowes, 2019; Heersmink & Sutton, 2020).

For the most part, research on extended cognition has focused on how environmental resources support the completion of cognitive tasks. Two biases have led to this focus. First, research on extended cognition has been mainly interested in analyses of *successful* cognitive episodes. For example, it has been argued that digital technologies make positive contributions to belief formation (Smart, 2017) and remembering (Heersmink & Sutton, 2020). Aagaard (2021) calls this the *dogma of harmony*: a tendency to capitalize on cases of cooperation between humans and technology and a deemphasizing of conflict or interference. This *harmony bias* has contributed to a neglect of theoretical considerations on cases of disharmonious cognition, i.e., human-technology relations that are detrimental to the manifestation of the agent's cognitive abilities or wider concerns in particular situations (for exceptions, see Gillett & Heersmink, 2019; Hebblewhite & Gillett, 2020).

Second, research on extended cognition has been biased towards explorations of the completion of cognitive *tasks* (Clark & Chalmers, 1998; Menary, 2010a). Otto's *task* is to go to MoMA, the question is how he is able to remember where it is located.¹ The *task* of playing Tetris mandates that the player rotates, internally or externally, the pieces and moves them to the right place. This *cognitive task bias* has led to a neglect of an important range of cognitive phenomena that are task-unrelated, such as mind-wandering. This is problematic, since mind-wandering is estimated to account for 25-50% of waking cognition (Christoff et al., 2016; Killingsworth & Gilbert, 2010). If task-related cognition can extend into the environment, then why should not the same hold for task-unrelated cognition?²

What would task-unrelated extended cognition look like? In this paper, we will focus on the habitual (i.e., diachronically established), unreflective or pre-reflective use of mobile devices, especially smartphones.³ Most smartphone users will be fa-

¹Otto is the protagonist of Clark and Chalmers' (1998) thought experiment, which helped motivate the extended mind thesis. The Alzheimer's patient Otto employs his notebook to remember the location of the Museum of Modern Art (MoMA) in New York. Identifying the location of MoMA, in turn, allows him to successfully navigate to the museum.

²We will discuss the notion of 'task-unrelated' cognitive processes in Sections 3 and 4 in detail.

³*Mobile devices* is a rather open-ended category. Mobile devices are computers (in the broad sense of the word) that are portable (as opposed to desktop-computers), are connected to the Internet, and typically have an interface (Janlert & Stolterman, 2017). At the time of writing, the canonical example of such a mobile device is a smartphone (such as an iPhone). For practical purposes, we will limit our analysis to smartphone use. However, we assume that our analysis is likely to have

miliar with phenomena like using their phone for longer than planned, finding themselves checking their phone without having decided to do so or scrolling through a social media or news feed without a particular goal (Aranda & Baig, 2018; Marty-Dugas et al., 2018). According to Hiniker et al. (2016), these cases qualify as *ritualistic* smartphone use that is “habitual and diversionary”, as opposed to *instrumental*, i.e., “goal-directed and purposeful” (p. 634). Paradigmatic cases of ritualistic smartphone use, as identified in Hiniker’s et al. (2016) experience sampling study, include the engagement with social media and news applications.⁴ Under the assumption that cognizers spend a significant amount of time engaging with their smartphone (Kruger et al., 2017; Winnick, 2016),⁵ we should expect that habitual and diversionary smartphone use is a ubiquitous phenomenon. Given that the frequency of general smartphone use is positively correlated with habitual and diversionary smartphone use (cf. Marty-Dugas et al., 2018), it is reasonable to assume that task-unrelated smartphone use characterizes our cognitive lives to a significant degree.

Recent psychological research has started to explore these cases of habitual and diversionary smartphone use (Wilmer et al., 2017). Notions that have been used in the psychological literature are *absent-minded smartphone use* (Marty-Dugas et al., 2018) and *smartphone-related inattentiveness* (Liebherr et al., 2020), which refer to smartphone use that is characterized by the absence of strong, task-related, attentional constraints. Smartphone-related inattentiveness can be endogenously or exogenously generated (Liebherr et al., 2020; Wilmer et al., 2017). In *endogenously* generated cases, “the user’s own thoughts drift toward a smartphone-related activity, and thereby evince an otherwise unsolicited drive to begin interacting with the device” (Wilmer et al., 2017, p. 4). In *exogenously* induced cases, the drift of attention is cued by the smartphone (cf. Wilmer et al., 2017).⁶ For current purposes, we

a broader scope (for example also applying to smartwatch, tablet, and laptop use). We do not take a stance on whether older (pre-digital) technologies may or may not support task-unrelated extended cognition as well. An interesting avenue for further research would be to what extent, if any, digital technologies would be continuous with earlier non-digital technologies with regard to their contribution to task-unrelated extended cognition.

⁴At the time of writing, the canonical social media apps are Twitter, Facebook and Instagram. The dominant ways of interacting with these apps is by scrolling through a newsfeed. The items on the newsfeed are typically short texts, links, images or videos that can be liked, shared and commented on. The feed itself is dynamically updated, i.e., continuously generated as the user scrolls down a page.

⁵In particular, Winnick’s (2016) study tracked smartphone users for 5 days and concluded that they spent, on average, 145 minutes per day on their phone across 76 sessions. Upon entering a waiting area (such as a queue or a bus stop), Kruger’s et al. (2017) study found, 62% of the people were observed using their smartphone.

⁶In the product design literature, the difference between endogenously and exogenously generated habitual use is captured by the concepts *internal* and *external* triggers (Eyal, 2014). External triggers are cues in the environment that a user associates with a particular behavior (for example a notification). Internal triggers are automatic associations between a thought, an emotion or a routine and the use of a particular product.

will focus on endogenously generated task-unrelated smartphone use to exclude cases in which smartphone notifications (Stothart et al., 2015) or the presence of a smartphone (Thornton et al., 2014) may merely exogenously cue the onset of an episode of *inattentive smartphone use*.

Despite these recent research efforts, a fine-grained conceptual framework for the analysis of this kind of digital engagement is currently missing. To close this gap, we propose that such episodes of habitual, diversionary smartphone use can be conceptualized as canonical cases of *extended mind-wandering*. To motivate this proposal, let's consider the following episodes:

1. Robert sits in class trying to listen to a lecture. He draws out his phone and checks his social media. He catches himself scrolling through his feed, puts the phone away and returns his focus to the lecture.
2. Amanda joins the queue for coffee. While progressing in the queue, she draws out her phone and checks a number of apps. When she is next in the queue, she puts her phone away and orders her coffee.

These examples of habitual, diversionary smartphone use bear striking similarities to typical cases of mind-wandering (Christoff et al., 2016; Irving & Glasser, 2020; Seli, Kane, Smallwood, et al., 2018; Smallwood & Schooler, 2015). However, in contrast to the kinds of mind-wandering that have been studied in the literature (Irving & Glasser, 2020; Smallwood & Schooler, 2015), the wandering described in these examples is mediated by a smartphone and thereby qualifies, or so we will argue, as a case of *extended cognition*.

At first glance, it might seem surprising to conceptualize these cases of habitual smartphone use as *extended mind-wandering*. At least initially, mind-wandering was partly defined in terms of *perceptual decoupling* from the environment (Schooler et al., 2011; Smallwood & Schooler, 2006, 2015), whereas extended mental processes essentially involve sensorimotor couplings with (a specific part of) the environment. Based on the more recent *family resemblances* approach to mind-wandering (Seli, Kane, Smallwood, et al., 2018), we will nevertheless claim that there are important resemblances between cases of non-extended mind-wandering and extended mind-wandering. Moreover, the most interesting cases of extended cognition are exactly the ones that are typically thought of as internal and in which extension is achieved *through* sensorimotor interaction (Chalmers, 2019).

In what follows, we will develop a conceptual framework that integrates research on extended cognition, mind-wandering, and habitual and diversionary smartphone use. Addressing the harmony and cognitive task biases in current research on extended cognition, we will argue that cases of extended mind-wandering are potentially disharmonious and require a careful and balanced normative assessment. To this end, we will first survey existing work on the extended mind (Section 2) and on mind-wandering (Section 3). In a second step, we will integrate these two strands of research (Section 4). Furthermore, we will

explore the question what difference the technological mediation could make to the phenomenological and functional characteristics of task-unrelated cognition (Section 5). We will discuss the similarities and dissimilarities of extended and non-extended mind-wandering and to what extent these two forms might stand in any competition. Before concluding, we will briefly situate extended mind-wandering within the normative framework of the attention economy (Section 6).

2 Extended mind: State of research

Before we are in a position to establish our conceptualization of extended mind-wandering, we will first present key positions in the extended mind debate. The extended mind thesis holds that cognitive processes are not exclusively realized by processes internal to the skull. Although precursors of the extended mind thesis can be found in pragmatism (James, 1890) and phenomenology (Merleau-Ponty, 1945), the thesis was stated in its best known form by Clark and Chalmers (1998). This articulation is also known as *first wave extended mind*.

Clark and Chalmers' (1998) main diagnostic tool for identifying whether a particular process is part of the mind is the *parity principle*:

If, as we confront some task, a part of the world functions as a process which, *were it done in the head*, we would have no hesitation in recognizing as part of the cognitive process, then that part of the world *is* (so we claim) part of the cognitive process. (1998, p. 8, italics in original)

In other words, the extended mind thesis mandates functional parity between an extended cognitive process and an internally realized cognitive process. Both Otto with his notebook and Inga, another fictional character mentioned in Clark and Chalmers' (1998) thought experiment who relies on her biological memory, face the *same* task of navigating to MoMA. If the *only* difference between relying on a notebook and relying on biological memory is that one is realized externally and the other internally, then there is no good reason to deny their functional parity.

The Internet provides an obvious case study for the extended mind thesis. In their original article, Clark and Chalmers discuss a number of criteria for functional parity (and hence for cognitive extension): reliability, trust, accessibility and past endorsement. There has been considerable debate on whether and under what circumstances these *trust and glue* conditions apply to the Internet (Clark & Chalmers, 1998; Halpin et al., 2010; Smart, 2012, 2017). What these approaches have in common is a search for sharp criteria for including parts of the Internet in the metaphysics of mind.

This metaphysical approach to the extended mind does not do justice to the full scope of extended mind research. Sutton (2010) identifies a second wave of extended mind research. This second wave is focused on how internal components

are *complemented* by external (environmental) components in giving rise to a cognitive process (Menary, 2010a; for discussion, see Heersmink, 2018). There is no need for external processes to substitute internal processes, but brains, bodies, and tools can form a heterogeneously assembled process in very different ways. Sutton sees second wave extended mind “as more [of] an invitation to give detailed attention to these differences in specific contexts and case studies than a fixed new metaphysics of mind” (Sutton, 2010, p. 206). Rather than searching for precise criteria for extension based on parity, *second wave extended mind* operates within a multidimensional space of variation.⁷

Operationalizing complementarity-based extended cognition requires the identification of the relevant, non-trivial reciprocal causal coupling relations between internal and external components (Menary, 2006). The notion of ‘reciprocal causal coupling’ originates in early work on dynamical systems theory (Beer, 2000; Van Gelder, 1998). It designates the causal interaction of two or more components that give rise to a cognitive process across time. However, it should be noted that the distinction between internal and external components is mostly drawn for heuristic purposes, given that “the nature of reciprocal coupling makes it difficult to study the components as separate systems because they are continuously influencing and responding to one another” (Menary, 2010b, p. 4). While proponents of first wave extended mind have also relied on a notion of reciprocal causal coupling (Clark, 2008; Clark & Chalmers, 1998), second wave theorists have argued that an analysis of reciprocal coupling relations should be supplemented by a careful consideration of the cognitive practices to which these relations contribute (Menary, 2010a; Sutton, 2010).

To summarize, first wave theories hold that minds can extend through functional parity of biological and non-biological processes, second wave theories hold that minds are extended in virtue of complementary biological and non-biological processes. In this paper, we are interested in specifying both the similarities *and* dissimilarities between extended and non-extended mind-wandering. These (among others functional) differences cannot be captured by an analysis based on functional parity.⁸ The methodological approach of second wave extended

⁷In his defense of the parity principle (Clark & Chalmers, 1998), Clark (2007) seems to be sympathetic to a complementarity-based approach. Thus, he writes that the parity principle “[...] is a call for sameness of opportunity, such that bio-external elements *might* turn out to be parts of the machinery of cognition *even if* their contributions are unlike (perhaps because they are deeply complementary to) those of the biological brain” (Clark, 2007, pp. 167–168, italics in original). This assumption is fully developed in complementarity-based second wave extended mind theorizing. The distinction between first and second wave accounts is a way of capturing the development of theorizing about extended cognitive processes. This development, we assume, is characterized by a shift in emphasis from parity to complementarity and corresponding methodological strategies, with Clark’s (2007) treatment as a transition point in the literature on the extended mind.

⁸This point also holds if we understand parity not in terms of a “fine-grained similarity between inner and outer processes”, but as an expression of the “sameness of opportunity” of internal and external components to contribute to cognitive processes (Clark, 2007, p. 167). This “sameness of

mind that emphasizes the complementarity of internal and external components of mental functioning is therefore better suited to support our analysis.⁹

The question then becomes under what circumstances mobile technologies contribute to extended mind-wandering episodes. The harmony bias identified in the Introduction is visible in some of the work on second wave extended mind and the Internet. For example, Clowes (2019) criticizes approaches to human-technology relations that he deems intrinsically pessimistic (Carr, 2011; Loh & Kanai, 2016). As an alternative, Clowes' proposes to build upon second wave extended mind approaches to show how technologies can give rise to new forms of cognition. Clowes writes:

We are rapidly building new virtual environments, props and prompts for cognition that structure a vast range of our own cognitive abilities. I believe these new cognitive props are best understood, not as the impact of autonomous technologies upon us, but rather as a vast and partly conscious construction of new embodied and embedded cognitive activities and abilities. (Clowes, 2019, p. 270)

The risk here is that the one-sided pessimistic view is countered by an equally one-sided optimistic view, according to which new digital technologies are, in principle, conducive to cognitive abilities. Whether new forms of cognition appear or disappear, are constructed or destructed should not be an *a priori* commitment of a theory but an open empirical question (Aagaard, 2021; Cecutti et al., 2021).

Heersmink (2016) and Gillett and Heersmink (2019) provide a more nuanced analysis of the cognitive effects of digital technologies. Heersmink (2016) focuses on how the ubiquity of external information changes memory practices. There is very little currently available empirical work in cognitive psychology, he concludes, on which tech-pessimists base their claims that memory is deteriorating. Moreover, the empirical work that is cited (i.e., Sparrow et al., 2011) investigates the performance on memory tasks when facts are stored in folders on a computer in the lab. It is not obvious that findings from such an artificial setting say anything about the cognitive effects of Internet use *in the wild*. Gillett and Heersmink (2019) analyse how GPS-based navigation systems transform navigation and wayfinding. They conclude that GPS devices “undermine the agent’s development of other skills”, “promote route knowledge more than survey knowledge” and “do not scaffold the agent to make autonomous decisions about how to solve wayfinding problems” (Gillett & Heersmink, 2019, p. 45). They propose to change both the GPS tools themselves as well as the epistemic practices in which they are embedded.

opportunity” assumption does not help us specify how external components contribute to cognitive processes and how extended and non-extended processes differ from each other.

⁹This means that we will not engage in any metaphysical debates about the conditions under which a smartphone (or any other environmental resource) should count as part of an agent’s cognitive system (Adams & Aizawa, 2001). We are interested in the epistemological question of how second wave extended mind can help us understand the complementarity of internal and external components in bringing about specific cases of mind-wandering.

In these studies, the normative implications do not follow from the conceptual framework itself, but from a careful study of the phenomena.

For the purposes of our paper, these studies are a step in the right direction, but still miss out on an important aspect of human cognition. They focus on the completion of cognitive *tasks* such as wayfinding and navigation (Gillett & Heersmink, 2019) and memory (Heersmink, 2016). More generally, Slaby characterizes this bias in the literature on the extended mind as the (implicit) endorsement of a “user/resource model” (Slaby, 2016, p. 5):

Baseline mentality in many of the example cases under discussion is that of a fully conscious individual cognizer (“user”) who sets about pursuing a well-defined task through intentional employment of a piece of equipment or exploitation of an environmental structure (“resource”).

The focus on individual cognizers who intentionally pursue a well-defined task might be one reason why, as far as we are aware, no study on extended cognition has addressed the question how the Internet and digital technologies are transforming task-unrelated cognition.

3 Mind-wandering: State of research

Mind-wandering is a relatively recent topic of study in psychology (Smallwood & Schooler, 2006). Perhaps for this reason, there has been an active debate on what exactly qualifies as mind-wandering and what characterizes mind-wandering episodes. Initially, research on mind-wandering started with the assumption that the target phenomenon is characterized by *task-unrelatedness* and *stimulus-independence* (e.g., Smallwood & Schooler, 2015). Other aspects that have been discussed in the literature include the *absence of attentional guidance*, a *lack of intention*, and a *lack of meta-awareness* (e.g., Irving & Glasser, 2020). In what follows, we will first summarize previous research on these aspects of mind-wandering. Our aim is not to provide an exhaustive review of the available literature, but to identify and discuss potential characteristics of mind-wandering episodes. In a second step, we will explore the option that a *family-resemblance approach* to mind-wandering can help integrate research on the various aspects of mind-wandering (Seli, Kane, Smallwood, et al., 2018).

It has been suggested that a mental episode qualifies as mind-wandering if it is *task-unrelated* (Smallwood & Schooler, 2006, 2015). In early behavioral studies on mind-wandering, participants were given a primary task, for example reading for comprehension (Reichle et al., 2010; Schooler et al., 2004; Smallwood et al., 2008). Any mental activity that was self-reportedly not related to task completion was classified as a mind-wandering episode (Christoff et al., 2016). This presupposes that it is possible to identify a single task at any given time – both from a

subjective first-person perspective and a scientific third-person perspective.¹⁰ This assumption is problematic for at least two reasons. First, it is not clear whether there always is a primary task (Murray et al., 2020). It seems possible to mind-wander in situations where no immediate cognitive task is available (Murray et al., 2020), such as when waiting in line. Second, it is conceivable that an agent is in the process of completing multiple tasks at the same time (Metzinger, 2018), which does not necessarily amount to mind-wandering. For these reasons, Irving (2016) proposes that a mental episode is task-unrelated iff it is unrelated to *any* of the agent's tasks. This excludes multi-tasking, since the agent's thoughts are unrelated to *some*, but not any of her tasks, but includes mind-wandering in the absence of a task (e.g., during rest). As we will discuss in Section 4, this does not preclude the possibility that there are relevant distinctions between mind-wandering in the presence and absence of a task.

Stimulus-independence has been identified as another aspect that can help identify a mind-wandering episode (Konishi & Smallwood, 2016; Schooler et al., 2011; Smallwood & Schooler, 2015). On this view, mind-wandering would occur independently from current perceptual stimulation. Furthermore, it has been argued that mind-wandering episodes are characterized by *perceptual decoupling* (Broadway et al., 2015; Konishi & Smallwood, 2016; Schooler et al., 2011; Smallwood, 2011; Smallwood & Schooler, 2015). According to the *decoupling hypothesis*, “[a]ttention is directed inwards during mind wandering; thus, representations of the external environment should be superficial” (Smallwood & Schooler, 2006, p. 947). The proposal that mind-wandering is stimulus-independent and therefore perceptually decoupled from the local environment has been criticized for at least two reasons. First, it has been noted that any mental episode is never sufficiently stimulus-independent, as it is always dependent upon an ongoing stream of exteroceptive and interoceptive stimulations (Metzinger, 2018). Second, mind-wandering “[...] can also be externally oriented towards stimuli in the current perceptual environment” (Christoff et al., 2016, p. 5; see also Irving & Glasser, 2020; Seli, Kane, Smallwood, et al., 2018; for empirical evidence, see Mills et al., 2018). For example, upon seeing your own image during an online conversation, your thoughts might drift away from the conversation to the need of getting a haircut. The assumption that mind-wandering can be oriented both inwards as well as towards the environment is part of the folk-psychological conception of mind-wandering (Irving et al., 2020, Study 2). Given that the notions of ‘stimulus-dependence’ and ‘stimulus-independence’ are problematic, we will talk about ‘perceptual coupling’ and ‘perceptual decoupling’ in the remainder of this paper. Note that ‘coupling’ in this context is a graded notion that captures reciprocal causal relations of various

¹⁰Note that this conception of mind-wandering makes a rather ambiguous appeal to the notion of ‘task’. Tasks can be construed as self-imposed individual projects partially constituted by the agent's current concerns, or as other-imposed public settings independent of an agent's current concerns. Morrison et al. (2019) find that what a subject takes to be their task often does not align with the task the experimenter takes the subject to be doing.

strengths between internal and external components. Just as a mental episode is never fully stimulus-independent, perceptual states and processes are never fully decoupled. For this reason, it would be more accurate to capture the episodes that are addressed by the decoupling hypothesis as ‘minimally perceptually coupled’, rather than ‘perceptually decoupled’. However, in keeping with the psychological literature, we will continue to talk about ‘perceptual decoupling’.

As we have pointed out in the previous paragraphs, there are pertinent problems of characterizing mind-wandering exclusively in terms of task-unrelated and perceptually decoupled mental episodes. Furthermore, this characterization does not differentiate between directed thinking and *attentionally unguided thought* and does not capture the temporal and attentional dynamics of mind-wandering. For these reasons, it has been suggested that mind-wandering can be conceptualized as *attentionally unguided thought* (Irving, 2016, 2021; Irving & Glasser, 2020; Irving & Thompson, 2018). During mind-wandering episodes, Irving (2016) proposes, “[...] the focus of attention drifts unguided from one topic to the next” (p. 563). Mind-wandering is thereby understood as the *absence* of attentional guidance, which is defined in the following way (Irving, 2016, p. 565):

An agent \mathcal{A} is guided to focus her attention on some information i if and only if she has two dispositions:

1. \mathcal{A} is reliably disposed to focus her attention on i and
2. If \mathcal{A} 's attention isn't focused on i , she notices, feels discomforted by, and is thereby disposed to correct this fact.

During mind-wandering, then, a person can have the disposition to focus their attention on currently relevant information, but does not feel pulled back if her mind were to drift somewhere else. This counterfactual conceptualization of mind-wandering as the absence of attentional guidance for mental processes, which is derived from theorizing in the philosophy of action (Pacherie, 2008), would help specify the “unstable dynamics” of mind-wandering (Irving & Thompson, 2018, p. 91): it excludes cases of directed thinking, since they do involve attentional guidance (Irving, 2021). This conception of mind-wandering as unguided attention is fully supported by Christoff et al.'s (2016) neuroscientific framework, according to which mind-wandering is characterized by “[...] an absence of strong constraints on the contents of each state and on the transitions from one mental state to the other” (Christoff et al., 2016, p. 2). The characterization of mind-wandering as a lack of attentional guidance would therefore emphasize the dynamics of mind-wandering across time, rather than the ‘content’ of a mind-wandering episode relative to current task demands or available stimuli in the local environment (Mills et al., 2018).

The idea that all cases of mind-wandering are entirely unguided might seem controversial. When your thoughts drift from reading a book to musing about your next holidays, there is a sense in which an agent feels attracted towards these musings. To accommodate this intuition, Watzl (2017) develops a view in which mind-

wandering “is guided by longer-lasting states like concerns and desires with which the subject does not identify” (p. 135). While Irving (2021) sees mind-wandering as unguided, he allows for a graded notion of guidedness. For example, a brainstorming session might be very loosely guided by the theme: the agent will only feel pulled back when drifting far away from the theme of the session. This means that there probably is no sharp line to be drawn between directed thinking and mind-wandering.

In addition to task-unrelatedness, perceptual decoupling, and unguided attention, philosophical and psychological research has explored the role of intention for mind-wandering. Initially, a *lack of intention* has been identified as a defining feature of mind-wandering episodes. On this view, mind-wandering episodes are not initiated or maintained intentionally (Smallwood & Schooler, 2006). However, more recent empirical evidence suggests that mind-wandering can be intentional or unintentional (Seli, Risko, & Smilek, 2016; Seli, Risko, Smilek, & Schacter, 2016)¹. Furthermore, several philosophers have recently argued for the possibility of intentional mind-wandering (Arango-Muñoz & Bermúdez, 2021; Irving, 2021)². First, Arango-Muñoz and Bermúdez (2021) suggest that “intentional mind-wandering is an intentional omission of control or guidance over one’s thoughts” (p. 7735). Second, Irving (2021) distinguishes between the intentional initiation and the intentional maintenance of mind-wandering. In the former case, the onset of a mind-wandering episode is intentional in the sense that “[y]our choice to initiate mind-wandering is intentional, but your attention then wanders unguided” (Irving, 2021, p. 637). In the latter case, a mind-wandering episode is intentionally maintained if one exerts second-order control over the first-order unguidedness of one’s thoughts: “[...] one can actively suppress the guidance of attentional focus and cultivate a wandering mode of attention” (Irving, 2021, p. 638). Both suggestions are consistent with the assumption that mind-wandering is characterised by unguided attention (see above).

Finally, researchers have explored the role of meta-awareness during mind-wandering. While some have associated mind-wandering with a transient *lack of meta-awareness* (Metzinger, 2018; Smallwood & Schooler, 2006), others have as-

¹It should be noted that the psychological concept of ‘intention’ as it is frequently employed in research on mind-wandering captures the influence of cognitive control and goal-directedness on the unfolding of mental processes (see e.g., Smallwood & Schooler, 2006). This understanding is distinct from the concept of ‘intention’ as it is used in the philosophy of language (e.g., Anscombe, 1963) and the philosophy of mind (e.g., Bratman, 1984).

²Engaging with the initial conception of mind-wandering as task-unrelated thought, according to which mind-wandering is unrelated to a primary task, Murray and Krasich (2020) have argued that task-unrelatedness and intentionality are incommensurable aspects of mental episodes. According to their *puzzle of willful wandering*, “an agent cannot intend to have task-unrelated thoughts, as intending to have any thought thereby makes that thought related to one’s task” on logical grounds (Murray & Krasich, 2020, p. 2). This puzzle can be resolved, Murray and Krasich (2020) argue, by revising the conception of either task-unrelatedness or intentionality. If Irving’s (2016) revised conception of task-unrelated thought in combination with his characterization of mind-wandering as unguided attention is adopted (see above), the puzzle of willful wandering can be avoided.

sumed that mind-wandering can become available to meta-awareness (Seli, Risko, & Smilek, 2016; Seli, Risko, Smilek, & Schacter, 2016). A relevant strategy for accommodating cases of meta-awareness and meta-unawareness is to introduce a distinction between *tuning out* and *zoning out* (Schooler et al., 2004, 2011; Smallwood, 2011). In cases of tuning out, cognizers can become temporarily aware that their mind is wandering. In cases of zoning out, cognizers temporarily lack meta-awareness of their current engagement in a mind-wandering episode. In the course of a given mind-wandering episode, cognizers can alternate between meta-aware and meta-unaware moments. This distinction between tuning out and zoning out is consistent with the view that mind-wandering is characterized by unguided attention (Irving, 2016; Irving & Thompson, 2018). Considerations on the relationship between intentionality and meta-awareness have led to the assumption that these are at least partly independent dimensions of mind-wandering (Seli et al., 2017).

This brief discussion of previous psychological and philosophical research raises the question how these different characteristics ascribed to mind-wandering can be accommodated. Recently, it has been suggested that the development of a *family-resemblances* framework for research on mind-wandering could help analyze the phenomenological and functional diversity and variability of mind-wandering episodes (Seli, Kane, Smallwood, et al., 2018). The notion of ‘family resemblances’ originates in Wittgenstein’s (2009) considerations on the concepts of ‘game’ and ‘number’. Just as Wittgenstein (2009) assumes that the concept of ‘game’ refers to “a complicated network of similarities overlapping and crisscrossing” (2009, § 66, 36^e), Seli et al. (2018) suggest that the concept of ‘mind-wandering’ refers to a family of more or less similar mental episodes. On this view, ‘mind-wandering’ would be “a natural category with graded membership”, which entails that “some exemplars are more prototypical than others” (Seli, Kane, Smallwood, et al., 2018, p. 483). Furthermore, just as the concept of ‘game’ has no clear, pre-determined boundaries (Wittgenstein, 2009), the concept of ‘mind-wandering’ would be depicted “as a fuzzy-boundaried and heterogeneous construct” (Seli, Kane, Smallwood, et al., 2018, p. 485). For current purposes, we assume that the family-resemblances framework can help identify and specify the members of the *mind-wandering family* (Seli, Kane, Metzinger, et al., 2018)¹³. Episodes of mind-wandering will share at least some of the features we just outlined: task-unrelatedness, perceptual decoupling, attentional unguidedness, (lack of) intentionality and (lack of) meta-awareness.

¹³Note, however, that Christoff et al. (2018) and Irving and Glasser (2020) have raised concerns about the family-resemblance framework and its ability to arrive at a sufficiently specific conceptualization of ‘mind-wandering’. However, in reply to Christoff’s et al. (2018) criticism, according to which unguided, relatively unconstrained thought does provide “an essential, defining feature” of mind-wandering (p. 957), Seli, Kane, Metzinger et al. (2018) point out that “[a] ‘relative lack of constraint’ is insufficiently specific to allow one to distinguish mind-wandering from other thoughts” (p. 959). Entering this debate is beyond the scope of the present paper.

Adopting a family-resemblance approach to mind-wandering also has implications for the normative assessment of the cognitive and affective consequences or the *costs and benefits* of mind-wandering (Mooneyham & Schooler, 2013; Schooler et al., 2014). According to Fox and Christoff (2014), research on mind-wandering has emphasized its detrimental impact on cognitive abilities: “In contrast to the more desirable pursuit of ‘rational’ thought, MW [mind-wandering] is often portrayed as undesirable – a wasteful mental diversion and potentially dangerous distraction” (p. 299). In support of this assessment of the negative consequences of mind-wandering, research has pointed out that mind-wandering impedes reading comprehension (Franklin et al., 2011; Schooler et al., 2004; Uzzaman & Joordeens, 2011), performance in tests of working memory span and general intelligence (Mrazek et al., 2012), knowledge acquisition in classroom and online learning environments (Szpunar et al., 2013), risk-averse driving behavior (Yanko & Spalek, 2014), and positively valenced emotional experiences (Killingsworth & Gilbert, 2010). However, it should also be noted that several beneficial effects of mind-wandering episodes have been identified, for example relief from boredom (Mooneyham & Schooler, 2013), as well as a positive impact on autobiographical planning (Baird et al., 2011), self-insight (D’Argembeau, 2018), creative incubation (Baird et al., 2012), and dishabituation during learning tasks (Schooler et al., 2014).

If a family-resemblances approach to mind-wandering is adopted, a more nuanced normative assessment of the cognitive and affective impact of mind-wandering episodes comes into view. For example, the idea that mind-wandering can provide a beneficial relief from boredom might be true for a mind-wandering episode that involves intentionally initiated, unguided thinking (cf. Irving, 2021, p. 637), but might not be true for a mind-wandering episode that lacks intentionality and occurs in the presence of another task. As we will suggest in the next section, the family-resemblance framework also allows for the possibility that mental episodes that are not perceptually decoupled qualify as proper members of the ‘mind-wandering family’ and warrant, as such, a normative evaluation.

4 Extended mind-wandering

In this section, we will propose that certain episodes of habitual, diversionary smartphone use can be conceptualized as *extended mind-wandering* and qualify as proper members of the *mind-wandering family*. This proposal rests on the assumption that an external (environmental) resource, i.e., a smartphone displaying a social media or news feed, can be a proper component of a dynamically unfolding mind-wandering episode, thereby *complementing* internal components (Menary, 2010a; Sutton, 2010). Crucially, this assumption requires a reconsideration of the view that mind-wandering is characterized by perceptual decoupling (Broadway et al., 2015; Konishi & Smallwood, 2016; Schooler et al., 2011; Smallwood, 2011; Smallwood & Schooler, 2015). As already noted in Section 2, Christoff et al. (2016), Irving and Glasser (2020), and Seli et al. (2018) have suggested that at least some

mind-wandering episodes are functionally specified by an occurrent coupling relation between a cognizer and relevant parts of the local environment. We follow these researchers by assuming that perceptually coupled mental episodes can be proper members of the mind-wandering family. This assumption helps connect research on mind-wandering and second wave extended mind: in cases of extended mind-wandering, or so we argue, internal components are complemented by an external component in virtue of a reciprocal causal coupling relation holding between them (see Section 2). In the case of habitual, diversionary smartphone use, internal components influence and are influenced by the perceptual input provided by the user interface as a result of motor action. Perceptual coupling, then, would be a special case of reciprocal causal coupling.

At first glance, there is a discrepancy between ‘perceptual coupling’ as used in the mind-wandering literature and ‘reciprocal causal coupling’ in the extended mind literature. As a limiting case, perceptual coupling might be a case of one-directional causal coupling (i.e. passively looking at a static object). Perceptual coupling of this sort would, under standard assumptions, not qualify as sufficient for extension, but would contribute to ‘embedded’ mind-wandering. The cases of habitual smartphone use under consideration, however, are characterized by active sensorimotor coupling (i.e., swiping and scrolling) between user and device, which does qualify as reciprocal causal coupling.¹⁴

Episodes of habitual and diversionary smartphone use are *task-unrelated* just in case they are unrelated to *any* task. Extended mind-wandering can be task-unrelated because there is no cognitive task that the user would be concurrently engaged with (e.g., during rest), or because the user is engaged in a cognitive task, but the smartphone use does not relate to that task. We propose to call the first kind of task-unrelatedness *task-absent extended mind-wandering* and the second kind of task-unrelatedness *task-present extended mind-wandering*. The two kinds of extended mind-wandering are exemplified in the examples mentioned in the Introduction. Robert catches himself scrolling while trying to listen to a lecture (example 1). His extended mind-wandering is task-unrelated in a situation of task-presence, because there is a task he takes himself to be doing, but his scrolling is unrelated to that task. Amanda is standing in line for coffee and habitually checks a number of apps (example 2). Her extended mind-wandering is task-unrelated in a situation of task-absence, because there is no cognitive task she is attempting to complete. The distinction between task-present and task-absent extended mind-wandering is important when considering the normative implications of extended mind-wandering (Section 5).

If we adopt Irving’s (2016) conceptualization of task-unrelatedness, according to which thoughts are task-unrelated iff they are unrelated to *any* of the agent’s tasks, and apply this conceptualisation to cases of extended mind-wandering, we will arrive at the assumption that these cases can be intentional or unintentional.

¹⁴In what follows, the cases of perceptual coupling we consider satisfy the conditions of reciprocal causal coupling. This allows us to integrate research on mind-wandering and the extended mind.



The consideration of unintentional extended mind-wandering would be consistent with Marty-Dugas' et al. (2018) operationalization of ritualistic smartphone use as *absent-minded behavior*. This kind of mind-wandering would be characterized by a lack of intention (either at the onset or in the course of the relevant mental episode) and a temporary loss of attentional guidance. Applying Irving's (2021) and Arango-Muñoz and Bermúdez's (2021) analysis of intentional mind-wandering to extended cases, we can describe some cases of habitual and diversionary smartphone use as the intentional omission of attentional guidance. Intentionally picking up one's smartphone to scroll aimlessly through a social media feed would be an example of the intentional initiation of an extended mind-wandering episode. An example of the intentional maintenance of an extended mind-wandering episode would be to swiftly exert cognitive meta-control to return to a first-order process of attentional unguidedness when one's attention gets captivated by a particular online content.

Episodes of smartphone use that are task-unrelated and intentional or unintentional can be conceptualized as *attentionally unguided*. Recall from Section 3 that "[...] the focus of attention drifts unguided from one topic to the next" during mind-wandering episodes (Irving, 2016, p. 560). This characterization would be consistent with our assumption that perceptual decoupling is not a necessary condition for the classification of a mental episode as a case of mind-wandering. In cases of *extended mind-wandering* characterized by *unguided attention*, the focus of attention shifts and drifts dynamically without any robust endogenous constraints (Christoff et al., 2016).

Episodes of extended mind-wandering characterized by unguided attention, we suggest, can either be cases of *tuning out* (extended mind-wandering with meta-awareness) or *zoning out* (extended mind-wandering without meta-awareness). Just as episodes of non-extended mind-wandering can occur with or without meta-awareness (Irving & Thompson, 2018), episodes of extended mind-wandering may or may not become temporarily available to meta-awareness. For example, while attempting to understand a lecturer's remarks (Example 1) or queuing for a cup of coffee (Example 2), a person could scroll through a social media or news feed while being meta-aware (tuning out) or without being meta-aware (zoning out) of their unguided smartphone behavior. Ultimately, it is an empirical question how frequent extended mind-wandering cases of zoning out and tuning out episodes are, whether there are mind-wandering episodes that are characterized by alternations between phases of zoning out and tuning out, and how these insights can help specify a theoretical assessment of extended mind-wandering characterized by unguided attention. More generally, empirical research could identify the temporal dynamics of extended mind-wandering, as well as the transitions between extended mind-wandering, non-extended mind-wandering, and task-related, attentionally guided (instrumental) smartphone use across time.

We have now arrived at a specification of extended mind-wandering that allows us to categorize well-defined cases of endogenously generated, habitual smartphone use as proper members of the *mind-wandering family*. In contrast to

non-extended cases of mind-wandering, which have been the focus of previous psychological and philosophical research, cases of extended mind-wandering are characterized by reciprocal causal coupling. This assumption, we have shown above, is consistent with more recent work on mind-wandering. In Table 1, we employ Seli’s et al. (2018) terminology to analyze a number of exemplars of extended mind-wandering.

	Coupled	Unguided	Task-present	Intentional	Meta-aware
1. <i>While trying to listen to a lecture, Rebecca has taken her smartphone out of her pocket absentmindedly and suddenly catches herself scrolling through her social media feed.</i>	✓	✓	✓	✗	✓
2. <i>While trying to listen to a lecture, Selma sets out to scroll through her social media feed and is aware of skimming through the most recent posts.</i>	✓	✓	✓	✓	✓
3. <i>While trying to listen to a lecture, Oliver has taken his phone out of his pocket absentmindedly and scrolls through his social media feed without noticing it.</i>	✓	✓	✓	✗	✗
4. <i>While trying to listen to a lecture, James sets out to scroll through his social media feed and keeps on skimming through the most recent posts without noticing it.</i>	✓	✓	✓	✓	✗
5. <i>While queuing for coffee, Karen has taken her phone out of her pocket absentmindedly and suddenly catches herself scrolling through her social media feed.</i>	✓	✓	✗	✗	✓
6. <i>While queuing for coffee, Peter sets out to scroll through his social media feed and is aware of skimming through the most recent posts.</i>	✓	✓	✗	✓	✓
7. <i>While queuing for coffee, Sam has taken her phone out of her pocket absentmindedly and scrolls through her social media feed without noticing it.</i>	✓	✓	✗	✗	✗
8. <i>While queuing for coffee, Adam sets out to scroll through his social media feed and keeps on skimming through the most recent posts without noticing it.</i>	✓	✓	✗	✓	✗

Table 1: Overview of exemplars of extended mind-wandering. All exemplars are perceptually coupled and attentionally unguided. Furthermore, all exemplars are unrelated to any task, the only difference lies in the situation-specific task-presence or task-absence. Exemplars that are not characterized by intentionality are cases of unintentional extended mind-wandering. Furthermore, exemplars that are not characterised by meta-awareness are cases of meta-unaware extended mind-wandering.

The systematization of extended mind-wandering provided in Table 1 allows us to arrive at a specification of the characteristics of habitual, diversionary smartphone use (Hiniker et al., 2016) and of notions such as *absent-minded smartphone use* (Marty-Dugas et al., 2018) and *smartphone-related inattentiveness* (Liebherr et al., 2020) (see Section 1). At the same time, it leads to a revision of the commonly held assumption that digital technologies such as smartphones cooperatively contribute to the completion of cognitive tasks in most (if not all) cases (see Section 2). Perceptual input provided by a smartphone, we have argued in this section, can contribute to episodes of extended mind-wandering.

It might be objected that the cases of habitual and diversionary smartphone use that we have been considering should not be conceptualized as members of the mind-wandering family. After all, habitual and diversionary smartphone use might seem to be strikingly different from the exemplars of mind-wandering that have been discussed in the psychological and philosophical literature. In reply to this objection, we return to the family resemblances approach, according to which mind-wandering is “a fuzzy-boundaried and heterogeneous construct” that applies to a variety of cases, which show similarities and dissimilarities (Seli, Kane, Smallwood, et al., 2018, p. 485). Once we allow for the possibility that perceptual decoupling need not be a necessary characteristic of mind-wandering episodes, as suggested by Christoff et al. (2016), Irving & Glasser (2020), and Seli, Kane, Smallwood, et al. (2018), it becomes conceivable that particular engagements with external components, such as smartphones, non-trivially contribute to the onset and maintenance of a mind-wandering episode. Furthermore, as shown above, recent empirical research strongly suggests that habitual and diversionary smartphone use can share key characteristics with seminal cases of mind-wandering (Forster & Lavie, 2014; Hiniker et al., 2016; Liebherr et al., 2020; Marty-Dugas et al., 2018). For these reasons, we submit that the differences *between* particular exemplars of extended and non-extended mind-wandering are smaller than the differences *within* the heterogeneous class of non-extended mind-wandering. The only identifiable dissimilarity of all cases of extended mind-wandering and some, but not all cases of non-extended mind-wandering, concerns the aspect of perceptual coupling/decoupling.

In order to show that this approach is misguided, a critic would need to argue why perceptual decoupling should count, after all, as *the* necessary condition for the identification of a mental episode as a mind-wandering episode. The point of the extended mind thesis is, of course, that sensorimotor coupling with the environment, in and of itself, does *not* provide grounds to drive a wedge between mental phenomena (Chalmers, 2019).

Based on these qualifications, we will further strengthen our case for the complementarity of smartphone applications and internal components in the cases of habitual and diversionary smartphone use we have identified above. To this end, we will consider the relationship of non-extended and extended cases of mind-wandering in the next section.

5 Comparing extended and non-extended mind-wandering

If the previous analysis holds, extended mind-wandering is a technologically mediated form of mind-wandering. In Section 3 we have briefly reviewed the costs and benefits of non-extended forms of mind-wandering. In this section we will explore two questions. First, what kind of evidence would support the thesis that extended mind-wandering tends to replace non-extended mind-wandering? Second, to what extent would extended mind-wandering share the costs and benefits of non-extended mind-wandering?

To date, it is difficult to directly assess the cognitive and affective costs and benefits of extended mind-wandering. The reason is that empirical research, which directly investigates the phenomenon that we conceptualize as extended mind-wandering, is currently missing. Yet, in this section we will review some studies that might motivate future research on extended mind-wandering.

It is clear that the overall amount of smartphone usage is going up ([Global Mobile Consumer Survey, 2019](#)), but the statistics do not differentiate between situations in which smartphones are being used (during a lecture or during alone time), whether smartphone use is attentionally guided or unguided, task-related (i.e., instrumental) or task-unrelated (i.e., habitual and diversionary), and whether a smartphone is used unintentionally or intentionally and with or without meta-awareness. Moreover, both the prevalence as well as the costs and benefits of extended mind-wandering may be subject to inter-individual differences ([Diefenbach & Borrmann, 2019](#)). This section is therefore explorative and is meant to guide future empirical research, rather than giving a definite answer to the question of the normative relationship between extended and non-extended forms of mind-wandering. We will structure our discussion by considering the following two theses, which we derive from our considerations presented above:

The replacement thesis: Extended mind-wandering competes for the same cognitive resources as non-extended mind-wandering and seems to partially replace non-extended mind-wandering.

The functionality thesis: Extended mind-wandering shares the costs of non-extended mind wandering, but does not share the benefits, especially concerning self-insight.

5.1 The replacement thesis

According to the replacement thesis, extended mind-wandering would partially replace non-extended mind-wandering: as we spend more time extended mind-wandering, the amount of time we spend on non-extended mind-wandering would go down. What kind of empirical evidence would be required to support this

claim? Ralph et al. (2020) investigated the trade-off between what they call media-multitasking and mind-wandering. In one phase of their behavioral experiment, participants performed a simple cognitive task (1-back)¹⁵ in the other condition, participants were able to concurrently watch a task-unrelated, optional video. During the experiment, participants were asked whether they were 1) focused on the task, 2) off-task attending to the video or 3) off-task mind-wandering. Compared to the non-video condition, participants in the video condition reported being off-task more often, but reported non-extended mind-wandering significantly less. These findings suggest a trade-off between (non-extended) mind-wandering and media use, at least in the presence of a primary task.

This study cannot be taken directly as evidence for the replacement thesis. The reason is that the study explored the prevalence of task-unrelated cognition in the presence versus absence of the opportunity to engage in media multitasking. However, we believe that the study design used by Ralph et al. (2020) could be modified to investigate the relative frequency of extended and non-extended mind-wandering. For example, in one condition, participants could be offered the opportunity to scroll through a social media feed (rather than watching a video). In the other condition, participants would be denied access to any kind of smartphone use. Subjects might then be asked whether or not they were guiding their attention to the task (1-back). Participants who report that their attention was temporarily unguided could then be administered further questions. For example, were they initiating or maintaining their task-unrelated mental episodes intentionally or unintentionally? Were they meta-aware that they were engaging in task-unrelated cognition?

A trade-off between extended and non-extended mind-wandering can also be motivated through computational studies. For example, Taatgen's et al. (2021) competition model shows that there is no principled difference between task-unrelated mind-wandering and external distraction. Task-unrelated mental episodes can be triggered by the availability of mental resources and the "presence of distracting stimuli in the environment and internally in the mind" (2021, p. 86). Consequently, if relevant environmental stimuli are available, extended mind-wandering might outcompete non-extended mind-wandering.

Could this trade-off also exist in the absence of any relevant task? While we are not aware of any empirical work that directly addresses this question, we would like to discuss two studies that might motivate future research. Diefenbach and Borrmann (2019) investigate the hypothesis that smartphones can act as a pacifier during periods of alone time. That is to say, smartphones can prevent us from having to stay alone with our thoughts. The authors conducted a survey in which they asked smartphone users about personality traits (capacity for solitude, need to belong, proneness to boredom), their perception of their smartphone as an attachment object, their smartphone use during alone time, and their self-reflection

¹⁵In the 1-back task, participants had to judge whether the currently presented letter matched the previously presented letter.

and self-insight. The authors found that users with a higher proneness to boredom, a higher need to belong, and a lower capacity for solitude also report higher smartphone use during alone time. Although this is a correlational study, it is likely that personality traits influence smartphone use and not the other way around. The authors hypothesize that smartphone users engage with their phone to steer away from negative emotions. Note, however, that this might not be a successful strategy: Sagioglou & Greitemeyer (2014) report a consistent “affective forecasting error” in which subjects expect to feel better after using Facebook, but report more negatively valenced emotional experiences the longer they use Facebook.

Diefenbach and Borrmann (2019) do not investigate the quality of smartphone use during alone time. Such smartphone use could in principle be highly directed and not of the attentional unguided mind-wandering variety that we have explored in this paper. The quality of smartphone use in relationship to boredom is explored in some detail by Aranda and Baig (2018) in a small ethnographic study. Users report:

“When I’m bored, I keep going into my news app and tapping the same article over and over, hoping for a new story to read.”
(Participant quote 1, Aranda & Baig, 2018, p. 19:4)

“Without my phone, what would I do— just stare out the window?!”
(Participant quote 2, Aranda & Baig, 2018, p. 19:3)

“I spent 1.5 hours on [a social networking site]. I was appalled at myself. I hate when I spend time just scrolling and scrolling... it’s all mind-numbing, and I don’t benefit from any of it.” (Participant quote 3, Aranda & Baig, 2018, p. 19:3)

Based on these and other reports, Aranda and Baig (2018) identify two behavioral cycles. The first pertains to a user’s checking habits to resist boredom, the second pertains to a shared expectation to be constantly available to others. While Aranda and Baig (2018) did not directly investigate the replacement of non-extended by extended mind-wandering during alone time, the cited self-reports may be interpreted as phenomenological descriptions of extended mind-wandering. Specifically, participant quotes 1 and 2 might imply that non-extended mind-wandering is replaced by extended mind-wandering, where habitual and diversionary smartphone use serves as a means of overcoming boredom.

These identified behavioral cycles are consistent with Diefenbach and Borrmann’s (2019) findings that boredom and need to belong are drivers of smartphone use. They lend support to the idea that habitual and diversionary smartphone use is affectively motivated in the absence of any task. The interpretation of the smartphone as a pacifier to prevent having to stay alone with your thoughts is backed up by research that shows that virtually any activity is preferred over having to stay with your thoughts. Wilson et al. (2014) asked participants to stay alone in a room for 15 minutes and entertain themselves with their thoughts. Participants had the opportunity to administer themselves an electric shock that they had previ-

ously experienced and had said they would pay money to avoid. During this time, 67% of men and 25% of women self-administered a shock. The study suggests that participants find it difficult and unrewarding to stay alone with their thoughts.

All in all, studies that directly investigate the trade-off between extended and non-extended mind-wandering are currently lacking. However, a number of studies do investigate phenomena closely related to extended mind-wandering. These studies provide some circumstantial evidence for a replacement hypothesis, according to which extended mind-wandering replaces non-extended mind-wandering in well-defined situational contexts. We have provided some suggestions to adapt these studies to directly investigate extended mind-wandering in future empirical research.

5.2 The functionality thesis

To what extent does extended mind-wandering share the costs and benefits of non-extended mind-wandering? Again, no studies have operationalized extended mind-wandering in the way developed in this paper, but a number of studies have explored absent-minded smartphone use (Marty-Dugas et al., 2018) or smartphone-related inattentiveness (Liebherr et al., 2020), as mentioned in the Introduction.

There is evidence that both forms of mind-wandering interfere with task performance in a number of domains. For example, both mind-wandering (Galéra et al., 2012; Yanko & Spalek, 2014) and phone use (Hancock et al., 2003) impair driving performance. Learning in a classroom setting was found to be impaired by both digital media use (Hembrooke & Gay, 2003; Spence et al., 2020; Wood et al., 2012) and non-extended mind-wandering (Risko et al., 2013; Wammes et al., 2016). Moreover, reading comprehension was found to be impaired by intermittent pop-ups (Liu & Gu, 2020) and non-extended mind-wandering (Feng et al., 2013; McVay & Kane, 2012; Smallwood, 2011). The functional similarity of extended and non-extended mind-wandering has been implied by mind-wandering researchers as well. Smallwood and Schooler (2015, p. 510) suggest:

Just as the use of smartphones is valuable to society yet can cause automobile accidents (Nemme & White, 2010), the rich imaginative mental life that [stimulus-independent] mind wandering affords is valuable when it is used correctly but counterproductive when it is not.

The empirical question then would be whether extended mind-wandering and non-extended mind-wandering share the conditions under which they are deemed appropriate or inappropriate, productive or counter-productive.

In Section 3, we briefly summarized the benefits of non-extended mind-wandering, such as relief from boredom (Mooneyham & Schooler, 2013), a positive impact on autobiographical planning (Baird et al., 2011), self-insight (D'Argembeau, 2018), creative incubation (Baird et al., 2012), and dishabituation during learning tasks (Schooler et al., 2014). In particular, D'Argembeau (2018) argues that because non-extended mind-wandering tends to be about self-related

information – such as personal experiences, anticipation of plans, evaluation of one’s life situation and social relationships – it might facilitate a sense of personal identity and be conducive to long-term goals.

Diefenbach and Borrmann (2019) correlate smartphone use during alone time and measures of self-reflection and self-insight. Their study shows no significant correlation between smartphone use and engaging in self-reflection, while they do find a negative correlation between smartphone use and judgments of self-insight. One speculative interpretation of these findings is that although smartphone use might initiate self-reflection, “the external oriented type of reflection might not correspond to ‘honest’ self-reflection and thus no self-insight” (Diefenbach & Borrmann, 2019, p. 10).

According to psychoanalyst and tech critic Sherry Turkle (2016), the possibility for continuous online connection prevents self-reflection, the engagement with negatively valenced emotions, and the negotiation and resolution of social conflicts in direct, real-time, face-to-face conversation with other people. Already in earlier work, Turkle (2008) has pointed out that the frequent use of smartphones and other digital technologies has a detrimental effect on our sense of self and our social relationships (p. 127):

[...] what is *not* being cultivated is the ability to be alone, to reflect on and contain one’s emotions. The anxiety that teens report when they are without their cell phones or their link to the Internet may not speak so much to missing the easy sociability with others but of missing the self that is constituted in these relationships.

Following this suggestion, the personality factors Diefenbach and Borrmann (2019) identify as predictors for smartphone use (high need to belong, high propensity to boredom, low capacity to be alone) might themselves be shaped by the availability of smartphones (especially during adolescence).

Importantly then, the costs and benefits of extended mind-wandering are not limited to their impact on concurrent task performance, or to opportunities for concurrent non-extended mind-wandering. Instead, we need to take a diachronic perspective to understand how extended mind-wandering habits form and self-stabilize over time and how these habits co-shape or interfere with practices of self-insight, self-regulation, and face-to-face social relationships. The interesting question here is not how one particular habit is formed (e.g., Eyal, 2014), but how multiple habits are linked with one another (Ramírez-Vizcaya & Froese, 2019) and how self-control can be developed in technological contexts (Cecutti et al., 2021).

To summarize: in this sub-section, we have investigated the functionality thesis, according to which extended mind-wandering would share the costs but not the benefits with non-extended mind-wandering. We discussed the possibility that there might be an overlap in the costs of both forms of mind-wandering in a number of different contexts. This possibility should be explored directly in future empirical research.

6 Extended mind-wandering in the attention economy

In order to fully understand the ramifications of extended mind-wandering, we need to situate this phenomenon in the context of the *attention economy*. The notion of the ‘attention economy’ captures the economic system in which human attention is the scarce commodity (Hendricks & Vestergaard, 2019; Williams, 2018; Zuboff, 2019). The incentive for businesses operating within this economic system is to optimize a user’s engagement with their product and to thrive in the competition for their attention. A steady philosophical literature is emerging on the ethical and political implications of the attention economy (Castro & Pham, 2020; Hanin, 2020; Williams, 2018).

A central assumption in the literature is that a quantitative and qualitative shift occurred in how humans relate to their world. The omnipresence of digital technologies connected to the Internet makes access to information extremely cheap. Information, in this literature, is anything that can consume attention. Information abundance leads to attention scarcity (Simon, 1971). Williams (2018) conceives of information abundance in terms of a functional threshold above which persons lose control over their attentional processes (for a similar view, see Gazzaley & Rosen, 2016). Similarly, Eyal (2014) writes how “[t]he convergence of access, data, and speed is making the world a more habit-forming place” (p. 14).

One of the challenges in theorizing about the cognitive (and affective) effects of the attention economy is that much of our conceptual apparatus (in philosophy and more generally) is based on the assumption of information scarcity, and might therefore be ill-equipped to deal with information abundance (cf. Williams, 2018, p. 16). For Williams (2018), the defining challenges of contemporary society have less to do with the management of information and more with the management of attention. Given that philosophical and empirical research has only started to acknowledge that these technologies give rise to information abundance and attention scarcity, a conceptual, empirically informed framework for the investigation of the epistemological, phenomenological and functional characteristics of habitual smartphone use – and their normative implications – is still missing (Williams, 2018).

Habitual technology use is a design feature of social media and other online resources (Eyal, 2014). Arguably, this makes extended mind-wandering an important manifestation of the effects of the attention economy on its users. In this paper, we have developed a proposal for the conceptualization of habitual smartphone use as a technologically mediated form of mind-wandering. Future research should explore these cross-connections between the literature on the attention economy and extended mind-wandering in more detail.

7 Concluding remarks

In this paper, we have argued that the phenomenon of habitual smartphone use can be fruitfully analyzed as a case of ‘extended mind-wandering’. Integrating second wave, complementarity-based work on the extended mind with philosophical and psychological research on mind-wandering, we have proposed that well-defined cases of habitual, diversionary smartphone use can be understood as technologically mediated, extended forms of mind-wandering. These cases should count as proper members of the *mind-wandering family* (Seli, Kane, Smallwood, et al., 2018). The upshot is a new conceptual framework for the theoretical and empirical investigation of habitual, task-unrelated smartphone use. This framework might be applied to other cases of habitual engagements with digital technologies in future research.

This framework can help overcome the cognitive task bias and the harmony bias in research on the extended mind that we have identified in the Introduction. First, by exploring task-unrelated cognition associated with habitual smartphone use, the *cognitive task bias*, i.e., the tendency to exclusively focus on the functional contributions of digital technologies (and other environmental resources) to the completion of cognitive tasks, can be overcome. Second, our considerations of the costs and benefits of extended mind-wandering can help overcome the *harmony bias* identified by Aagaard (2021). Specifically, the functionality thesis developed in Section 5 can give rise to a nuanced assessment of the cognitive (and affective) costs of our habitual engagements with smartphones.

At first glance, we could have motivated our conceptualization of habitual smartphone use as extended mind-wandering by relying on the *parity principle* developed by first wave extended mind theorists. That is, we could have rephrased Clark and Chalmers (1998, p. 8) parity principle in the following way: *If, as we were mind-wandering, a part of the world functions as a process which, were it done in the head, we would have no hesitation in recognizing as part of the mind-wandering episode, then that part of the world is (so we claim) part of the mind-wandering episode.* It would then have been sufficient to show that cases of unmediated and mediated task-unrelated cognition are functionally on a *par* (Clark & Chalmers, 1998) or would be characterized by a “sameness of opportunity” (Clark, 2007, p. 167). However, this strategy would not have allowed us to specify the criteria for classifying cases of habitual, diversionary smartphone use as members of the *mind-wandering family*. Furthermore, this strategy would have made it necessary to engage in a metaphysical discussion about the boundaries of the (wandering) mind at the expense of an in-depth analysis of the descriptive and normative ramifications of extended mind-wandering.

By adopting a second wave extended mind perspective with its commitment to the complementarity principle (Menary, 2010a; Sutton, 2010), we have arrived at a more nuanced description and categorization of cases of habitual smartphone use as specific members of the *mind-wandering family*. The assumption that smart-

phone applications can be proper components of mind-wandering episodes, and thereby complement components that are internal to the organism, has put us in the unique position to directly assess the similarities and dissimilarities of non-extended and extended cases of mind-wandering – above and beyond their (alleged) functional parity or *sameness of opportunity*.

We hope that the conceptual framework we have developed in this paper will lead to new empirical investigations on the effects of habitual smartphone use and open up new lines of research on extended cognition, mind-wandering, and their theoretical integration. Specifically, we have articulated the *replacement thesis* and the *functionality thesis* in Section 5, which is based on our theoretical considerations and informed by the limited, currently available empirical evidence. They are both open to further empirical investigation, which could in turn lead to refinements and specifications. We think the conceptual tools provided in this paper might help assess the normative implications of cognitive (and affective) processes in the attention economy as suggested in Section 6. Hopefully, the proposed conceptual framework can contribute to timely philosophical research on the moral and political roles of digital technologies in our individual and collective lives.

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