Habitual smartphone use as 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 either task-unrelated or task-free. 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 or task-free 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 or task-free 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.

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).

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

[1] Both authors have made equal intellectual contributions to this paper.

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, for the most part, research on extended cognition has been 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 detrimental human-technology relations (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). Otto*'s task* is to go to MoMA, the question is how he is able to remember where it is located.[2] 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 or even task-free, 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 or task-free cognition?[3]

What would task-unrelated or task-free 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.[4] Most smartphone users will be familiar 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

[2] Otto is the protagonist of Clark and Chalmers' (1998) thought experiment that 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.

[3] We will discuss the notions of 'task-related', 'task-unrelated', and 'task-free' cognitive processes in Sections 3 and 4 in detail.

[4] *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 a broader scope (for example also applying to tablet and laptop use).

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.[5] Under the assumption that cognizers spend a significant amount of time engaging with their smartphone (Kruger et al., 2017; Winnick, 2016),[6] we should expect that ritualistic 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 or task-free 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. ibid.).[7] For current purposes, we 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. In this paper, 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:

[5] At 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 video 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.

[6] In 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.

[7] In 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.

1. Robert sits in class trying to listen to a lecture. He draws out his phone and checks his e-mail and social media. He catches himself scrolling through his newsfeed, 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). Example 1 occurs during an ongoing cognitive task, while example 2 occurs in the absence of a specific cognitive task. In both cases, the person is temporarily detached from the wider situational context in the here-and-now. 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 task-unrelated and task-free 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 review 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 makes to the phenomenological and functional characteristics of task-unrelated or task-free thought (Section 5). We will discuss the similarities and dissimilarities of extended and non-extended mind-wandering and to what extent these two forms 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 the 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 most wellknown 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, relying 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). 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 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.

Operationalizing complementarity-based extended cognition requires the identification of the relevant, non-trivial reciprocal causal 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).

For the purposes of this paper, first wave extended mind will not help us capture extended mind-wandering. After all, a parity-based, task-oriented approach to mind-wandering seems unfeasible, given that mind-wandering is by its very definition task-unrelated or task-free. Moreover, in this paper, we are interested in specifying the similarities *and* dissimilarities of extended and non-extended mind-wandering, which cannot be captured by an analysis of functional parity. The methodological approach of second wave extended mind that emphasizes the complementarity of internal and external components of mental functioning is therefore better suited to support our analysis.[8]

The question then is how mobile technology contributes to an extended mind-wandering episode. 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 and agency. 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

[8] This 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 as 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.

> 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).

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 available stored on 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" (p.45). They propose to change both the GPS tools themselves as well as the epistemic practices in which they are embedded. 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 of 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 or task-free 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*. Other aspects that have been discussed in the literature include a *lack of intention*, a *lack of meta-awareness*, and the *absence of attentional guidance*. 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). Identifying task-unrelatedness as a phenomenological and functional signature of mind-wandering 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. This assumption is problematic for at least two reasons. First, it is not always clear whether there always is a primary task, be it self-imposed or other-imposed (Murray et al., 2020). It seems possible to mind-wander in situations where no immediate cognitive task is available (ibid.), such as when waiting in line. Furthermore, it is conceivable that cognizers attempt to complete several tasks within a given period of time (Metzinger, 2018).

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 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. 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 strengths between internal and external components in moments of perception (Fabry, 2018). 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'.

In addition to task-unrelatedness and perceptual decoupling, a *lack of intention* has been identified initially 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 (Murray & Krasich, 2020; Seli, Risko, & Smilek, 2016; Seli, Risko, Smilek, et al., 2016).[9] Similarly, while some researchers have assumed that mind-wandering episodes are characterized by a transient lack of *meta-awareness* (Metzinger, 2018; Smallwood & Schooler, 2006), it has also been assumed that it is necessary 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 epsiode, cognizers can alternate between meta-aware and meta-unaware moments. 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).

Another suggestion has been that mind-wandering could be conceptualized as *attentionally unguided thought* (Irving, 2016; Irving & Glasser, 2020; Irving & Thompson, 2018). During mind-wandering episodes, Irving (2016) proposes, "[...] the focus of attention drifts unguided

[9] It 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).

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 (ibid., 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 has the disposition to focus their attention on currently relevant information, but does not regulate or re-direct their attention. This 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). An advantage of this view is that it can accommodate cases of meta-aware *and* meta-unaware mind-wandering. Furthermore, it would be fully consistent with the assumption that 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 emphasise 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).

This brief review of previous psychological and philosophical research indicates that it seems unlikely that a set of necessary and sufficient conditions for the identification of mind-wandering episodes can be developed. This poses a problem if we wish to arrive at a better understanding of the diversity and variability of the phenomenological and functional characteristics of mind-wandering. Recently, it has been suggested that the development of a *family-resemblances* framework for research on mind-wandering could help overcome this problem (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" (§66, p. 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). The challenge of adopting the family-resemblances framework would then lie in identifying

and specifying the members of the *mind-wandering* family and to establish their inter-relations (Seli, Kane, Metzinger, et al., 2018).

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). For the time being, we are in agreement with this reply and suggest that the family-resemblances framework is currently the best available option for making progress in identifying and specifying a range of mental episodes to which the concept of 'mind-wandering' can be reasonably applied.

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 & Joordens, 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-aversive driving behavior (Yanko & Spalek, 2014), and positively valenced emotional experiences (Killingsworth & Gilbert, 2010). However, it should also been 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, autobiographical planning might be characterized as a process of unguided, meta-aware thinking, during which the intentional task of planning the next holiday is temporarily prioritized. 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 in 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. Perceptual coupling, then, would be a special case of reciprocal causal coupling.

An important consequence of this assumption is that a clear-cut distinction between mind-wandering and *external distraction*, as suggested by Smallwood and Schooler (2015), might not be tenable. If mind-wandering can be characterized by a perceptual coupling relation, the "process of perceptual decoupling" on its own cannot differentiate mind-wandering and external distraction (Smallwood & Schooler, 2015, p. 490). This would be consistent with a computational model developed by Taatgen et al. (2021), which shows that there is no principled difference between task-unrelated mind-wandering and external distraction. Similarly, based on the results of three consecutive behavioral experiments, Forster and Lavie (2014) propose that there might be "a common mechanism underlying both mind wandering and task-irrelevant external distraction" (p. 258). The upshot is that mind-wandering episodes can be characterized by perceptual coupling relations between internal components and a certain external resource. This paves the way towards specifying the characteristics of extended mind-wandering within the family resemblances framework (Seli, Kane, Smallwood, et al., 2018).

Episodes of habitual and diversionary smartphone use are *task-unrelated* just in case that a primary task or a set of relevant tasks can be identified. This assumption is consistent with the view that the engagement with a smartphone "can acutely interfere with, or interrupt,

ongoing mental and physical tasks" (Wilmer et al., 2017, p. 4; see also Liebherr et al., 2020). Task-unrelated smartphone use can be characterized as a kind of *media-multitasking* in specific experimental settings (Ralph, Smith, et al., 2020). Specifically, in cases of media-multitasking, the informational content provided by media would be "(a) *unrelated* to a required primary task [...] and (b) *optional*, insofar as attention to the media is not a required component of the ongoing primary task" (Ralph, Smith, et al., 2020, p. 57, italics in original). Both criteria would apply to Example 1 that we presented in the Introduction:

> *Robert sits in class trying to listen to a lecture. He draws out his phone and checks his e-mail and social media. He catches himself scrolling through his newsfeed, puts the phone away and returns his focus to the lecture*.

The person's scrolling through his social media newsfeed is unrelated to the primary task (understanding what is being said by the lecturer) and is optional in the sense that the completion of the primary task does not require this instance of smartphone use. However, media-multitasking, we suggest, can also occur if a cognizer is in the process of completing more than one self-imposed or other-imposed task within a given time window. In all these cases, task-unrelated media-multitasking, as characterized by Ralph et al. (2020), would be a prime example of extended mind-wandering.

Previous theoretical work on mind-wandering implies that extended task-unrelated mental episodes cannot be intentional. Murray and Krasich (2020) have convincingly argued that task-unrelatedness and intendedness are incommensurable aspects of mind-wandering. They state that, on logical grounds, "[...] an agent cannot intend to have task-unrelated thoughts, as intending to have any thought thereby makes that thought related to one's task" (Murray & Krasich, 2020, p. 2). We take it that this equally applies to cases of extended and non-extended cases of task-unrelated thought. This conceptualization of unintentional, task-unrelated media-multitasking would be consistent with Marty-Dugas' et al. (2018) operationalization of ritualistic smartphone use as *absent-minded behavior*. As Ralph et al. (2020) note in their review of this study, "absent-minded smartphone use [...] is best construed as an unintentional behavior" (p. 58). However, note that there is an interesting tension between Murray and Krasich's (2020) theoretical considerations and Ralph's et al. (2020) assumption that mediated and unmediated forms of task-unrelated thought can be intentional or unintentional. If Murray and Krasisch's (2020) argument in support of this statement is sound, as we think it is, the occurrence of intentional media-multitasking that Ralph et al. (2020) observe would not be task-unrelated, but a case of transient task-switching. It could thus be reconceptualized as an extended variant of *unsuccessfully directed task-unrelated thought*, during which "[...] a participant switches tasks and fails to maintain attention on this other [primary] task" (Murray et al., 2020, p. 576).

This tension can also be resolved by noting a rather ambiguous appeal to the notion of 'task' (Hazel et al., 2019). Tasks can be construed as self-imposed individual projects partially constituted by the agent's intentions, or as other-imposed public settings independent of an agent's intentions. In the case of a self-imposed task, intentional task-unrelated thought is contradictory, but in an other-imposed task it is not. While one might think that the task of a student during a lecture is to pay attention to the lecture, it is perfectly possible for a student to intentionally not pay attention to the lecture. But the student cannot impose on himself to pay attention to the lecture and simultaneously intentionally mind-wander.

As Murray et al. (2020) and Seli et al. (2018) note, it is conceivable that mind-wandering occurs in situations in which cognizers are not attempting to complete any primary task (or a certain number of pre-set tasks). We take it that this would equally apply to cases of non-extended and extended mind-wandering. In cases of task-free extended mind-wandering, smartphone use could be intended or unintended. As an illustration, consider again Example 2 from the Introduction:

> *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.*

Unless we define "queuing for coffee" as a cognitive task, this example would be a case of task-free smartphone use that could be either intentional or unintentional.

Episodes of smartphone use that are task-unrelated and unintentional or task-free and either 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 unguided attention*, the focus of attention shifts and drifts dynamically without any robust endogenous constraints (Christoff et al., 2016). However, this requires an important qualification: from the first-person perspective of the smartphone user, attention is unguided. From a third-person perspective, however, it is guided by the configurations and algorithms of the smartphone application with which the cognizer is currently engaging – what Williams (2018) calls the *persuasive design* of digital applications in the *attention economy* (for more details, see Section 6). While the cognizer does not actively guide their attention during extended mind-wandering episodes, their attention is guided *for them*, to a relevant degree, by the informational sensory input that is provided by a certain social media or news application.

Episodes of extended 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 unguided attention can occur with or without meta-awareness (Irving & Thompson, 2018), episodes of extended unguided attention 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 cases of extended 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 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 perceptual coupling. This assumption, we have shown above, is consistent with more recent work on mind-wandering. The category of *extended mind-wandering* can be applied to the following *exemplars*, to employ Seli's et al. (2018) terminology:

1. Perceptually coupled, unguided, task-unrelated, unintentional, meta-aware thought.
   Example: *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*.

2. Perceptually coupled, unguided, task-unrelated, unintentional, meta-unaware thought.
   Example: *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*.

3. Perceptually coupled, unguided, task-free, unintentional, meta-aware thought.
   Example: *While queuing for coffee, Karen has taken her phone out of her pocket absentmindedly and suddenly catches herself scrolling through her social media feed.*

4. Perceptually coupled, unguided, task-free, intentional, meta-aware thought.
   Example: *While queuing for coffee, Peter sets out to scroll through his social media feed and is aware of skimming through the most recent posts.*

5. Perceptually coupled, unguided, task-free, unintentional, meta-unaware thought.
   Example: *While queuing for coffee, Sam has taken her phone out of her pocket absentmindedly and scrolls through her social media feed without noticing it*.

6. Perceptually coupled, unguided, task-free, intentional, meta-unaware thought.
   Example: *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.*

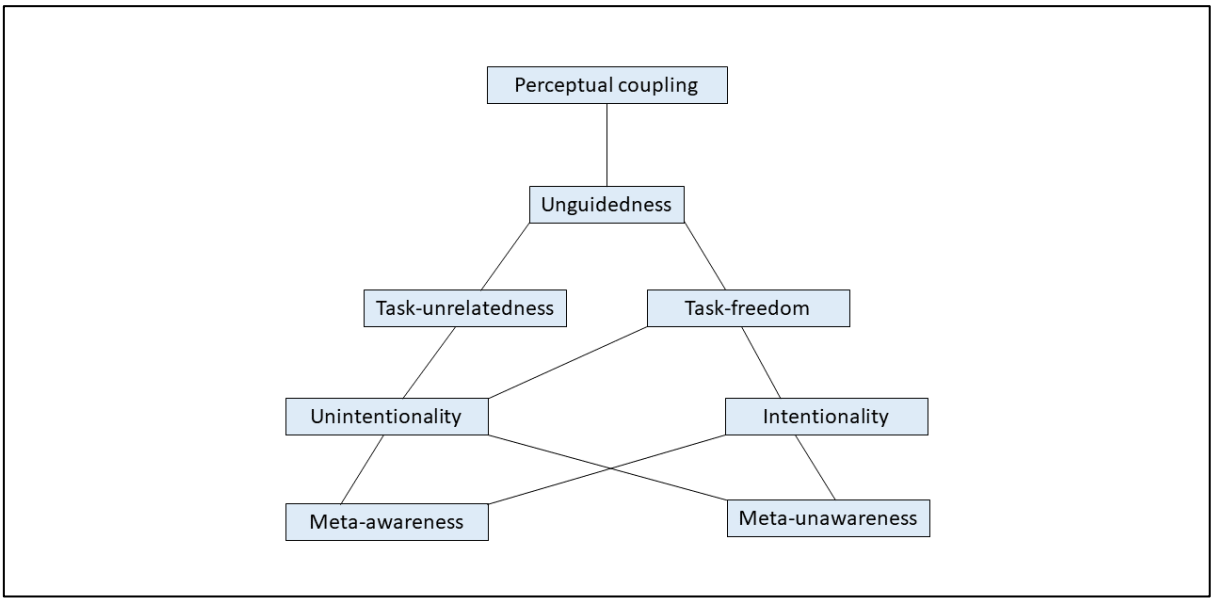

Figure 1. A schematic representation of the characteristics of extended mind-wandering episodes.

This systematization of extended mind-wandering allows us to arrive at a specification of the characteristics of habitual, diversionary smartphone use (Hiniker et al., 2016) and 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 primary 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 and Glasser (2020), and Seli 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; Ralph, Smith, et al., 2020). 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 heterogenous class of non-extended mind-wandering. The only clearly identifiable dissimilarity of cases of extended and 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 show 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).

Another, related objection might be that it would be a mistake to give up on a clear-cut distinction between mind-wandering and external distraction. However, under the assumption that perceptual decoupling is not necessary requirement for the ascription of mind-wandering, the burden of proof lies on our critics to develop an empirically supported argument that clearly establishes why a principled distinction between 'internal' mind-wandering and 'external' distraction should be maintained. This argument would need to refute the plausibility of the computational model by Taatgen et al. (2021), as well as Forster and Lavie's (2014) proposal that perceptually coupled and de-coupled forms of task-unrelated cognition are likely to be mechanistically integrated.

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 similarities and dissimilarities between 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 are concerned with two questions. First, is there evidence suggesting that extended mind-wandering replaces non-extended

mind-wandering? Second, to what extent does 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. 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 task-related (i.e., instrumental), task-unrelated or task-free (i.e., habitual and diversionary), and whether a smartphone is used unintentionally or intentionally. 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). In this section, we will piece together the currently available empirical evidence. Based on this, we will articulate and discuss the following two theses:

> **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.

Current research shows there is a strong situational aspect to both forms of mind-wandering. If a primary task can be identified for a given mental episode, the cognitive costs of both extended and non-extended mind-wandering vary with task difficulty. When the difficulty of the primary task is low, distraction impairs performance less, compared to when the primary task is difficult (Ralph, Smith, et al., 2020, p. 57). Moreover, evidence suggests that people adaptively adjust both forms of mind-wandering as a function of task demands. Mind-wandering is reduced during demanding tasks compared to non-demanding tasks (Smallwood et al., 2013). Ralph et al. (2020) found that participants were less likely to multitask when engaged in a demanding task as compared to a less demanding task. Hence, there is often a situational overlap between extended and non-extended mind-wandering: both interfere with a primary task, and both occur most frequently when the primary task is relatively easy. The situational overlap fits well with a competition model. As already mentioned in the previous section, Taatgen et al. (2021) present a cognitive model in which task-related cognition, distraction, and mind-wandering compete for a limited set of mental resources. When the primary task is easy, there are resources available to be occupied by task-unrelated processes, whether these processes are extended or not.

5.1. The Replacement Thesis

What can we say about the competition between extended and non-extended mind-wandering? 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), in the other condition participants were able to concurrently watch a task-unrelated, optional video. During the task, participants were asked whether they were 1) focused on the task, 2) off-task attending to an external distraction 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 a significantly less. These findings suggest a trade-off between extended and non-extended mind-wandering, at least in the presence of a primary task.

Competition models like the already mentioned Taatgen et al. (2021) study also support the trade-off between between extended and non-extended mind-wandering. Distraction can be triggered by the availability of mental resources and the "presence of distracting stimuli in the environment and internally in the mind" (p. 86). Consequently, if relevant environmental stimuli are available, extended mind-wandering might outcompete non-extended mind-wandering.

Does this trade-off also exist when no primary task is available? Diefenbach and Borrmann (2019) investigate the hypothesis that smartphones can act as a pacifier during periods of alone time. The authors conduct a survey in which they ask 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 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: Sagiogliou and Greitemeyer (2014) report a consistent "affective forecasting error" in which subjects expect to feel better after using Facebook, but simultaneously find that the valence of participant's emotional experience becomes more negative the longer they use Facebook.

Considering motivational and affective characteristics of smartphone use, Aranda and Baig (2018) report the results of 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, Aranda and Baig, 2018, 19:4)

> *"Without my phone, what would I do— just stare out the window?!"* (Participant quote, Aranda and Baig, 2018, 19:3)

> *"I spent 1.5 hours on [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, Aranda and Baig, 2018, 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.

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 task-free situations. The interpretation of the smartphone as a pacifier to prevent having to stay alone with your thoughts is backed by 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 previously 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.

To summarize: as far as we know, Ralph et al. (2020) is the only study that directly investigated the trade-off between extended and non-extended mind-wandering in the presence of a primary task. Their findings suggest that adding the opportunity for extended mind-wandering increased the total amount of task-unrelated cognition, but decreased the amount of non-extended mind-wandering. As rehearsed above, this finding is consistent with computational work on mind-wandering and distraction (Taatgen et al., 2021). In the absence of a primary task, we have found no studies that directly investigated the trade-off between perceptually coupled and perceptually decoupled mind-wandering. However, as already noted, Diefenbach and Borrmann (2019) report an association between personality factors and smartphone use during alone time, which suggests that the trade-off between extended and non-extended mind-wandering is mediated by personality factors such as propensity to boredom and the need to belong. More research is needed on the trade-off between both forms of mind-wandering (task-unrelated and task-free), but there seems to be some initial plausibility for a replacement hypothesis, according to which external mind-wandering replaces non-extended mind-wandering in well-defined situational contexts. This replacement hypothesis should be tested by 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? There is evidence that both forms of mind-wandering interfere with primary task performance in a number of domains. For example, both extended mind-wandering (Galéra et al., 2012; Yanko & Spalek, 2014) and non-extended mind-wandering (Hancock et al., 2003) impair driving performance. Learning in a classroom setting was found to be impaired by both extended mind-wandering (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 both extended mind-wandering (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) suggest, "[j]ust 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" (p. 510). 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 focus on 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" (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 a concurrent primary task, 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 is here not how one particular habit is formed (i.e. Eyal, 2014), but how multiple habits are linked with one another (Ramírez-Vizcaya & Froese, 2019).
To summarize: in this sub-section, we have investigated the functionality thesis, according to which extended mind-wandering shares the costs but not the benefits with non-extended mind-wandering. We provided evidence for an overlap in the costs of both forms of mind-wandering in a number of different contexts. As for the benefits, Diefenbach and Borrmann (2019) speculate that extended mind-wandering does not provide the same amount of self-insight as non-extended mind-wandering. These are preliminary findings that require further 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 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. Similarly, Eyal writes how "[t]he convergence of access, data, and speed is making the world a more habit-forming place" (2014, 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. 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.

in Section 4 we described how extended mind-wandering seems unguided from the first-person perspective of a smartphone user. From a third-person perspective, extended mind-wandering seems to be guided by the attention-economic configurations and algorithms of the smartphone application with which the cognizer is currently engaging. The metaphor of 'wandering' might help elucidate this assumption (Dorsch, 2015). A wanderer aimlessly and itinerantly travels from place to place, letting themself be guided by alluring aspects of the landscape. The relevant difference between extended and non-extended mind-wandering is that the landscape is self-generated in the latter case and (at least partially) generated by algorithms in the former. The extended mind-wandering landscape is optimized for the wanderer to stay engaged and is fine-tuned to their habits. What seems unguided from the user's perspective might in fact be much closer to a "guided tour" through the algorithmic configurations of the smartphone application. An important implication of this algorithmic guidedness is that we should expect that the information provided by social media or news application contributes to the cognitive content and emotional valence of extended mind-wandering episodes. 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 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 or task-free 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 or task-free 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, the empirically informed consideration of the costs and benefits of extended mind-wandering can help overcome the *harmony bias* identified by Aagaard (2021). Specifically, the functionality hypothesis developed in Section 5.2 gives 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 or task-free cognition are functionally on *a par*. 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 explanatory 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 categorisation of cases of habitual smartphone use as specific members of the mind-wandering family. The assumption that smartphone 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 mind-wandering – above and beyond their (alleged) functional parity.

We hope that the conceptual framework we have developed in this paper will lead to new empirical investigations on the effects of habitual smartpone 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 based on 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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