# A Case for Replacing Extended Mind-Wandering with Non-Extended Mind-Wandering

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Mind-wandering has been defined as "a situation in which executive control shifts away from a primary task to the processing of personal goals and occurs without intention or even awareness that one's mind has drifted" and is characterized by attention being directed towards "concerns that are wholly unrelated to the task at hand" (Smallwood & Schooler, 2006, p. 946; Randall, Oswald, & Beier, 2014). Mind-wandering may be intentional or unintentional (Seli et al., 2016); endogenously or exogenously generated (Wilmer et al., 2017); and meta-aware and meta-unaware (Schooler et al., 2004, Schooler et al., 2011). Overall, Bruineberg and Fabry suggest that the family-resemblance framework of mind-wandering best captures the shared features of mind-wandering episodes, with at least a few of the following features being common to the family - task-unrelatedness, perceptual decoupling, lack of attentional guidance, lack of intentionality, and lack of meta-awareness. It is useful to note that mind-wandering may have beneficial effects like a break from task-boredom or be maladaptive and result in wasted time and scattered mental effort. Irving (2021) suggests that the former is a quality of intentional mind-wandering and the latter of one that lacks such intentionality.

The question then is to see whether scrolling while using smartphones constitutes mind-wandering and if it does, whether it is helpful or unhelpful to cognition. The question arises since smartphone use is external to our physical brain. Does the use of smartphones constitute cognition, and if so, does scrolling amount to an intentionality-lacking form of cognition? To that end, we set up the idea of 'extended mind-wandering' as follows. Cognition itself may be task-related or task-unrelated. Task-unrelated cognition may be ritualistic or instrumental (Davis et al., 2016), with the former being simply habitual and diversionary, while the latter is purposeful and goal-oriented. Digital device use may be considered a case of extended cognition as per Chalmers' 'Extended Mind' hypothesis

(Chalmers, 2019). Mind-wandering is known to account for nearly half of all waking cognition (Christoff et al., 2016). Since ritualistic use of digital devices such as smartphones is extensive, and mind-wandering may account for a significant portion of cognition, mind-wandering during diversionary activities- known as 'extended mind wandering' - would account for a significant portion of our cognition (Bruineberg & Fabry, 2022) Contrarily, non-extended mind-wandering may be conceived as generated within one's mind, but yet lack intentionality and suffer from a lack of attentional guidance and other shared family-resemblances to mind-wandering at large. The question that is being explored here is whether all scrolling constitutes extended mind-wandering or if only absent-minded scrolling does.

With the advent and exponential growth of technology use, non-extended mind-wandering may be getting replaced with extended mind-wandering (such as scrolling on one's phone), due to the morphological similarity between their stimuli and effects (Bruineberg and Fabry, 2022). Using arguments from Clark and Chalmers' (1998) 'extended mind' hypothesis, this paper seeks to expand on Bruineberg and Fabry's (2022) exposition by advocating that absent-minded scrolling may be considered extended mind-wandering. Subsequently, it discusses the implications of absent-minded scrolling and advocates for replacing non-intentional scrolling with endogenous, non-extended mind wandering, especially in the absence of a goal that requires attention.

## Introduction

(Non-extended) mind-wandering, a frequent occurrence, is an important, albeit under-emphasised component of cognition. It may be task-related or unrelated and can be produced endogenously (by the brain in the absence of a goal) or exogenously (by external stimuli, usually in the presence of a goal) (Seli et al., 2016). Endogenous mind-wandering has

been associated with greater management of personal goals, creative intuitive problem-solving and self-directed thought (Eichenlaub et al., 2023). The first section of the paper elaborates on the different kinds of non-extended mind-wandering in the presence of goals or the lack thereof.

The next part addresses Clark and Chalmers' (1998) 'extended mind' thesis which advocates for considering reliably available and invoked gadgets or devices in the environment as a bonafide part of our cognitive network under the parity principle (Clark and Chalmers, 1998), in alignment with the 4E (embodied, extended, embedded and enactive) model of cognition. In the context of mind-wandering, Bruineberg and Fabry (2022) argue that using tools such as pens, notebooks or smartphones in habitual, task-independent, perceptually coupled ways should be considered a form of extended mind-wandering. The next section of the paper distinguishes between technologically-extended mind-wandering—which is mediated by a device such as a smartphone—and object-extended mind-wandering—which is mediated by an object such as a haptic fidgeting device.

The last section makes a case for replacing technologically-extended mind-wandering with endogenous non-extended mind-wandering in the absence of a goal with considerations to valence, emotion-regulation, coping and long-term memory retention. The paper concludes with remarks acknowledging methodological shortcomings in self-reported response based studies and addresses studies pointing to evidence of instances where scrolling Instagram has resulted in positive affect among teens citing Aagard's (2021) dogma of harmony argument.

## (Non-Extended) Mind Wandering

Non-extended mind wandering has been defined as bearing a family resemblance to task-unrelated, attentionally unguided, perceptually decoupled train of thoughts that lack intention and meta-awareness (Irving & Glasser, 2020; Bruineberg & Fabry, 2022; Smallwood & Schooler, 2015). Biologically, mind-wandering has been defined by its neural

correlates primarily as an increase in default mode network activity (Mittner et al., 2014). It may also be defined phenomenologically as a shift from external stimulus-guided processing to inward introspection (Killingsworth and Gilbert, 2010, as cited in Mittner et al., 2014). Mind-wandering may provide beneficial relief from boredom or listlessness or be a maladaptive source of distraction when occurring in the presence of a goal or task that requires attentional resources.

There is a distinction drawn between intentional and unintentional mind wandering using Tversky and Kahneman's (1973) classical capacity model of attention. Seli and colleagues (2016), describe endogenous, voluntary shift in attention as guided by top-down goals and exogenous, involuntary attentional shifts as guided by external bottom-up stimuli. The benefits of non-extended mind-wandering such as improved self-concept (D'Argembeau, 2018), creative incubation (Baird et al., 2012), autobiographical planning (Baird, 2011; Beaty et al., 2018) etc. are usually applicable to endogenous mind-wandering, which is accompanied by a sense of agency. Exogenous mind-wandering, contrarily, is usually initiated by an external stimulus in the presence of a goal or task, and acts as a distraction that is followed by surprise and vexation at the lack of control (Giambra, 1995, as cited in Seli et al., 2016). Furthermore, exogenous mind-wandering is related to obsessive compulsive disorder (OCD) and attention-deficit hyperactivity disorder (ADHD) and is associated with deficits in reading comprehension and car accidents, among other negative consequences (Mooneyham and Schooler, 2013).

## Extended Cognition

Clark and Chalmers' (1998) extended cognition thesis exploits Clark's 'veil of ignorance' argument to suggest that if functions normally performed by the brain are offloaded regularly and reliably to external sources (such as a smartphone), then the source may be considered part of our cognitive network. They use the example of information

processing, claiming that if instead of performing arithmetic operations (for instance) in our brain, we offloaded that action onto the calculator app on our phone, then the phone should be reasonably considered part of our cognitive framework. It advocates for considering the technology we use as extensions of our minds and selves into the world. In his (2008) book, Clark elaborates on the criteria (dubbed 'trust and glue' criteria) to be met for a device to be considered as a cognitive extension as:

- Reliable availability, wherein the device is constantly available and frequently invoked
- Automatic endorsement, wherein information from the resource should be trusted as much as one trusts biological memory
- Accessibility of information in a quick and easily retrievable way

There is also a mention of conscious endorsement— i.e. consciously endorsing information provided by the device and intentionally externalising the task— however that has been contested (Piredda and Di Francesco, 2020). It seems imminent, from the above criteria, how technology extends different previously internal cognitive functions. This next section will elaborate specifically on how absent-minded scrolling on gadgets is an example of a technological extension of mind-wandering.

## Scrolling as Extended Mind Wandering

Extended mind-wandering has been described as diachronically established, diversionary gadget use (Bruineberg and Fabry, 2022). There are two kinds of extended mind-wandering– technologically extended mind-wandering and object-extended mind-wandering. The former is characterised by habitual, unreflective use of smartphones (which may be extended to other devices), where the device mediates the mind-wandering (Gozli, 2022, as cited in Eichenlaub et al., 2023) whereas object-extended mind wandering may be understood as mind-wandering being extended through task-unrelated bodily

behaviours using specific artifacts (Eichenlaub et al., 2023). This section will pertain to technologically-extended mind-wandering.

Davis and colleagues' (2025) study revealed that teens reported their primary behaviour with respect to social media as "mindless, diversionary and deliberate", which bears a family resemblance to the mind-wandering phenotype. As for extension, gadgets (specially smartphones) are reliably available, used as a tool for curing boredom (Diefenbach and Borrmann, 2019) and provide quick and reliable access to highly dopaminergic short-form content on various apps, thereby adhering to all criteria requisite for establishing cognitive extension.

Social-media users are familiar with the effect of losing spatio-temporal awareness, manifesting as spending significantly more time than anticipated and losing sense of surroundings while scrolling absent-mindedly (Oulasvirta, 2012). This matches the morphology of spontaneous mind-wandering.

Scrolling challenges the assumption that mind-wandering is perceptually decoupled. However, upon considering the extended mind thesis, we can conceive a clearer image of scrolling as technologically extended mind-wandering. Gozli (2022) elaborates on the practice of painting or writing blurring the distinction between the mind and tools. Similarly, insofar as the smartphone, or any device used for absent-minded scrolling, is an agent of extended cognition (Clark and Chalmers, 1998; Chalmers, 2011; Clark, 2010) , this analogy of bidirectional flow of goal-agnostic thought may be reasonably extended to scrolling on a gadget. Bruineberg and Fabry extend this claim to assert that user and device exert a reciprocal causal coupling onto each other. This is supported by studies showing that teens use Instagram to escape, engage with and manage the demands of the platform (Davis et al., 2025).

As with non-extended mind-wandering, extended mind-wandering has also been segregated based on intentionality into task-present and task-absent extended mind-wandering. Attentionally unguided extended mind-wandering without meta-awareness has been termed ‘zoning out’ and with meta-awareness as ‘tuning-out’ (Eichenlaub et al., 2023).

## Case for Replacing EMW with MW

Bruineberg and Fabry (2022), in their ‘replacement thesis’ posit that extended mind wandering seems to replace non-extended mind-wandering in part since they compete for the same cognitive resources. However, I believe that to preserve our cognitive architecture and enable positive valence, we should replace extended mind-wandering with endogenous, non-extended mind-wandering. This belief aligns with their ‘functionality thesis’ which states that though extended and non-extended mind-wandering share the same cost, they do not share the same benefits. The case for replacing extended mind-wandering with non-extended mind-wandering is two-fold. It entails arguments for why extending mind-wandering may be more malevolent than beneficial and arguments supporting endogenous mind-wandering in the absence of an attention-seeking goal.

Non-extended mind-wandering is thought to be hindered by hedonic experiences. In fact, hedonic technology use increases spontaneous / exogenous mind-wandering which is not a case of utilitarian IT-use and also negatively correlated with enjoyment (Klesel et al., 2021). Davis and colleagues (2025) showed that teens use Instagram to regulate their emotions — entailing modulation of emotion arousal and valence. Absent-minded scrolling as extended mind-wandering is correlated with high anxiety levels, low self-esteem and traits of escapism (Chapman, 1999; Nehra et al., 2012). Eid (2021) showed a positive correlation between TikTok use disorder and memory loss, depression, anxiety and stress. This is in direct contrast to non-extended mind-wandering studies showing a positive impact on

autobiographical memory recollection (Baird, 2011). Moreover, scrolling on Instagram has been associated with non-engaged, escapist coping mechanisms (Davis et al., 2025).

Absent-minded scrolling through short-form content on YouTube or Instagram has been shown to give people a false sense of true understanding and retention. This exacerbates the human propensity to be overly confident in their self-assessment, generating what is dubbed the "illusion of knowledge" (de Ridder, 2022; Kahneman, 2011). An important detail is that information found online has no epistemic quality-control. Thus, this chasing "internet rabbit-holes" could lead to spending excessive periods of time consuming poor-quality information or disinformation. This gives us another reason to curb mindless extended mind-wandering in the form of scrolling.

In terms of its benefits, studies have shown that non-extended mind-wandering might actually facilitate cognitive absorption for users engaged in technology due to its ability to cause spatio-temporal dissociation (Braboszcz and Delorme, 2011). Mind-wandering has been shown to correlate with greater recollection of past experiences and imaginal future experiences (Baird, 2011). Some studies have even shown deliberate / endogenous mind-wandering (MWT-D) as resulting in a positive mood and enjoyment (Agnoli et al., 2018; Klesel et al., 2021; Seli et al., 2016). Endogenous mind-wandering is said to be associated with a node of high activation in the semantic network, where the node could correlate to present concerns or recently reviewed concepts (Seli et al., 2016). Dreams are hypothesised to have the same effect (of memory and conceptual consolidation) as shown by both animal and human studies (Wamsley, 2014). I conjecture a positive correlation between conceptual reiteration in endogenous mind-wandering and dreaming, which might be potentially beneficial in long-term memory consolidation. However due to the paucity of present studies on this subject, further research is warranted.

From the above arguments, it is reasonable to claim that when there is no specific goal or cognitive demand, engaging in endogenous, non-extended mind-wandering might result in more positive affect as well as greater memory recollection than extended mind-wandering.

## Conclusion

In summary, although extended and non-extended mind-wandering have similar causes, there is ample evidence in favour of endogenous non-extended mind-wandering being correlated to positive affect, greater long term autobiographical memory and planning contrasted to technologically-extended mind-wandering being correlated with negative affect, mood dysregulation and escapist coping mechanisms. This suggests that in the interest of well-being, we should engage in non-extended over extended mind-wandering in the absence of a cognitive goal. This paper does acknowledge that the studies cited are mostly correlational, but due to the novelty of the field of mind-wandering research, this should encourage further research along the lines of cognitive well-being rather than being seen as a limitation.

A well-known drawback of mind-wandering research is the validity of self-reports. It is difficult to consider whether a particular instance of mind-wandering was intentional or not, and is prone to confabulatory rationalisations. Additionally, self-reports (anonymous or not) are prone to social desirability bias, which may manifest in this case as an increased reservation to admitting intentional mind-wandering (Seli et al., 2016). These can be examined further by isolating the neural correlates of intentional and unintentional mind-wandering within the default mode network, to back-up self-reported data.

Davis et al. (2025) show that some teens use scrolling on Instagram as a form of de-stressing and to engage with their friends and content creators. However this does not

preclude the fact that absent-minded scrolling could still last for longer than anticipated and create uncertainty and anxiety in the cognitive system. Additionally, we must be wary of what Aagard (2021) calls the ‘dogma of harmony’, which is the tendency to overemphasise the cases of human-technology cooperation and pay inadequate attention to conflict or interference.

Although this paper makes a case for replacing technologically-extended mind-wandering with non-extended mind-wandering, there is insufficient research about object-extended mind-wandering. Further studies researching the effects of object-extended mind wandering, as done by Eichenlaub and colleagues (2023) might be helpful in understanding whether all extended mind-wandering is equivalent or some more beneficial than others.

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