

## Review

## Mind-Wandering With and Without Intention

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The past decade has seen a surge of research examining mind-wandering, but most of this research has not considered the potential importance of distinguishing between intentional and unintentional mind-wandering. However, a recent series of papers have demonstrated that mind-wandering reported in empirical investigations frequently occurs with and without intention, and, more crucially, that intentional and unintentional mind-wandering are dissociable. This emerging literature suggests that, to increase clarity in the literature, there is a need to reconsider the bulk of the mind-wandering literature with an eye toward deconvolving these two different cognitive experiences. In this review we highlight recent trends in investigations of the intentionality of mind-wandering, and we outline a novel theoretical framework regarding the mechanisms underlying intentional and unintentional mind-wandering.

### The Intentionality of Mind-Wandering

Research on mind-wandering has seen a massive increase in recent years, spreading to a wide variety of psychological domains including those examining cognition [1–10], neuroscience [11–16], education [17–20], creativity [21,22], clinical populations [23–26], and workplace functioning [27], to name a few. The rapidly growing body of research on mind-wandering was largely stimulated by Smallwood and Schooler's [28] integrative review of related concepts such as 'task-unrelated imagery and thoughts' (TUITs) [29] and 'stimulus-independent thought' [30]. Although the unification of these related concepts under the single term 'mind-wandering' has proved to be exceptionally useful in stimulating research, the field has now advanced to a point where it is necessary to make finer distinctions and to consider different types of mind-wandering [31]. One such distinction, originally advanced before the recent surge of research focused on 'mind-wandering', is that between intentional task-unrelated thought and unintentional task-unrelated thought [32] (Box 1). Although this distinction has been largely ignored since its inception, an emerging area of research focused on the intentionality of mind-wandering has clearly demonstrated the practical and theoretical utility of making this distinction. In this review we discuss this recent trend, and we make the case that the distinction between intentional and unintentional mind-wandering is becoming, and ought to continue to be, a prominent focus in research on mind-wandering.

### Mind-Wandering Can Occur With or Without Intention

Although mind-wandering was initially defined as off-task thought that occurs either with or without intention [28], some researchers have assumed that the mind-wandering they have examined in their investigations occurred without intention [2,11,33–38]. At face value, this seems to be a reasonable assumption. That is, when participants enter the laboratory, there is a tacit assumption that they will do their best to attend to the assigned tasks. Hence, in cases where participants report the experience of mind-wandering during task completion, it would be reasonable for a researcher to assume that this mind-wandering occurred despite the best

### Trends

Researchers are beginning to recognize the importance of distinguishing between intentional and unintentional forms of mind-wandering.

The standard practice has been to employ dichotomous probes that ask people to report whether they are 'on task' or 'mind-wandering', which conflates intentional and unintentional types of mind-wandering.

A growing number of studies have shown that people intentionally mind-wander both in laboratory tasks and in everyday life, and that intentional and unintentional mind-wandering are dissociable cognitive experiences.

Extant theories have largely neglected the distinction between unintentional and intentional mind-wandering, and must be amended to include the important role of intentionality.

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### Box 1. Differences between Unintentional and Intentional Mind-Wandering

An early distinction between unintentional and intentional task-unrelated imagery and thoughts (TUIs) was advanced over 20 years ago by Giambra and colleagues [29,32,39]. Giambra [29] noted 'TUIs may occupy awareness because they capture our attention – an uncontrolled shift – or because we have deliberately shifted our attention to them – a controlled shift' (p. 2). He also identified several ways in which these two types of attentional shifts differ. According to Giambra [29], p. 2:

Voluntary shifts of attention to TUIs would seem to involve higher orders of control in information processing or be motivationally determined and to be benign because of their controlled nature. However, involuntary shifts of attention from the task at hand to TUIs would seem to involve lower orders of control in information processing and not [be] motivationally determined; in addition, involuntary shifts may be less benign because they are uncontrolled.

To these differences between intentional and unintentional TUIs (or mind-wandering), we could also add possible differences in subjective experiences. Unintentional episodes of mind-wandering lack a distinct moment of conscious initiation, and, during these episodes, participants are likely not meta-cognitively aware that they are mind-wandering. Consequently, once the episode is detected, the participant might experience surprise, vexation, and the feeling of a lack of control. By contrast, intentional episodes of mind-wandering are associated with a conscious moment of intention to initiate (or to continue) a mind-wandering episode. Moreover, intentional mind-wandering likely includes metacognitive awareness of its occurrence (at least at some point during the episode), and is therefore unlikely to be associated with surprise or vexation, or the feeling of a lack of control.

Interestingly, although unintended, episodes of unintentional mind-wandering are nevertheless experienced as being authored by the individual (in the sense of authorship noted by [80]) and are thus accompanied by a sense of agency. In other words, unintentional mind-wandering is not experienced as being derived from an alien source, but as originating within the individual. In this way, unintended mind-wandering is similar to non-deliberate action. With respect to non-deliberate action, Bayne and Levy [81] note: 'Few of our actions derive from processes of conscious deliberation, and there is no reason to think that those actions that are non-deliberative are any less authored than those that are.' Nevertheless, an interesting direction for future research will be to examine how people's feeling of authorship (i.e., agency) differs between intentional and unintentional bouts of mind-wandering.

intentions of the participants to remain focused on the task (i.e., that it occurred unintentionally). Notwithstanding the apparent soundness of this assumption, it has been challenged by recent studies that have validated and extended previous work [32,39] showing that, in the laboratory, mind-wandering episodes are frequently engaged with intention [40–44].

The finding that people frequently report intentional mind-wandering was revealed in a series of experiments that examined rates of mind-wandering while participants completed behavioral tasks. To capture moments during which people intentionally and unintentionally mind-wandered, these experiments have relied upon a variant of the commonly used experience-sampling technique, which involves periodically presenting participants with 'thought probes' while they complete an ongoing task. Although thought probes traditionally require participants to periodically report whether they are focused on the current task or mind-wandering, to examine the intentionality of mind-wandering episodes recent studies have required participants instead to report whether they were (i) focused on the task, (ii) intentionally mind-wandering, or (iii) unintentionally mind-wandering [40,44]. Despite the fact that some researchers have come to assume that laboratory-based mind-wandering reflects unintentionally engaged off-task thought, 34–41% of the mind-wandering that participants reported while completing these laboratory tasks was engaged with intention ([41,45], respectively). Although other studies have found comparatively less intentional mind-wandering in laboratory tasks [40], the fact that, in at least some tasks, a substantial portion of mind-wandering occurs intentionally suggests that participants may not be particularly motivated to complete some psychological tasks, or that they may perceive the tasks to be sufficiently easy that they believe they can afford to mind-wander without hindering performance (Box 2).

Complementing these state-level findings, research that has investigated rates of mind-wandering at the trait level has revealed a similar pattern of results. Because investigations

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