

TITLE: The Wandering Mind: Where Imagination Meets Consciousness

AUTHOR: Anna Abraham

AFFILIATION: School of Social Sciences, Leeds Beckett University, UK

CONTACT: Professor Anna Abraham, School of Social Sciences, Leeds Beckett University,
City Campus CL 920, Leeds, LS1 3HE, United Kingdom

Tel: +44 113 812 7342

Email: annaabr@gmail.com (or) a.g.abraham@leedsbeckett.ac.uk

Special Issue: Altered States of Consciousness

Editor: Arne Dietrich

Journal: Journal of Consciousness Studies

Article Type: Theoretical Article

Number of Words: 6844 (including abstract, keywords & references)

ABSTRACT

Daydreaming, or the seemingly aimless and inadvertent roaming of the mind, is a common experience that each of us undergoes several times a day during our waking lives. This fascinating phenomenon, which has been described as being akin to a “private theater” is typically considered an altered state in relation to human consciousness but is also considered to be a central operation within the playground of the human imagination. This paper provides a selective overview of the literature that highlights the necessity to question assumptions regarding daydreaming as an altered state of consciousness, daydreaming as a facet of the imagination, as well as the types and functions of daydreaming. In doing so, attention is drawn towards critical factors to consider when interpreting findings from the purview of each of these perspectives of study on this core human propensity.

KEYWORDS

daydreaming; mind wandering; default mode network; spontaneous cognition; internal mentation; resting state; task-unrelated thought; stimulus-independent thought; self-generated thought; phenomenology; psychology; neuroscience; philosophy

We know the feeling all too well. One sets forth to undertake an activity with a clear objective in mind, like writing a paper on the topic of daydreaming for a special issue on altered states of consciousness. After a period of diligent goal-directed thought and action, one finds oneself completely off course in an altogether different conceptual space, mentally exploring realms that have little to do with the original plan or narrative. In one of his earliest works on the topic, Jerome Singer stated that “daydreaming represents a shift of attention *away* from some primary physical or mental task we have set for ourselves, or *away* from directly looking at listening to something in the external environment, *toward* an unfolding sequence of private responses made to some internal stimulus” (Singer, 1975: 3, original italics). Singer went on to aver that daydreaming is “one manifestation” of what William James magnificently termed the “stream of consciousness” – a deeply resonant phrase that is illustrative of two key features of personal consciousness, namely that the states or contents of one’s consciousness are ever-changing, but that the experience itself of one’s consciousness is nonetheless “sensibly continuous” (James, 1891). This paper critically explores the phenomenon of daydreaming with reference to its status as an altered state of consciousness and as a manifestation of the imagination. It ends with reflections on the conceptualizations surrounding its functions, mechanisms, and indeed its very nature.

Daydreaming as an Altered State of Consciousness

The inevitability of mentally drifting away from a task one is performing is a phenomenological state that we routinely experience. In fact, empirical investigations estimate that this inexorable propensity to daydream, mind wander, or fall into states of reverie and fantasy occupies “at least 25-50% of our waking lives” (Konishi & Smallwood, 2016). In reality this number is likely to be higher as such estimates are largely derived from

experience or thought sampling paradigms where study participants are prompted at intervals over an extended period of time to report their current state with regard to whether their minds have wandered from the activity at hand or not (Kane et al., 2007; Killingsworth & Gilbert, 2010; Klinger & Cox, 1987). Such protocols allow one to record the number of times a person has confessed to daydreaming when prompted but not how much time has elapsed in that state, which would in any event be difficult to accurately report given that the experience in itself is characterized by a loss or ambiguity of the sense of time. Moreover, the prompt to report one's current phenomenological state in and of itself rouses the daydreaming person out of the state of reverie and thereby curtails the experience of mind wandering. Additional variability is also introduced by the fact that are differences in the types of contexts in which daydreaming is more frequent with "praying/worshipping/meditating," "listening to the radio, news," and "making love" associated with lowest occurrences of mind wandering (Killingsworth & Gilbert, 2010). These are all factors to bear in mind when contemplating the frequency of mind wandering within and across the daily lives of individuals.

The relatively high experiential frequency of daydreaming or mind wandering indicates its normative nature and therefore also begs the question as to why the phenomenon is classified as an 'altered state' of consciousness (Vaitl et al., 2005) when it is one that we routinely and inevitably consciously experience over a substantial period of our day-to-day living. This potentially stems from an unchecked assumption that there is but one 'standard state' of consciousness, and that the key characteristic of this state is of being aware and alert to one's external environment. It should be noted though that daydreaming was not always regarded as an altered state of consciousness. In one of the landmark papers within

this field, Arnold Ludwig (1966) provided the following definition of altered states. “For the purpose of discussion, I shall regard "altered state(s) of consciousness" [hereafter referred to as ASC(s)] as any mental state(s), induced by various physiological, psychological, or pharmacological maneuvers or agents, which can be recognized subjectively by the individual himself (or by an objective observer of the individual) as representing a sufficient deviation in subjective experience or psychological functioning from certain general norms for that individual during alert, waking consciousness. This sufficient deviation may be represented by a greater preoccupation than usual with internal sensations or mental processes, changes in the formal characteristics of thought, and impairment of reality testing to various degrees” (Ludwig, 1966: 225, my italics). Note that central to this idea of an altered stated is that there is something non-normative about the phenomenology at the level of the individual.

Indeed, William Farthing in his seminal book on consciousness explicitly stated the following: “Daydreaming is different from active externally oriented consciousness, but because it is within the normal range of conscious experience it is usually not considered to be an ASC” (Farthing, 1992: 203). This is because, in addition to wide individual differences in the patterns of normal waking states, "the concept of a "normal" waking state of consciousness is, in a sense, a convenient fiction. Your waking state can vary widely during the course of a day, from an alert, active externally oriented state to a relaxed or drowsy, inner-oriented, daydreamy state" (Farthing, 1992: 206). Having said that, there are parallels between state of daydreaming and that of ASCs like meditation, sleep, drug-induced states, transcendental and sensory deprivation experiences, and this potentially explains why daydreaming is often allocated to the ASC bandwagon.

ASCs are identified by virtue of changes in subjective experience and psychological functioning (Tart, 1975) and are associated with 14 dimensions of changed subjective experience. These include changes in attention, perception, inner speech, memory, higher-level thought processes, imagery and fantasy, the meaning of experiences, the experience of time, arousal, emotional feeling and expression, self-control, suggestibility, body image, and sense of personal identity (Farthing, 1992). Some of these overlap with commonly occurring features of daydreaming which include inner speech, inner seeing, unsymbolized thinking, feelings or affective experiences, and sensory awareness of particular facets of the environment (Heavey & Hurlburt, 2008). Indeed, the phenomenological dimensions associated with daydreaming are relaxed activation (or reduced readiness to act), narrow awareness span (or focused attention on singular content), increased sensory dynamics (or lower thresholds and hyperesthesia) and self-awareness (reflective absorption), all of which are similar to that of other spontaneously occurring ASCs such as near-death experience and hypnagogic states (Vaitl et al., 2005).

Phenomenologically speaking then, daydreaming appears to be a somewhat special case because it can both be and not be an ASC depending on the focus of analysis one adopts. So one of the open questions in this context is what is the best way to conceive of daydreaming? Perhaps it occupies the central zone of the potential continuum between non-altered and altered states of consciousness. Or perhaps a classification of the different types of standard or non-altered states of consciousness (of which daydreaming is one type) needs to be outlined as a parallel to that of altered states of consciousness. Indeed, the next section will highlight how another lens on daydreaming sees it allocated within a

constellation of imaginative mental operations that is typically pitted against purportedly “non-imaginative” counterparts.

Daydreaming as an Facet of Imagination

In 1997, a group of neuroscientists took on an unconventional approach when examining the pattern of brain activity elicited across several functional brain imaging datasets by looking beyond customary brain activity ‘increases’ as a function of task performance by extending the focus to brain activity ‘decreases’ in relation to the same. What they found was that a set of brain regions was consistently less engaged during active goal-directed language and non-language tasks (Shulman et al., 1997). Early on this brain network was therefore referred to as a ‘task-negative’ network (for a discussion on misconceptions that stem from this phrase, see Spreng, 2012), which was more active when engaged in passive contexts or tasks of low cognitive demand relative to tasks of high cognitive demand. Indeed, as this network was highly active during periods of rest in the absence of externally imposed task demands, it was dubbed the ‘default mode network’ (DMN) of the brain in that it reflected the baseline pattern of functional brain activity (Gusnard, Raichle, & Raichle, 2001; Raichle et al., 2001; Raichle, 2015).

Right at the outset, the relevance of the DMN for self-referential and reflective mental operations was noted (Gusnard, Akbudak, Shulman, & Raichle, 2001) and fit with earlier postulations concerning the types of operations (episodic, dreamlike, and so on) that were likely to be involved under conditions of rest and would influence brain activity patterns (Andreasen et al., 1995). The particular relevance of the DMN for daydreaming and ‘stimulus-independent thought’ was highlighted as the propensity for mind wandering was

positively correlated with activity in regions within this brain network (Mason et al., 2007). Using retrospective thought sampling procedures where participants were asked to report what occupied their minds during periods of rest when they were not assigned any particular task, participants reported being in a blank state of mind only 5% of the time. Instead, their minds were actively engaged in internal mentation where they spontaneously reflected on a range of themes including their own personal or episodic past (19%) and future (30%) (Andrews-Hanna, 2012).

What is particularly notable is the overlap between the contexts that engage the DMN, either spontaneously (via task-unrelated or stimulus-independent mind wandering) or deliberately (via task-elicited or stimulus-dependent goal directed thought). This brain network is activated during both spontaneous cognition and deliberate cognition in contexts that call for internal mentation in terms of self-referential processing (am I ambitious?), mental state reasoning or theory of mind (does she believe that I am ambitious?), moral reasoning (is this behavior conscionable?), autobiographical and episodic memory retrieval (when was the last time I built a snowman?), and episodic future thinking or prospection (when will I build a snowman again?) (Buckner, Andrews-Hanna, & Schacter, 2008; Spreng & Grady, 2009; Spreng, Mar, & Kim, 2009). Given the role of the DMN in contexts of self and social relevance, the network has been characterized as one that “primes the intentional stance” which refers to the “irresistible tendency to conceive the actions of others as intentional and guided by beliefs and desires” (Spunt, Meyer, & Lieberman, 2015: 1116). However, the reality is more complex than that as the DMN is spontaneously engaged at the mere suggestion of self-relevance or personal significance associated with the presented stimuli even in tasks that do not necessitate these types of internal mentation for optimal

task performance (Abraham & von Cramon, 2009; Krienen, Tu, & Buckner, 2010; Sui, Rotshtein, & Humphreys, 2013).

It is also necessary to bear in mind that not only is the DMN engaged in contexts that are beyond and unlike that of mind wandering (e.g., Vatansever, Menon, Manktelow, Sahakian, & Stamatakis, 2015), the enormous surge in neuroimaging investigations of mind wandering in relation to the DMN have in fact revealed the need to consider the functional roles of regions outside the DMN in relation to mind wandering (Fox, Spreng, Ellamil, Andrews-Hanna, & Christoff, 2015; Kucyi, 2017). Evidence for the involvement of the central executive network (CEN) in mind wandering in the past have been drawn upon to make the special case for mind wandering as eliciting joint activity in two distinct brain networks (Christoff, Gordon, Smallwood, Smith, & Schooler, 2009). As these two regions are ordinarily anti-correlated, a third brain network – the salience network (SN) – determines when to switch to the appropriate brain system: the DMN in contexts of internal mentation versus CEN in contexts that warrant externally-directed attention and cognitive control (Goulden et al., 2014; Sridharan, Levitin, & Menon, 2008). But a similar special case of jointly activated DMN and CEN networks are also made in relation to the brain basis of creativity (Beaty, Benedek, Kaufman, & Silvia, 2015; Jung, Mead, Carrasco, & Flores, 2013), so this type of neural activity pattern cannot be held as a singular feature of daydreaming. Moreover, there are alternate views concerning the dynamics between these three networks including that both the CEN and SN jointly regulate the DMN (Chen et al., 2013). Indeed, explorations of “transmodal” brain areas, termed thus due to their involvement in a wide array of diverse cognitive states and “whose activity is not specific to a single modality of sensory input or motor output” (Huntenburg, Bazin, & Margulies, 2018: 23) reveal that core regions of the

DMN qualify as transmodal regions (Braga, Sharp, Leeson, Wise, & Leech, 2013; Mittner, Hawkins, Boekel, & Forstmann, 2016), potentially explaining the heterogeneous functional profile associated with this brain network.

So while the DMN is the key brain network involved in internally-directed cognition (Andrews-Hanna, Smallwood, & Spreng, 2014) of which mind wandering is one key aspect of spontaneous cognition (Christoff, Irving, Fox, Spreng, & Andrews-Hanna, 2016), the dynamics of the activity of this brain network cannot be viewed in isolation from other key brain networks with which it closely interacts (Zabelina & Andrews-Hanna, 2016). It is therefore important to not overstate or misrepresent the nature of the link between the DMN and daydreaming as being a simplistic or linear especially as “the cognitive processes that spontaneous DMN activity specifically reflects are only partially related to mind-wandering and include also attentional state fluctuations that are not captured by self-report” (Kucyi, Esterman, Riley, & Valera, 2016: 13899).

Owing to the fact of DMN engagement across heterogeneous contexts, one theoretical framework viewed the DMN as facilitating ‘intentionality-based forms of imagination’ where the processing is “predominantly recollective in nature with a view to establishing the best possible explanation of a situation or event in question. This is brought about by means of spontaneous access to an extensive and diverse repertoire of relevant knowledge when processing such contexts. The best or most plausible explanation is the one that fits best with what is already known in terms of oneself and/or one’s world-view” (Abraham, 2016: 4203). Parallels to this postulation are also found in other perspectives of the DMN in which its role was hypothesized to be in “the process of conceptualization—in which

representations of prior experiences are brought to bear to construct representations of the past, the future, or the present moment. These regions are necessary to give meaning to others' actions, to make meaning of one's own core affective state, to recall prior experiences during instances of memory and spontaneous thought, and to represent the meaning of concepts by simulating category instances" (Oosterwijk et al., 2012: 2124).

Another view holds that the DMN plays an "auto-pilot" role such as during "automated decision-making under predictable environmental demands" where "automated, fast, and accurate responses" are called for in order to meet "worldly demands" (Vatansever, Menon, & Stamatakis, 2017). Daydreaming indeed routinely transpires in contexts in which we operate in autopilot mode, such as when driving under predictable conditions where incidences of mind wandering of around 70% have been reported (Baldwin et al., 2017).

A question that arises in this context is whether the DMN involvement in daydreaming reflects a functional specificity of this network for this function or if it is instead the case that daydreaming is related to DMN merely as an epiphenomenon of this brain network being involved in autopilot mode. One contemporary neuroscientific account potentially seeks to accommodate both possibilities by proposing a single model that differentiates "between an exploratory 'off-focus' state and active mind wandering" (Mittner et al., 2016).

The next section will continue to examine the heterogeneity associated the state of mind wandering in terms of its characteristics and functions across a wide array of contexts.

Types and Functions of Daydreaming

When our minds are free to roam, we can experience a variety of dissimilar mental states. Early work on daydreaming, stimulus-independent and task-unrelated thought (Antrobus,

1968; Giambra, 1995; Singer, 1975; Singer & Antrobus, 1963) paved the way for distinguishing between positive-constructive daydreaming (“playful, wishful imagery, and planful, creative thought”), guilty-dysphoric daydreaming (“obsessive, anguished fantasies”) and poor attentional control (“the inability to concentrate on either the ongoing thought or the external task”) (McMillan, Kaufman, & Singer, 2013: 1). This has some parallels with contemporary work where positive habitual thoughts and spontaneous off task thoughts during mind wandering were contrasted in terms of their wider impact on other psychological variables as well as brain activity patterns (Wang et al., 2017).

The focus on different dimensions of mind wandering is largely motivated by the necessity to explain the disparate findings associated with this fundamental human faculty (Mooneyham et al., 2016; Smallwood & Andrews-Hanna, 2013). On one hand, there are studies showing circumscribed advantages in information processing in relation to mind wandering, such as in the domains of creativity, memory consolidation, future thinking and dishabituation. On the other hand, there is also evidence to show that mind wandering is associated with unhappiness and can exert a disruptive influence when engaged in goal-directed behaviors, such as during reading and driving, both of which necessitate the maintenance of external vigilance and optimal working memory.

Two hypotheses have been proposed to accommodate such divergent results (Smallwood & Schooler, 2014). The ‘context regulation hypothesis’ holds that self-generated thought (SGT) commonly occurs in cognitively undemanding contexts. So when SGTs transpire in contexts that necessitate continuous attention it can be disadvantageous, whereas when SGTs take place in non-demanding contexts they can be beneficial. Alternatively, the ‘content

regulation hypothesis' holds that SGTs that are future-oriented are positive, adaptive and promote wellbeing whereas SGTs that are past-oriented are likely to be negative, maladaptive and indicative of unhappiness. So while positive-constructive daydreaming is largely associated with positive outcomes, the opposite is deemed to be true of the other dimensions, namely guilty-dysphoric daydreaming and poor attentional control.

The impact of cognitive demands is also investigated from the vantage point of the association between mind wandering and executive functions like working memory. Cognitive demands are embedded within the task context but the degree to which one is impacted by task-based cognitive demands is influenced by an individual's capacity to deal with such contextual demands. Impoverished executive capacity is associated with a greater propensity for mind wandering in keeping with the 'control-failure hypothesis' (McVay & Kane, 2009, 2010). At the same time though, performing tasks associated with higher executive demands are associated with diminished mind wandering in line with the 'global availability hypothesis' which holds that more executive resources should be associated with greater frequency in mind wandering (Smallwood, 2010). It appears that here too the type of daydreaming one is engaged in (positive or negative) plays a significant role as it mediates the association between mind wandering and executive functions (Marcusson-Clavertz, Cardeña, & Terhune, 2016).

There are still further distinctions across disciplines about how best to construe dimensions, features and types of daydreaming. Mind wandering is typically regarded as a state that "often occurs without intention ... or even awareness that one's mind has drifted" (Smallwood & Schooler, 2006: 946) but at the same time is characterized by meta-

awareness or “the ability to take explicit note of the current contents of consciousness” as well as perceptual decoupling or “the capacity to disengage from perception” (Schooler et al., 2011: 319) (for an alternative definition that does not presuppose meta-awareness in mind wandering, see Metzinger, 2013). In psychology and neuroscience, the terms ‘mind wandering’ and ‘daydreaming’ are often used interchangeably. Conceptualizations regarding their distinctions largely stem from empirical contexts in which they are examined as “daydreaming entails engaging in spontaneous thoughts unrelated to one’s current context (i.e., stimulus-independent), and mind wandering has been defined as daydreaming occurring while performing another task” (Zedelius & Schooler, 2015: 1).

In the philosophical tradition, however, mind wandering is sometimes viewed as a type of daydreaming that is distinct from other types of daydreaming (Dorsch, 2015). Mind wandering in this context is seen as akin to spontaneously occurring task-unrelated thoughts which is distinct from ‘focused daydreaming’ where “we also withdraw from the world surrounding us and start to experience or think about objects and events that are largely absent, past or imaginary. But we take a much more active part in directing the order and content of our mental episodes and usually stick to a particular topic or issue” (Dorsch, 2015: 792). This is akin to other conceptualizations from the early psychological theorizing on this topic that distinguished between ‘spontaneous mind wandering’ and ‘deliberate mind wandering’ (Giambra, 1995) as well as more recent drives to distinguish intentional and unintentional mind wandering (Seli, Risko, Smilek, & Schacter, 2016).

Still others postulate that mind wandering is a state of “unguided attention” which is what makes it distinct from other internally oriented states like rumination and absorption which

are considered instead to reflect instances of internally oriented guided attention (Irving, 2016). The purposive oxymoron – unguided attention – in relation to mind wandering is employed to illustrate the fact that although the state of mind wandering appears undirected and purposeless, in actuality our minds tend to predominantly vacillate towards consideration of our personal goals. Such a “prospective bias” in mind wandering is confirmed in empirical work (Stawarczyk & D’Argembeau, 2015; Stawarczyk, Majerus, Maj, Van der Linden, & D’Argembeau, 2011), and it necessitates the important question of how best to conceive of ‘goal-directedness’ in internal mentation because the propensity to only consider ‘goals’ as limited to the context of an external task translates to a failure to fully take into account the wider dynamics of our inner experience. The next and final section of the paper further explores the consequences that result from drawing such conceptual distinctions and the implications of the same.

Further critical issues in the empirical study of daydreaming

A range of critiques has been leveled at the empirical study of consciousness. Some highlight the essentially non-conscious underpinnings of the ‘contents of consciousness’ which is neither influenced nor directed by the ‘experience of consciousness’ rendering consciousness to be ephiphenomenal (Oakley & Halligan, 2017). Others point to suspect rationale that typically underlie isomorphisms that are applied when mapping contents of conscious experience to neural substrates (Noë & Thompson, 2004). Beyond these types of highly relevant philosophical issues to consider are other more commonplace assumptions surrounding paradigms and theoretical conceptualizations that need to be questioned as well. Does the study of daydreaming obscure vital aspects of the phenomenon itself? Do experimental paradigms constrain our understanding of the phenomenon? Are limitations

at the level of the paradigm then generalized to conceive of limitations about the phenomenon? These are questions that are worth considering in more depth.

Take the following statement from a recent paper: “As the representations upon which we are focused during mind-wandering are different from those related to the stimuli in the moment, these experiences are by definition stimulus independent. Moreover, the gold standard method to assess the mind-wandering state is experience sampling (ES), which in turn depends on our capacity to introspect on our own experiences. Our capacity for meta-cognition is therefore a key element to the mind-wandering state because it is how participants share their experiences with the experimenter” (Konishi & Smallwood, 2016: 234). This points to how paradigm based factors (the participant’s means by which to convey information to the experimenter) in the study of mind wandering influence conceptualizations of the phenomenon itself.

As the study of daydreaming is largely derived from conscious verbal self-reports, aspects of the phenomenon, such as awareness, that do not lend themselves to verbalization are not captured. “Awareness is really beyond definition in words, as words are only a small subset of the total functioning of mind. It loosely refers to our ultimate ability to know that something exists or is happening. In ordinary consciousness, awareness is usually almost totally wrapped up in words, internal talking to ourselves (which is what we usually mean by thought), but it is far more basic than words” (Tart, 1986: 161). This is notwithstanding the typical problems associated with verbal reports after the fact, such as forgetting, elaboration, and the impact of the duration of the delay period between the actual experience and the memory of that experience on the ability to report of the contents of

the experience. It is therefore important to bear in mind that that only a slice of the actual experience of mind wandering is being empirically captured from which several broad generalizations are derived about the phenomenon.

Another interesting dimension to take note of in that aforementioned Konishi & Smallwood (2016) quote is the significance ascribed to the term “stimulus” in relation to mind wandering. This is how it is commonly construed in the literature, namely that mind wandering is essentially ‘stimulus-independent’ or ‘task-unrelated’ and such conceptualizations directly stem from the empirical context of behavioral testing. However, the insistence that daydreaming is entirely ‘stimulus-independent’ or ‘task-unrelated’ in day-to-day life seems suspect because – outside of lab testing situations – we usually find ourselves in contexts that are deeply relevant to ourselves and way of being.

Think about the last time your mind wandered. Often the triggers for such mental journeys are stimuli within the environment. One is drinking coffee from one’s favorite cup and one is reminded of the occasion surrounding the cup and then one’s thoughts move to the people in that situation and what that person was wearing or saying. And so on. So while the wanderings journey beyond the immediate surroundings or context into the real past, the counterfactual past, future possibilities and fantasies, the starting point can be something in the environment. A strict limitation of stimulus independence is not necessary, and need not be stringently applied. Moreover, just because some aspects of the stimuli (liking a cup) are peripheral to the task or task-unrelated (drinking the coffee) in that it is not relevant to the goal of the task (quenching one’s thirst), one cannot conclude that the contextual information is irrelevant to the agent. Indeed, a clearer specification of what is meant by

‘task-relatedness’ is essential if conceptions of mind wandering are tethered to it (Irving, 2016).

The insistence on stimulus independence also makes it challenging to explain some of the effects that are attributed to mind wandering such as enhanced creative performance. If mind wandering is entirely divorced from the present context, how can it be useful in real time to abet creative problem solving? Explanations of how spontaneous internal mentation interacts with goal-directed task-specific cognition are therefore necessary in order to understand its wider impact.

Concluding note

The empirical study of daydreaming and mind wandering has grown in leaps and bounds since the 1960s, and this topic constitutes a very productive area of scientific inquiry in psychology and neuroscience in terms of the sheer volume of focus it garners in the literature. Its relevance as a theme of study is also expansive as it spans the complex domains of consciousness and imagination. This paper provided a selective overview of this topic with a view to highlighting the need to critically consider some of the assumptions that are central to this field which stand to significantly skew our understanding of the phenomenon itself. The importance of questioning assumptions is certainly applicable to all subjects of study, but nudging oneself to do so for topics that do not lend themselves as easily to such analysis is especially crucial. James Morley (1998) provides an eloquent argument that highlights why daydreaming is an interesting case in point. “The daydreaming subject collapses certain dualisms historically central to psychology, such as subject-object, mind-body, cognition-emotion, and real-imaginary. In light of this collapse, we can

understand the daydreaming subject metaphorically, as both actor and spectator; or as writer, director, and critic; or as camera, film, projector, and screen. The artistic metaphors typically used by subjects express an intertwining of active and passive forms of consciousness in a complicated circuit of relationships” (Morley, 1998: 132-133). We stand to gain greatly by refocusing our understanding of daydreaming and mind wandering as the veritable possibility space where consciousness meets imagination.

REFERENCES

- Abraham, A. (2016). The imaginative mind. *Human Brain Mapping, 37*(11), 4197–4211.
<https://doi.org/10.1002/hbm.23300>
- Abraham, A., & von Cramon, D. Y. (2009). Reality = relevance? Insights from spontaneous modulations of the brain's default network when telling apart reality from fiction. *PloS One, 4*(3), e4741.
<https://doi.org/10.1371/journal.pone.0004741>
- Andreasen, N. C., O'Leary, D. S., Cizadlo, T., Arndt, S., Rezai, K., Watkins, G. L., ... Hichwa, R. D. (1995). Remembering the past: two facets of episodic memory explored with positron emission tomography. *The American Journal of Psychiatry, 152*(11), 1576–1585.
- Andrews-Hanna, J. R. (2012). The brain's default network and its adaptive role in internal mentation. *The Neuroscientist: A Review Journal Bringing Neurobiology, Neurology and Psychiatry, 18*(3), 251–270.
<https://doi.org/10.1177/1073858411403316>
- Andrews-Hanna, J. R., Smallwood, J., & Spreng, R. N. (2014). The default network and self-generated thought: component processes, dynamic control, and clinical relevance. *Annals of the New York Academy of Sciences, 1316*, 29–52.
<https://doi.org/10.1111/nyas.12360>
- Antrobus, J. S. (1968). INFORMATION THEORY AND STIMULUS-INDEPENDENT THOUGHT. *British Journal of Psychology, 59*(4), 423–430.
<https://doi.org/10.1111/j.2044-8295.1968.tb01157.x>
- Baldwin, C. L., Roberts, D. M., Barragan, D., Lee, J. D., Lerner, N., & Higgins, J. S. (2017). Detecting and Quantifying Mind Wandering during Simulated Driving. *Frontiers in Human Neuroscience, 11*. <https://doi.org/10.3389/fnhum.2017.00406>

- Beaty, R. E., Benedek, M., Kaufman, S. B., & Silvia, P. J. (2015). Default and Executive Network Coupling Supports Creative Idea Production. *Scientific Reports*, 5, 10964. <https://doi.org/10.1038/srep10964>
- Braga, R. M., Sharp, D. J., Leeson, C., Wise, R. J. S., & Leech, R. (2013). Echoes of the Brain within Default Mode, Association, and Heteromodal Cortices. *Journal of Neuroscience*, 33(35), 14031–14039. <https://doi.org/10.1523/JNEUROSCI.0570-13.2013>
- Buckner, R. L., Andrews-Hanna, J. R., & Schacter, D. L. (2008). The brain's default network: anatomy, function, and relevance to disease. *Annals of the New York Academy of Sciences*, 1124, 1–38. <https://doi.org/10.1196/annals.1440.011>
- Chen, A. C., Oathes, D. J., Chang, C., Bradley, T., Zhou, Z.-W., Williams, L. M., ... Etkin, A. (2013). Causal interactions between fronto-parietal central executive and default-mode networks in humans. *Proceedings of the National Academy of Sciences of the United States of America*, 110(49), 19944–19949. <https://doi.org/10.1073/pnas.1311772110>
- Christoff, K., Gordon, A. M., Smallwood, J., Smith, R., & Schooler, J. W. (2009). Experience sampling during fMRI reveals default network and executive system contributions to mind wandering. *Proceedings of the National Academy of Sciences of the United States of America*, 106(21), 8719–8724. <https://doi.org/10.1073/pnas.0900234106>
- Christoff, K., Irving, Z. C., Fox, K. C. R., Spreng, R. N., & Andrews-Hanna, J. R. (2016). Mind-wandering as spontaneous thought: a dynamic framework. *Nature Reviews Neuroscience*, 17(11), 718–731. <https://doi.org/10.1038/nrn.2016.113>
- Dorsch, F. (2015). Focused daydreaming and mind-wandering. *Review of Philosophy and Psychology*, 6(4), 791–813. <https://doi.org/10.1007/s13164-014-0221-4>

- Farthing, G. W. (1992). *The psychology of consciousness*. Englewood Cliffs, N.J: Prentice Hall.
- Fox, K. C. R., Spreng, R. N., Ellamil, M., Andrews-Hanna, J. R., & Christoff, K. (2015). The wandering brain: Meta-analysis of functional neuroimaging studies of mind-wandering and related spontaneous thought processes. *NeuroImage*.
<https://doi.org/10.1016/j.neuroimage.2015.02.039>
- Giambra, L. M. (1995). A laboratory method for investigating influences on switching attention to task-unrelated imagery and thought. *Consciousness and Cognition*, 4(1), 1–21. <https://doi.org/10.1006/ccog.1995.1001>
- Goulden, N., Khusnulina, A., Davis, N. J., Bracewell, R. M., Bokde, A. L., McNulty, J. P., & Mullins, P. G. (2014). The salience network is responsible for switching between the default mode network and the central executive network: Replication from DCM. *NeuroImage*, 99, 180–190.
<https://doi.org/10.1016/j.neuroimage.2014.05.052>
- Gusnard, D. A., Akbudak, E., Shulman, G. L., & Raichle, M. E. (2001). Medial prefrontal cortex and self-referential mental activity: Relation to a default mode of brain function. *Proceedings of the National Academy of Sciences of the United States of America*, 98(7), 4259–4264. <https://doi.org/10.1073/pnas.071043098>
- Gusnard, D. A., Raichle, M. E., & Raichle, M. E. (2001). Searching for a baseline: functional imaging and the resting human brain. *Nature Reviews. Neuroscience*, 2(10), 685–694. <https://doi.org/10.1038/35094500>
- Heavey, C. L., & Hurlburt, R. T. (2008). The phenomena of inner experience. *Consciousness and Cognition*, 17(3), 798–810.
<https://doi.org/10.1016/j.concog.2007.12.006>

- Huntenburg, J. M., Bazin, P.-L., & Margulies, D. S. (2018). Large-Scale Gradients in Human Cortical Organization. *Trends in Cognitive Sciences*, 22(1), 21–31.
<https://doi.org/10.1016/j.tics.2017.11.002>
- Irving, Z. C. (2016). Mind-wandering is unguided attention: accounting for the “purposeful” wanderer. *Philosophical Studies*, 173(2), 547–571.
<https://doi.org/10.1007/s11098-015-0506-1>
- James, W. (1891). *The Principles of Psychology, Vol 1*. New York: Holt, Rinehart, & Winston.
- Jung, R. E., Mead, B. S., Carrasco, J., & Flores, R. A. (2013). The structure of creative cognition in the human brain. *Frontiers in Human Neuroscience*, 7.
<https://doi.org/10.3389/fnhum.2013.00330>
- Kane, M. J., Brown, L. H., McVay, J. C., Silvia, P. J., Myin-Germeys, I., & Kwapil, T. R. (2007). For Whom the Mind Wanders, and When: An Experience-Sampling Study of Working Memory and Executive Control in Daily Life. *Psychological Science*, 18(7), 614–621. <https://doi.org/10.1111/j.1467-9280.2007.01948.x>
- Killingsworth, M. A., & Gilbert, D. T. (2010). A Wandering Mind Is an Unhappy Mind. *Science*, 330(6006), 932–932. <https://doi.org/10.1126/science.1192439>
- Klinger, E., & Cox, W. M. (1987). Dimensions of Thought Flow in Everyday Life. *Imagination, Cognition and Personality*, 7(2), 105–128.
<https://doi.org/10.2190/7K24-G343-MTQW-115V>
- Konishi, M., & Smallwood, J. (2016). Shadowing the wandering mind: how understanding the mind-wandering state can inform our appreciation of conscious experience. *Wiley Interdisciplinary Reviews. Cognitive Science*, 7(4), 233–246. <https://doi.org/10.1002/wcs.1392>

- Krienen, F. M., Tu, P.-C., & Buckner, R. L. (2010). Clan mentality: evidence that the medial prefrontal cortex responds to close others. *The Journal of Neuroscience: The Official Journal of the Society for Neuroscience*, *30*(41), 13906–13915.
<https://doi.org/10.1523/JNEUROSCI.2180-10.2010>
- Kucyi, A. (2017). Just a thought: How mind-wandering is represented in dynamic brain connectivity. *NeuroImage*. <https://doi.org/10.1016/j.neuroimage.2017.07.001>
- Kucyi, A., Esterman, M., Riley, C. S., & Valera, E. M. (2016). Spontaneous default network activity reflects behavioral variability independent of mind-wandering. *Proceedings of the National Academy of Sciences*, *113*(48), 13899–13904.
<https://doi.org/10.1073/pnas.1611743113>
- Ludwig, A. M. (1966). Altered states of consciousness. *Archives of General Psychiatry*, *15*(3), 225–234.
- Marcusson-Clavertz, D., Cardeña, E., & Terhune, D. B. (2016). Daydreaming style moderates the relation between working memory and mind wandering: Integrating two hypotheses. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *42*(3), 451–464. <https://doi.org/10.1037/xlm0000180>
- Mason, M. F., Norton, M. I., Van Horn, J. D., Wegner, D. M., Grafton, S. T., & Macrae, C. N. (2007). Wandering minds: the default network and stimulus-independent thought. *Science (New York, N.Y.)*, *315*(5810), 393–395.
<https://doi.org/10.1126/science.1131295>
- McMillan, R., Kaufman, S. B., & Singer, J. L. (2013). Ode to positive constructive daydreaming. *Frontiers in Psychology*, *4*.
<https://doi.org/10.3389/fpsyg.2013.00626>
- McVay, J. C., & Kane, M. J. (2009). Conducting the train of thought: Working memory capacity, goal neglect, and mind wandering in an executive-control task. *Journal*

- of Experimental Psychology: Learning, Memory, and Cognition*, 35(1), 196–204.
<https://doi.org/10.1037/a0014104>
- McVay, J. C., & Kane, M. J. (2010). Does mind wandering reflect executive function or executive failure? Comment on Smallwood and Schooler (2006) and Watkins (2008). *Psychological Bulletin*, 136(2), 188–197.
<https://doi.org/10.1037/a0018298>
- Metzinger, T. K. (2013). The myth of cognitive agency: subpersonal thinking as a cyclically recurring loss of mental autonomy. *Frontiers in Psychology*, 4.
<https://doi.org/10.3389/fpsyg.2013.00931>
- Mittner, M., Hawkins, G. E., Boekel, W., & Forstmann, B. U. (2016). A Neural Model of Mind Wandering. *Trends in Cognitive Sciences*, 20(8), 570–578.
<https://doi.org/10.1016/j.tics.2016.06.004>
- Mooneyham, B. W., Mrazek, M. D., Mrazek, A. J., Mrazek, K. L., Phillips, D. T., & Schooler, J. W. (2016). States of Mind: Characterizing the Neural Bases of Focus and Mind-wandering through Dynamic Functional Connectivity. *Journal of Cognitive Neuroscience*, 29(3), 495–506. https://doi.org/10.1162/jocn_a_01066
- Morley, J. (1998). The Private Theater: A Phenomenological Investigation of Daydreaming. *Journal of Phenomenological Psychology*, 29(1), 116–134.
<https://doi.org/10.1163/156916298X00049>
- Noë, A., & Thompson, E. (2004). Are There Neural Correlates of Consciousness? *Journal of Consciousness Studies*, 11(1), 3–28.
- Oakley, D. A., & Halligan, P. W. (2017). Chasing the Rainbow: The Non-conscious Nature of Being. *Frontiers in Psychology*, 8. <https://doi.org/10.3389/fpsyg.2017.01924>
- Oosterwijk, S., Lindquist, K. A., Anderson, E., Dautoff, R., Moriguchi, Y., & Barrett, L. F. (2012). States of mind: Emotions, body feelings, and thoughts share distributed

- neural networks. *NeuroImage*, 62(3), 2110–2128.
<https://doi.org/10.1016/j.neuroimage.2012.05.079>
- Raichle, M. E. (2015). The brain's default mode network. *Annual Review of Neuroscience*, 38, 433–447. <https://doi.org/10.1146/annurev-neuro-071013-014030>
- Raichle, M. E., MacLeod, A. M., Snyder, A. Z., Powers, W. J., Gusnard, D. A., & Shulman, G. L. (2001). A default mode of brain function. *Proceedings of the National Academy of Sciences of the United States of America*, 98(2), 676–682.
<https://doi.org/10.1073/pnas.98.2.676>
- Schooler, J. W., Smallwood, J., Christoff, K., Handy, T. C., Reichle, E. D., & Sayette, M. A. (2011). Meta-awareness, perceptual decoupling and the wandering mind. *Trends in Cognitive Sciences*. <https://doi.org/10.1016/j.tics.2011.05.006>
- Seli, P., Risko, E. F., Smilek, D., & Schacter, D. L. (2016). Mind-Wandering With and Without Intention. *Trends in Cognitive Sciences*, 20(8), 605–617.
<https://doi.org/10.1016/j.tics.2016.05.010>
- Shulman, G. L., Fiez, J. A., Corbetta, M., Buckner, R. L., Miezin, F. M., Raichle, M. E., & Petersen, S. E. (1997). Common Blood Flow Changes across Visual Tasks: II. Decreases in Cerebral Cortex. *Journal of Cognitive Neuroscience*, 9(5), 648–663.
<https://doi.org/10.1162/jocn.1997.9.5.648>
- Singer, J. L. (1975). *Daydreaming and fantasy*. London: Allen and Unwin.
- Singer, J. L., & Antrobus, J. S. (1963). A FACTOR-ANALYTIC STUDY OF DAYDREAMING AND CONCEPTUALLY-RELATED COGNITIVE AND PERSONALITY VARIABLES. *Perceptual and Motor Skills*, 17, 187–209.
<https://doi.org/10.2466/pms.1963.17.1.187>

- Smallwood, J. (2010). Why the global availability of mind wandering necessitates resource competition: Reply to McVay and Kane (2010). *Psychological Bulletin*, 136(2), 202–207. <https://doi.org/10.1037/a0018673>
- Smallwood, J., & Andrews-Hanna, J. (2013). Not all minds that wander are lost: the importance of a balanced perspective on the mind-wandering state. *Frontiers in Psychology*, 4. <https://doi.org/10.3389/fpsyg.2013.00441>
- Smallwood, J., & Schooler, J. W. (2006). The restless mind. *Psychological Bulletin*, 132(6), 946–958. <https://doi.org/10.1037/0033-2909.132.6.946>
- Smallwood, J., & Schooler, J. W. (2014). The Science of Mind Wandering: Empirically Navigating the Stream of Consciousness. *Annual Review of Psychology*. <https://doi.org/10.1146/annurev-psych-010814-015331>
- Spreng, R. N. (2012). The fallacy of a “task-negative” network. *Cognition*, 145. <https://doi.org/10.3389/fpsyg.2012.00145>
- Spreng, R. N., & Grady, C. L. (2009). Patterns of Brain Activity Supporting Autobiographical Memory, Prospection, and Theory of Mind, and Their Relationship to the Default Mode Network. *Journal of Cognitive Neuroscience*, 22(6), 1112–1123. <https://doi.org/10.1162/jocn.2009.21282>
- Spreng, R. N., Mar, R. A., & Kim, A. S. N. (2009). The common neural basis of autobiographical memory, prospection, navigation, theory of mind, and the default mode: a quantitative meta-analysis. *Journal of Cognitive Neuroscience*, 21(3), 489–510. <https://doi.org/10.1162/jocn.2008.21029>
- Spunt, R. P., Meyer, M. L., & Lieberman, M. D. (2015). The default mode of human brain function primes the intentional stance. *Journal of Cognitive Neuroscience*, 27(6), 1116–1124. https://doi.org/10.1162/jocn_a_00785

- Sridharan, D., Levitin, D. J., & Menon, V. (2008). A critical role for the right fronto-insular cortex in switching between central-executive and default-mode networks. *Proceedings of the National Academy of Sciences of the United States of America*, *105*(34), 12569–12574. <https://doi.org/10.1073/pnas.0800005105>
- Stawarczyk, D., & D'Argembeau, A. (2015). Neural correlates of personal goal processing during episodic future thinking and mind-wandering: An ALE meta-analysis. *Human Brain Mapping*, *36*(8), 2928–2947. <https://doi.org/10.1002/hbm.22818>
- Stawarczyk, D., Majerus, S., Maj, M., Van der Linden, M., & D'Argembeau, A. (2011). Mind-wandering: Phenomenology and function as assessed with a novel experience sampling method. *Acta Psychologica*, *136*(3), 370–381. <https://doi.org/10.1016/j.actpsy.2011.01.002>
- Sui, J., Rotshtein, P., & Humphreys, G. W. (2013). Coupling social attention to the self forms a network for personal significance. *Proceedings of the National Academy of Sciences of the United States of America*. <https://doi.org/10.1073/pnas.1221862110>
- Tart, C. T. (1975). *States of Consciousness*. New York: E. P. Dutton.
- Tart, C. T. (1986). Consciousness, altered states, and worlds of experience. *Journal of Transpersonal Psychology*, *18*, 159–170.
- Vaitl, D., Birbaumer, N., Gruzelier, J., Jamieson, G. A., Kotchoubey, B., Kübler, A., ... Weiss, T. (2005). Psychobiology of altered states of consciousness. *Psychological Bulletin*, *131*(1), 98–127. <https://doi.org/10.1037/0033-2909.131.1.98>
- Vatansever, D., Menon, D. K., Manktelow, A. E., Sahakian, B. J., & Stamatakis, E. A. (2015). Default Mode Dynamics for Global Functional Integration. *The Journal of Neuroscience: The Official Journal of the Society for Neuroscience*, *35*(46), 15254–15262. <https://doi.org/10.1523/JNEUROSCI.2135-15.2015>

- Vatansever, D., Menon, D. K., & Stamatakis, E. A. (2017). Default mode contributions to automated information processing. *Proceedings of the National Academy of Sciences*, *114*(48), 12821–12826. <https://doi.org/10.1073/pnas.1710521114>
- Wang, H.-T., Poerio, G., Murphy, C., Bzdok, D., Jefferies, E., & Smallwood, J. (2017). Dimensions of Experience: Exploring the Heterogeneity of the Wandering Mind. *Psychological Science*, 095679761772872. <https://doi.org/10.1177/0956797617728727>
- Zabelina, D. L., & Andrews-Hanna, J. R. (2016). Dynamic network interactions supporting internally-oriented cognition. *Current Opinion in Neurobiology*, *40*, 86–93. <https://doi.org/10.1016/j.conb.2016.06.014>
- Zedelius, C. M., & Schooler, J. W. (2015). The Richness of Inner Experience: Relating Styles of Daydreaming to Creative Processes. *Frontiers in Psychology*, *6*, 2063. <https://doi.org/10.3389/fpsyg.2015.02063>