Can a microdynamic approach to sleep-onset imagery solve the overabundance problem of dreaming? Commentary on Tore Nielsen’s “Microdream neurophenomenology”

Jennifer M. Windt*

Philosophy Department, Monash University, Level 6, Menzies Building, Clayton Campus, 20 Chancellor’s Walk, Clayton, VIC 3800, Australia

*Correspondence address. Philosophy Department, Monash University, Level 6, Menzies Building, Clayton Campus, 20 Chancellor’s Walk, Clayton, VIC 3800, Australia. Tel: +61-3-99-05-15-19; E-mail: jennifer.windt@monash.edu

Abstract

Nielsen proposes that a microdynamic approach to experiences occurring in the earliest stages of sleep onset, which he calls microdreams, can shed light on the process of dream imagery formation. I discuss microdreams in the context of simulation views, in which dreaming is defined as the immersive experience of a virtual world centered on a virtual self. I also evaluate his proposal to expand the dimensions included in the oneiragogic spectrum by kinesis. I conclude that while a subset of microdreams might not fulfill the conditions to count as even minimal dreams, their investigation can nonetheless help address key questions in dream research and may even constitute a distinctive pathway to the generation of full-fledged dreaming.

Key words: imagery; sleep and dreaming; binding and multisensory integration; sleep onset; hypnagoga

The Microdynamic Approach and the Overabundance Problem

In an exceptionally rich and thought-provoking article, Nielsen (2017) proposes a research methodology to address the “overabundance problem”: progress in dream research has been hampered by the availability of too much information both on the phenomenology of dreaming and its neural basis. Nielsen proposes a subset of sleep-onset imagery—microdreams—as a research model: because of their brevity and comparatively simple phenomenological structure, microdreams isolate core features of dreaming while also reducing its complexity. Microdreams create ideal conditions for gathering detailed phenomenological descriptions, time-locking them to associated neurophysiological events, and identifying memory and concurrent external stimulus sources to probe the mechanisms underlying dream imagery formation. Nielsen’s paper also offers a timely and much needed review of research findings on sleep-onset imagery, which has long been a dormant area of sleep and dream research, and introduces a new conceptual framework.

Here, I will focus on the relation between microdreams and full-fledged dreams. I argue that while the analysis of microdreams can extend and enrich dream research, a subset of microdreams may not fulfill the conditions to count as even minimal forms of dreaming. I also discuss Nielsen’s claim that kinesis is central to dream formation and propose that there might be two distinct pathways to the generation of immersive dreaming.
Are Microdreams Minimal Kinds of Dreams?

Designating a subset of sleep-onset experiences as microdreams suggests that these present the core characteristics of dreaming in a greatly simplified, isolated form and at a minimal time scale. Microdreams would then help demarcate the difference between dreaming and non-dreaming: they would help isolate and empirically ground the minimal set of necessary and jointly sufficient conditions for dreaming to occur.

It is useful to consider this proposal in the context of a broader taxonomy of dreaming. Dream research was long hampered by lack of agreement about its target, with different research groups using different definitions. This situation was further complicated by the notorious variability of dreaming itself. Only recently has there been increasing convergence on simulation views of dreaming (Revonsuo et al. 2015). Different versions of simulation views exist, but their key claim is that dreams simulate the experience of a world centered on a self. Dreams have an immersive structure: they involve a subjective sense of presence, with imagery arising mostly independently of an appropriate external stimulus source.

In the simplest version of simulation views, spatiotemporal self-location—“here-and-now” experience—is both necessary and sufficient for dreaming (Windt 2015a). A majority of dreams involve multimodal (especially visual and motor) imagery as well as strong emotions. Yet neither these nor a sense of presence, with imagery arising mostly independently of an appropriate external stimulus source.

A more established, may have the overall coherence and immersive coherence and immersive scene, whereas others might involve largely veridical (and hence perceptual) experiences of the actual sleeping environment. In yet other cases, veridical perception of the bedroom may merge with hallucinatory, illusory, or even more imaginative, daydream-like imagery (Windt 2015a, chap. 11.2). Here, my point is that even immersive microdreams would fail to count as dreams if they were predominantly perceptual.

So far, these are just theoretical possibilities. More systematic studies involving larger samples are needed and it seems likely that the phenomenology of microdreams will have to be assessed on a case-by-case basis. Based on the examples provided by Nielsen, it would seem that microdreams typically have a dynamic or kinetic component as well as spatial imagery (e.g. Fig. 3), but may indeed lack a broader temporal context as well as integration into an immersive and largely stimulus-independent (visuo)spatial scene. Visual imagery, e.g. of non-self-characters or objects, often has an oddly fragmented character, appearing seemingly out of nowhere or even lacking a sense of location relative to the self (e.g. Table 3, examples 1, 4). Other cases involve bodily experiences occurring seemingly without a larger context (e.g. Table 3, example 6). I would argue that such microdreams are non-immersive and hence dreamless.

Other microdreams involve immersive (and seemingly hallucinatory) scene construction (e.g. Table 3, examples 11, 12), while yet others seem to be intermediate cases. The latter include incomplete self-other distinctions, such as overlapping experiences of self- and observed movement (Table 3, example 17), and incomplete scene construction, such as the experience of non-self-persons or objects appearing independently of a larger spatiotemporal scene, but nonetheless having a particular spatial location relative to the self (e.g. Table 3, example 18).

Non-immersive microdreams would still be useful for the microdynamic approach, but they would not be mini-versions of dreams, even in the reduced sense of minimal dreaming implicit in the simulation view. They would better be described as prequels to dreams, in which the core feature of self-centered world simulation was lacking or only incompletely expressed. Investigating these different cases might shed light on the gradual transition from non-immersive and hence dreamless to immersive, dreamful experience; more generally, it could provide important glimpses of the organization of conscious experience, including underlying complexities and nuances.

1 All tables and figures referred to in this commentary can be found in Nielsen (2017).
Should the Oneiragogic Spectrum Be Expanded?

Based on his analysis of microdreams, Nielsen proposes that the oneiragogic spectrum (Windt 2015a, chap. 11.2) be expanded to include spatiotemporal kinesis. The dimensions I originally proposed were (i) the gradual emergence of an integrated, largely hallucinatory visuospatial scene; (ii) changes in phenomenal-functional embodiment, or in the pattern of bodily experiences and their degree of causal coupling with the physical body; (iii) the emergence of a temporal reference frame, culminating in prolonged, narratively organized episodes; (iv) the integration of waking-memory sources; and (v) the integration with autobiographical memory and recallability.

I agree with Nielsen that kinesis is central for understanding both full-fledged dreaming and its precursors. While I did not include it as a separate dimension of oneiragogy, kinesis does play a role in my original classification. Kinesis is implicit in (ii) in the form of (illusory) self-movement; it is also often involved in (i) the emergence of visuospatial scenery and (iii) temporal and narrative organization, both of which are associated with an increase in dynamics.

Whether kinesis is best treated as a separate category as suggested by Nielsen or, as in my classification, carved up to include spatiotemporal kinesis, kinesis does play a role in my original classification. Kinesis is implicit in (ii) in the form of (illusory) self-movement; it is also often involved in (i) the emergence of visuospatial scenery and (iii) temporal and narrative organization, both of which are associated with an increase in dynamics.

Could there still be instances of immersive spatiotemporal hallucinations that lack kinesis entirely, both in the form of self- or observed environmental movement? Conceptually, this seems possible. Empirically, it is worth noting that in full-body-illusions, where multisensory conflict induces changes in experienced self-location and self-identification, both the participant and the avatar with which they identify stand still throughout the experiment (Lenggenhager et al. 2007). There are also reports of static dreams from stages 2 and 3 non-rapid-eye-movement (NREM) sleep that appear to involve a sense of self-location including visuospatial scenery (Noreika et al. 2009). Future research could investigate whether in these dreams, the sense of subjective duration is independent not just of events or narrative progression but also of any kind of experienced self- or observed environmental movement.

If it turns out that at least a subset of immersive and hence dreamful experiences does not involve kinesis, we might say that there are two distinct pathways leading into immersive dreaming. One would be dreamless sleep experiences arising in NREM sleep, where the transition from non-immersive imagery, sleep thinking, or even purely temporal experience (Windt 2015b) to immersive dreams occurs, at least initially, independently of kinesis. Static dreams would be an example. The other would be non-immersive microdreams at the lower end of the oneiragogic spectrum, where kinesis might be consistently associated with the emergence of an immersive (visuo)spatial scene. Kinesis, under the conditions of sleep onset, would then be a causally enabling, but not a necessary or sufficient condition for dreaming to occur. The pathways leading into dreaming might, in other words, be state-dependent, reflecting the differences in conscious state, responsiveness to external stimuli, level of brain activity, etc. that hold between e.g. drowsiness preceding sleep onset and the deeper stages of NREM sleep.

Can Insights from Microdreams Be Generalized to Full-Fledged Dreaming?

I think the answer to this question is clearly yes. I also think this is true even if microdreams (or a subset thereof) do not fulfill the conditions to count as even minimally immersive dreams. The analysis of microdreams can help identify and experimentally isolate the state-dependent, causally enabling conditions for dreaming to occur. Microdreams are oneiragoric in the sense of being experiences leading into dreams (Windt 2015a); they are informative, in part, because they provide a glimpse of the borderline state between waking and dreaming. This is true even if some remain in this borderland without crossing the threshold into full-fledged dreaming.

The multisensory integration approach, in which experimental stimulation during sleep onset can be used to probe the inherently kinetic character of microdream imagery formation, is a particularly good example. Incorporation rates for external stimuli are likely higher in drowsiness than in NREM or REM sleep; modality-specific differences (e.g. for tactile or vestibular vs. visual stimulation) between sleep stages might also exist. The microdynamic approach to sleep-onset experience can also help investigate characteristics that are necessary but not yet sufficient for immersive dreaming. Non-immersive spatiotemporal imagery, which is prominent even at the lower end of the oneiragogic spectrum, is an example.

Another advantage of looking to microdreams is methodological, having to do with the comparative ease with which microdreams “can be mined for evidence of features that define
dreaming’s phenomenal core” (p. 6), as exemplified by Nielsen’s upright napping procedure. To ensure that first-person reports of microdreaming have the required level of detail and specificity to capture the relevant features of experience—such as “here-and-now experience”—it might be useful to use detailed questionnaires or interviews. Verbal reports can be complemented by other reporting methods, such as drawings; training can help ensure participants have an adequate grasp of technical terms such as immersion. Exploring these different options may lead to more fine-grained phenomenological distinctions. Descriptions of sleep-onset experience can then be refined in concert with sleep-stage scoring. I think one of the strongpoints of Nielsen’s contribution is that it takes concrete steps in this direction. In sum, microdreams can help tackle the overabundance problem even though—or even because—a subset may not count as immersive and hence dreamful.

Funding
This research was funded by an Australian Research Council Discovery Early Career Researcher Award (DE170101254).

Conflict of interest statement. None declared.

References
Cheyne JA, Girard TA. The body unbound: vestibular–motor hallucinations and out-of-body experiences. Cortex 2009;45: 201–15.
LaBerge S, DeGracia DJ. Varieties of lucid dreaming experience. In: Kunzendorf RG, Wallace B (eds), Individual Differences in Conscious Experience. Amsterdam / Philadelphia: John Benjamins, 2000, 269–307.
Lenggenhager B, Tadi T, Metzinger T, et al. Video ergo sum: manipulating bodily self-consciousness. Science 2007;317:1096–9.
Nielsen T. Felt presence: paranoid delusion or hallucinatory social imagery? Conscious Cogn 2007;16:975–83.
Nielsen TA. A self-observational study of spontaneous hypnagogic imagery using the upright napping procedure. Imagin Cogn Pers 1992;11:353–66.
Nielsen TA. Describing and modeling hypnagogic imagery using a systematic self-observation procedure. Dreaming 1995;5: 75–94.
Nielsen TA. Dream analysis and classification: the reality simulation perspective. In: Kryger M, Roth T, Dement WC (eds), Principles and Practice of Sleep Medicine, 5th edn. New York, NY: Elsevier, 2010, 595–603.
Nielsen TA. Microdream neurophenomenology. Neurosci Conscious 2017;2017:nix001.
Noreika V, Valli K, Lahtela H, et al. Early-night serial awakenings as a new paradigm for studies on NREM dreaming. Int J Psychophysiol 2009;74:14–8.
Revonsuo A, Tuominen J, Valli K. The avatars in the machine: dreaming as a simulation of social reality. In: Metzinger T, Windt JM (eds), Open MIND: 32(T). Frankfurt am Main: MIND Group, 2015, 1–28.
Windt JM. Dreaming: A Conceptual Framework for Philosophy of Mind and Empirical Research. Cambridge: MIT Press, 2015a.
Windt JM. Just in Time—Dreamless Sleep Experience as Pure Subjective Temporality – A Commentary on Evan Thompson. In: Metzinger T, Windt JM (eds), Open MIND: 37(C). Frankfurt am Main: MIND Group, 2015b, 1–34.
Windt JM. Predictive brains, dreaming selves, sleeping bodies: how the analysis of dream movement can inform a theory of self- and world-simulation in dreams. Synthese 2018a;195:2577–625.
Windt JM. Consciousness and dreams: from self-simulation to the simulation of a social world. In: Gennaro R (ed.), Routledge Handbook of Consciousness. New York: Routledge, 2018b, 420–35.
Windt JM, Nielsen TA, Thompson E. Does consciousness disappear in dreamless sleep? Trends Cogn Sci 2016;20:871–82.