Dreaming: a psychiatric view and insights from the study of parasomnias

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Summary


This paper provides a psychiatric view of the psychological, experimental, and medical literature on dreams, along with insights gained from the study of parasomnias. The psychoanalytic theory of dreams developed by Freud considers dreams to be highly meaningful mental products, with unconscious processes playing a major role. However, it has been quite difficult to devise operational criteria to rigorously test this theory. With the discovery of REM sleep and the NREM/REM sleep cycle, sleep laboratory techniques facilitated the systematic sampling of dreams. Studies carried out to examine dreams focused on their individual context were hampered by small sample sizes. Studies of dreams from larger samples of subjects involved in a particular and often disturbing life circumstance posed various challenges in interpretation. Experimental manipulations of REM sleep and associated dreaming have been carried out, with various theoretical and methodological shortcomings. REM sleep deprivation studies have suggested that REM sleep, and associated dreaming, may perform vital functions. Studies on the childhood development of dreaming are also pertinent. The neurobiology of REM sleep as the primary source of data from which to make inferences on dreaming was pioneered by Hobson and McCarley in their “activation-synthesis” model (recently updated as the activation/input/modulation-AIM-model by Hobson), in which brainstem activation during REM sleep randomly stimulates the forebrain, which then attempts to “synthesize” the information into coherent dreams. In this model, dreams are not intrinsically meaningful, though some meaning may accrue through the forebrain’s efforts to “make sense” of its physiologically determined stimulation. Various problems with the activation-synthesis model have been identified. A recent critique by B. E. Jones discusses how brainstem activation of the forebrain can originate from highly ordered brainstem circuits that generate not only specific motor patterns but also complex organized behaviors. The possible relation to dreaming of the “hippocampal theta rhythm” in REM sleep is discussed. The “neuropsychology of dreaming” proposed by Solms is presented, based on the large study of neurological patients with widely distributed brain lesions. Neuroimaging techniques and their application to dreaming across the sleep-wake cycle are another new source of data. The second part of this article discusses abnormal dreaming with the parasomnias, which are the behavioral, autonomic nervous system and experiential disturbances that can accompany sleep. REM sleep behavior disorder is the prototypic dream-enacting parasomnia in which the characteristic generalized muscle paralysis of REM sleep, i.e. “REM atonia”, becomes compromised, allowing for behavioral release associated with stereotypically altered dreams involving the dreamer being threatened or attacked by unfamiliar people or animals. Sleepwalking and sleep terrors in adults, obstructive sleep apnea (OSA “pseudo-RBD”), nocturnal seizures and nocturnal dissociative disorders can also present with dream-enacting behaviors. The recently identified “epic dream dis-
Introduction

The contemporary student of dreaming is faced with a wide, disparate, and potentially bewildering array of sources of data as well as theoretical views. Workers in this area have drawn material from such areas as the intensive clinical study of individual dreams, systematic samples of recalled dreams, experimental manipulations of REM sleep and dreaming, neurobiological studies of REM sleep, lesion and imaging studies, and a variety of others. Indeed, in this paper, we will consider a new source of data, changes in dreaming seen in certain sleep disorders. How best to consider material from these varied sources, and how to assess the adequacy and usefulness of the different theoretical models available to account for this material, are complex and difficult questions. In what follows, we shall present some of the major areas of data, important findings, inferences drawn, and implications for the different extant theoretical models. In Part II, various insights on dreaming from the study of parasomnias will be considered, including the presentation of altered dreaming associated with dream-enacting behaviors.

Part I:

Dreaming as seen from a range of approaches

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Intensive clinical study of dreams

There has perhaps been no better opportunity for the intensive, in-depth study of individual dreams in their subjective context than that afforded in clinical work. Here dreams can be explored with maximal knowledge of the dreamer’s present-day circumstances, past history, salient inner themes and conflicts, idiosyncratic subjective meanings and modes of thought, and, importantly, relationship to the person to whom the dream is reported. The most rich, comprehensive, and influential theory to be devised from clinical work is the psychoanalytic, initially developed by Freud [1] and elaborated and modified by many contributors since. This model will be described in some detail, both because of its importance in thinking about dreams and the fact that it deals with so many of the key issues that need to be considered in a theory of dreaming.

The psychoanalytic model understands dreams to be highly meaningful mental products. Their nature is determined both by general principles of mental functioning and particular circumstances obtaining during sleep (predominantly REM sleep, according to present understanding). Unconscious processes play a major role in the construction of the dream; such processes follow, as in waking mental life, different laws, called primary-process mechanisms, than do conscious thought processes (which utilize secondary-process mechanisms). The dream is an attempt at the fulfilment of a wish; the wishes that serve as the motive force for dreams are conflicted instinctual, i.e. sexual and aggressive, wishes that can ultimately be linked to childhood sources. During sleep, the controlling/inhibitory forces that deal with these wishes are weakened but not absent; a motor blockade helps protect from enactment of the wishes. The meaning of the dream is not apparent in the “manifest content” of the dream, or the dream as recalled by the dreamer, but is to be found in the “latent content”, which includes the unconscious wishes. Processes of association to the manifest elements of the dream are required to uncover the latent dream. The latent content is transformed into the manifest content by the unconscious, primary-process mechanisms which include condensation, the combining or fusion of two or more elements into a single one, and displacement, a shifting of emphasis from one element to a different one. Symbolisation is also involved in the transformation of the latent into the manifest content of the dream. Since the wishes are conflicted, they must be disguised so as not to arouse excessive anxiety and disturb sleep; the primary-process mechanisms subserve this need for censorship, which is diminished but still present during sleep. If disguise fails and the dream arouses excessive anxiety, a nightmare with awakening may result. (Another mechanism for nightmares may be the need to actively replay a traumatic situation that was originally experienced passively, i.e. without preparedness or control, in an effort to obtain mastery, though it is not certain whether this is truly distinct from the more usual processes that enter into dreaming.) The manifest dream also contains “day residues”, or thought processes typically from the previous day, which
are the point of contact between the unconscious wishes and the dreamer’s current concerns. The mental activity of the dream is blocked from motor output due to the state of sleep (particularly REM sleep), and undergoes a regressive process in which the dream is represented perceptually, as a hallucination.

The psychoanalytic model can be seen to encompass hypotheses about the dream’s meaningfulness, the kind of mental material (conflicted wishes; diminished inhibitory structures) with which it deals, the nature of the thought processes which enter into its construction, and its connection to ongoing life concerns and experiences. A technique for understanding the dream’s meaning, and placing it in the context of the individual’s present-day life and his or her significant conflicts and past history, is also part of the model. Indeed, with the expansion over time of general psychoanalytic theory, the conceptual richness that can be brought to bear in understanding dreams has also grown. For example, developments in conflict theory, the theory of object relations (internal relatedness to people), and the understanding of narcissism (development of the self and self-esteem) all add scope and depth to the possibilities for comprehending dreams.

The richness, complexity, and specificity of the psychoanalytic model are commensurate with and faithful to the nature and quality of the individual dream experiences which they are intended to elucidate. At the same time, these very strengths have made it difficult to develop truly adequate and satisfactory experimental approaches for testing the model. This has led some to question its scientific status, e.g., [2], but the difficulty may be more a reflection of the very complexity that gives the theory its special value, the fact that it deals with unconscious, covert elements that cannot be apprehended in a simple or direct way, and that some of its postulates deal with fundamental elements of mental functioning in general that are not easily testable in the narrow realm of dreaming. In any case, the challenge of devising studies that engage essential aspects of the model and satisfactorily operationalize key concepts has proven to be quite difficult.

In-depth laboratory studies of dreams

When, with the discovery of REM sleep and elaboration of the NREM/REM sleep cycle [3, 4], sleep laboratory techniques became available for sampling dreams systematically and more immediately after their occurrence, a number of studies were carried out that made serious efforts to examine dreams in an intensive way, with detailed attention to their individual context and potential subjective meanings. Associations to dream elements were collected, and in-depth information about the dreamers’ mental life was obtained, or often was available due to subjects being psychotherapy patients. Interesting preliminary findings were made. For example, evidence was found that suggested the dreams of a particular night may deal with the same emotional conflict, or a limited number of conflicts [5]. Exploration of which of a night’s dreams a subject will or will not report to either the experimenter who awakens them or a psychiatrist interviewing them the following day suggested that dreams, or aspects of dreams, that contain areas of interpersonal conflict (often not conscious), especially where these conflicts involve the person to whom the dream is to be reported, tend not to be reported or to be defensively altered [6]. Unfortunately, conceptually rich studies such as these tend to be highly labour-intensive, such that sample sizes are very small, and difficult to generalize from, given the uniqueness of individual subjects and often the use of subjective judgments based on large amounts of material as measures. Over time, such studies became increasingly rare, to be replaced by approaches utilizing easily operationalized measures which unfortunately tended to deal only with more concrete and narrow aspects of dreams (e.g., numerical counts of the characters in the dream, the incidence of recent vs. older memories, etc.) without reference to the dream’s overall meaning and significance or the guidance of an overarching theoretical perspective.

Large-sample studies of dreams

Another approach has been to collect dreams from larger samples of subjects who are involved in a particular life circumstance, often a disturbing one, and study how the circumstance, and efforts to cope with it, may be reflected in dreaming. Perhaps best known is the work of Cartwright on dreaming in people undergoing divorce [7]. She obtained dreams in the laboratory from 70 subjects who were separated and anticipating divorce, 40 of whom were judged depressed about their pending divorce and 30 who were seen as not depressed. She reported that the depressed subjects had more dreams with negative feeling than those who were not depressed, indicating that daytime mood is reflected in dreaming. The figure of the spouse was found to appear in the dreams of those who were depressed about the divorce much more often than in the
dreams of subjects judged to be coping well. This suggested that dreams reflect emotionally distressing issues from waking life. The final reported finding was that among the depressed subjects, those who incorporated the spouse in their dreams were more likely to be doing well at one-year follow-up than those who did not incorporate the spouse. Cartwright interpreted this finding to indicate an adaptive, emotional problem-solving function for dreaming: those subjects who dreamt about the spouse were working on the problem of the divorce in their dreams, and therefore more likely to have a favorable outcome. This last interpretation would be more compelling if data were presented that elucidated why, among non-depressed subjects, absence of the spouse in the dream was a reflection of successful coping with the divorce, whereas among depressed subjects, non-appearance of the spouse indicated a lack of adaptive, problem-solving efforts. This difficulty reflects the broader limitation that much potential richness and specificity is lost when single elements are abstracted from dreams and understood only in a rather literal fashion. It is likely that struggles regarding the divorce were reflected in a variety of other ways in subjects’ dreams than simply by direct incorporation of the spouse, and that these struggles differed qualitatively among subjects in ways that might be linked more convincingly to the prognosis for a good outcome. Also, as Cartwright notes, it is difficult to know whether adaptive efforts reflected in dreaming indicate an adaptive function for dreaming or merely that dreams reflect what is happening, including adaptive efforts, elsewhere in a person’s life.

It becomes possible to appreciate some of the data in a more multidimensional way when a number of dreams from each of several individual subjects, along with their related life circumstances and typical modes of functioning, are discussed [8]. Most compelling is Cartwright’s demonstration that the dreams reflect a subject’s overall coping capacities and strategies, however effective or limited. Some of the interpretations of the meanings of individual dreams also seem quite cogent, but in other cases, without associations to elucidate individual elements of the dreams or richer, more in-depth data about the subjects’ inner lives, the interpretations can seem somewhat arbitrary, deriving from rather generic application of some known significant themes in the subject’s life, assessment of where the content falls on some “dream dimensions”, etc. In addition, relying a fair amount on subjects’ own interpretations and inferences about their dreams makes appreciation of deeper unconscious levels less likely.

Hartmann [9] has drawn on a similar source of data in formulating his view of dreaming. He has studied series of dreams reported by subjects over a period of time after experiencing a psychological trauma, and regards severe trauma as a paradigmatic situation for understanding dreaming. He reports that initially, subjects have dreams that reflect raw feelings of terror, being overwhelmed, etc., as in a dream of being threatened by a tidal wave. Working with a neural nets model of the mind, he sees dreams as acting to make connections, in a much broader way than waking mental activity, and in an “autoassociative” mode. Guided by the dreamer’s emotion, the dream connects the trauma and related emotional material, in order to “contextualize” the dominant emotion in the form of an explanatory metaphor. Over time, the dream connects the experience of the trauma more and more broadly with emotionally similar material from the dreamer’s life, experience, and mind, and the trauma becomes more and more integrated. The process functions both to calm the immediate emotional storm and to promote more ready integration of similar traumas in the future.

The findings and ideas are certainly of interest, though a number of questions may be raised, including some similar to those about Cartwright’s work. The singling out of particular elements from dreams, and application of a single interpretive paradigm, at times in the absence of the dreamer’s associations, may result in a loss of richness, comprehensiveness, and specificity in understanding the dream. That dreams employ broad connections seems clear; it is less compelling that the function of the dream is to make such connections, or that emotions, which are undoubtedly important in dreams, act to guide the dream in this process of making connections. The central place that the model assigns to trauma in dreaming does not easily fit with the fact that the cyclical occurrence of dreaming during the night and its ontogenetic development are largely preprogrammed rather than reactive to trauma; in addition, the role of internal psychological conflict appears somewhat marginalized. In extending his model to “ordinary” dreams, i.e. dreams that do not follow a trauma, Hartmann suggests that such dreams too function to deal with the dreamer’s dominant emotional concern, but that the concern may not be apparent or there may be a number of such concerns active simultaneously, making the working of the dream more obscure. However, it may also be that the model cannot as readily accommodate ordinary dreaming. When moving from trauma to more typical dominant emotional concerns, Hartmann may be in a realm with some conceptual overlap.
with persistent internal conflict, but it is not clear that the level of explanatory power is preserved. In emphasizing an adaptive function for dreaming, Hartmann is in agreement with a number of contemporary theorists from a variety of disciplines.

Basic physiology of REM sleep

The basic parameters and physiology of REM sleep, as the stage of sleep in which most dreams occur, have been utilized as another source of data for approaching an understanding of dreaming. The regular, cyclic, and essentially universal occurrence of REM sleep indicates that the occurrence of dreaming is largely preprogrammed and not, as suggested in earlier psychoanalytic thought, a more happenstance occurrence dependent on the chance arousal of an instinctual wish. The muscle atonia which is distinct to REM sleep is consistent with the idea that a motor block plays an important, in part protective, role in processes of dreaming, and supports the idea that it is the state of REM sleep in particular rather than sleep as a whole that is most facilitative of dreaming. The sheer quantity of dreams is such as to suggest that defensive processes, i.e. repression, cannot account for the majority of dream forgetting; indeed, research has indicated that an awakening during or shortly after an REM period may be necessary for a dream to be committed to memory [10], after which forgetting may indeed be determined by psychological defense as well as other factors. Finally, the cyclic episodes of penile erection in men and vaginal blood engorgement in women occurring in close temporal association with periods of REM sleep suggest processes of physiological drive activation during REM consistent with an important role for instinctual drives, and related wishes, in dreaming.

Experimental manipulations of REM sleep/dreaming

A variety of experimental manipulations of REM sleep and associated dreaming have been carried out in an effort to better understand the nature, process, and function of dreaming. Subjects have been exposed to a wide range of stimuli both during REM sleep and before going to sleep in an effort to see whether and how dreaming is affected. Stimuli presented during REM sleep may be incorporated in the ongoing dream both directly and in a transformed manner; the frequency of incorporation varies with the kind of stimulus. In an early study of this kind, by Dement and Wolpert [11], the stimulus most frequently incorporated in the dream was a spray of water on the skin, at a rate of 42%; the least frequent was a 1000 hz tone, at a rate of 9%. An example of a direct incorporation of the spray of water was the dreamer “being squirted by someone”; an indirect incorporation was “a leaking roof”. Most often, rates of incorporation of stimuli applied during REM sleep have been found to be relatively low and such incorporations as do occur typically have relatively little impact on the dream as a whole [12]. Rechtschaffen was impressed by this relative imperviousness of the dream to external stimulation, and the dream’s tendency to follow its own, endogenously determined course, in formulating his view of “the single-mindedness and isolation” of dreams. The effects of a variety of pre-sleep experiences on subsequent dreams have also been studied, including exposure to films with aggressive, sexual, or anxiety-provoking content and deprivation of water and food. Here too, it has often been reported that direct and straightforward effects on the content of dreams are relatively infrequently present. However, many of these studies may have been limited by significant methodological and theoretical shortcomings: without consideration in some depth of a subject’s particular psychology, it is difficult to know whether a generic type of pre-sleep experience will impinge on the subject’s areas of conflict and if so in what way, creating ambiguities both for the expectation and the assessment of incorporation in dreams. A study in which dreams were collected after experiences that were stressful in known, personally distinct ways, such as participation in group therapy sessions where the subjects’ problems were the focus for the group, and in which dream content was studied, including exposure to films with aggressive, sexual, or anxiety-provoking content and deprivation of water and food. Here too, it has often been reported that direct and straightforward effects on the content of dreams are relatively infrequently present. However, many of these studies may have been limited by significant methodological and theoretical shortcomings: without consideration in some depth of a subject’s particular psychology, it is difficult to know whether a generic type of pre-sleep experience will impinge on the subject’s areas of conflict and if so in what way, creating ambiguities both for the expectation and the assessment of incorporation in dreams. A study in which dreams were collected after experiences that were stressful in known, personally distinct ways, such as participation in group therapy sessions where the subjects’ problems were the focus for the group, and in which dream content was studied in light of knowledge of the dreamer’s salient issues, modes of adaptation, etc., reported high rates of incorporation in the dreams of the conflicts stirred up by the pre-sleep experiences [13].

A study that is of particular interest both for its theoretical clarity and relevance and the appropriateness of the measure employed is that of Shevrin and Fisher [14]. Here the pre-sleep stimulus to which subjects were exposed was a special subliminal stimulus that had previously been demonstrated to evoke both primary- and secondary-process levels of responses which could be scored in a precise, objective fashion. In free associations obtained after awakenings from subsequent REM and NREM sleep, it was found that primary-process associates to the pre-sleep stimulus predominated after REM-sleep awakenings.
whereas secondary-process associates predominated after NREM awakenings. These findings support the psychoanalytic view that primary-process modes of cognitive functioning predominate in association with dreaming, at least that which occurs during REM sleep. The use of sublimal stimulation provided a means for tracking unconscious influences on thought processes in association with REM/dreaming and NREM sleep.

A very extensively utilized experimental manipulation has been the deprivation of REM sleep, usually by procedures that awaken subjects whenever they begin to enter REM. Pioneered by Dement, this method has consistently demonstrated that subjects deprived of REM sleep make increasingly frequent attempts to enter that stage (“increased REM pressure”). And, after REM deprivation is terminated, show a compensatory increase in REM time (“REM rebound”). These findings suggest that REM sleep and associated dreaming perform a vital function. An early hypothesis, based in part on psychoanalytic thought, was that subjects deprived of REM sleep (and associated dreaming) would become psychotic, with the dream-like mentation spilling over into wakefulness, but this was not borne out [15].

A number of studies in cats, rats, and mice have provided evidence that prolonged REM sleep deprivation leads to hypersexual and/or hyperaggressive behavior during wakefulness. A striking early description of hypersexuality provided by Dement and colleagues was of male cats who, during prolonged REM deprivation, would make persistent efforts to mount other male cats, awake or anesthetized, behavior not seen in any other circumstances [16, 17]. Although some of the early work was not presented in fully quantified form, and must be seen as exploratory and suggestive, it is lent additional credence by later, more formal experimental reports that similarly found hyperaggressive and hypersexual behavior with REM deprivation (e.g., in rats, [18–20]). It has also been found that REM deprivation leads to an increase in intracranial self-stimulation behavior (ICSS) in rats [21]. These findings are consistent with the view that REM sleep and associated dreaming are importantly involved with basic drives and pleasure-seeking manifestations of which increase during wakefulness when REM sleep is decreased. And conversely, ICSS behavior in REM-deprived rats has been reported to result in a reduction of REM rebound [21], while electrical stimulation of hypothalamic defense (rage) reactions in cats results in both a decrease in subsequent REM sleep and, in REM-deprived animals, a decrease in subsequent REM rebound [22], findings suggestive of reciprocal elements in the relationship between REM sleep and drive.

REM deprivation has also been used extensively to investigate the hypothesis that REM sleep (and perhaps associated dreaming) is important in learning and memory consolidation. Subjects, often animals, have been exposed to a new learning task and then deprived of REM sleep, with the expectation that impairments in learning would result. Early studies yielded mixed results; more recent efforts, and conceptual refinements, may be yielding more clear-cut evidence of such a relationship [23, 24], but this remains an area of controversy [25].

Childhood development of dreaming

An important approach to understanding dreaming is the study of its childhood development. REM sleep (or active sleep, its developmental precursor) occupies about 50% of sleep time at birth; this decreases to around the adult level of 20–25% by ages 3 to 5 years. It is very difficult, however, to ascertain what this means for dreaming; the younger a child is, the more limitations in conceptual and linguistic abilities, and in memory, complicate determination of what the child experiences during REM sleep. In laboratory studies, dreams have been obtained from children as young as 2 years of age [26], though dream recall is reported to be much less frequent the younger the child. Foulkes, who has done the most extensive work in this area, reported that a median figure of only 15% of REM awakenings in children ages 3 to 5 yielded dream reports. He characterized the dreams of very young children as brief and static, with barnyard animals the most frequent characters and body states often represented. Only gradually, with development to the 7 to 9 year age range do dreams come to include such features as social interaction, an active self character, locomotion or other movement, and a narrative quality [27]. Foulkes links these developmental changes in dreaming to the child’s overall cognitive development, according particular importance to the development of visuo-spatial skills in being able to have dreams that are complex narratives. In addition to uncertainties stemming from the difficulties in accessing young children’s dreams mentioned above, some questions have been raised about how accurately laboratory-collected dreams reflect actual dreaming experience in very young children, given differences from impressions obtained from parents, who are much closer to the children than...
the experimenter, and from clinical populations [28, 29]. However this may be, it is an observation of central importance that dreaming undergoes a process of development that must be seen in the context of the child's developing cognitive capacities.

Foulkes seems on much weaker footing in his view that the contents of children's (and also adult's) dreams are not very different from ordinary cognitive activity, representing the operation of typical waking consciousness except for the absence of external sensory input and of self-control of ideation. He sees these conditions as leading to relatively mundane, but novel, combinations of knowledge and memory. Unconscious processes, internal conflicts, intense feelings, disguise, etc. have no place in this model. But absent a means of evaluating, in their individual psychological context, what the elements in the dreams he collects may signify to the (child) dreamer, there is no way of determining whether the dreams have meanings other than what taking their manifest character at face value would suggest. Indeed, one of Foulkes' own findings, that barnyard animals are the most frequently occurring characters in preschool children's dreams, suggests a view quite different from his own. If dreams simply draw upon and combine knowledge and experience in novel yet mundane and realistic ways, one would expect the child's parents and siblings, the most frequently present (and important) characters in its life, to be the most common characters in dreams, rather than animals with which the child may have little direct experience and may know mainly from stories, fairy tales, movies, etc. However, such animals appear in imaginative products that appeal to children precisely because of their value in representing, and at one remove, the child's troubling impulses (e.g. biting, devouring, messing, sexual urges), frightening images of the parents, and other elements of the internal conflicts that occupy such an important place in the child's inner life [30]. Their frequent appearance in dreams suggests that the dreams too deal with such impulses and internal conflicts in ways that may not be immediately apparent.

Neurobiology of REM sleep

Another approach to understanding dreaming has been to utilize the increasing knowledge of the neurobiology of REM sleep as the primary source of data from which to make inferences. Here, the distance between the data and the intended object of study, dreams and dreaming, grows wider, and the possibilities for error or bias to lead the inference process astray become proportionately greater. The most widely known and influential such attempt is the activation-synthesis model of Hobson and colleagues [31], a group who have been major contributors to the understanding of the sites and neurochemical interactions in the brainstem involved in the generation of REM sleep. The model was derived by direct interpretation of the neurophysiology, based on what the authors term "mind-body isomorphism", an assumption of an "identity of form" between physiological and psychological events. It leans heavily on the fact of the generation of REM sleep in the pontine brain stem. In the activation portion of the model, the brainstem is seen as providing largely random, direct stimulation of the forebrain, for example of the oculomotor, vestibular, and motor systems, accounting for the predominance of visual and movement elements in dreams. The forebrain then attempts to "synthesize" the information that has been generated in the pontine brain stem: "Best fits to the relative inchoate and incomplete data provided by the primary stimuli are called up from memory, the access to which is facilitated during dreaming sleep." In this, "the forebrain may be making the best of a bad job in producing even partially coherent dream imagery from the relatively noisy signals sent up to it from the brain stem". The model explains bizarre formal qualities of dreams, such as spatiotemporal distortions, condensations, and discontinuities, as the direct result of the random pattern of brainstem stimulation. Dreams in this view are not essentially meaningful, though some meaning may accrue secondarily through the forebrain's efforts to make sense of its physiologically determined stimulation.

Fundamental problems with the activation-synthesis model were identified from the time of its inception. In an early critique, Vogel [32] pointed to three such issues. He noted that the assumption that a particular temporal discharge pattern of brainstem neurons would cause particular qualities in mentation, including "bizarre" formal qualities, was entirely arbitrary. In laboratory dream research, the bizarre formal qualities in dreams have been found to be much less common than the model would suggest [33], and efforts to correlate these qualities in actual dreams with indicators of phasic activation from the brainstem have generally shown weak relationships at best [34]. Second, the model overstates the role of the brainstem; evidence was available even at that time that in the intact animal, forebrain structures interact importantly with the brainstem sites in the production of REM sleep. Finally, a considerable amount of
dreaming that is indistinguishable from REM-sleep dreaming occurs in NREM sleep, when the physiological processes upon which the activation-synthesis model bases its explanation of dreaming are not found.

Laboratory dream researchers such as Rechtschaffen and Foulkes have particularly emphasized in their criticisms of the activation-synthesis model their lack of fit between the relative coherence and organisation of most dreams and what the activation-synthesis model would suggest. In Rechtschaffen and Siegel’s words [35], “some scholars have proposed that dreams arise from random brain activity, but dreams are not kaleidoscopic jumbles of visual fragments; they are organized thematically and perceptually”.

In a recent, important critique, Jones, herself a central contributor to the understanding of the neurobiology of REM sleep for more than three decades, argued that Hobson and colleagues had interpreted the physiology in an arbitrary fashion [36]. She emphasized two points: first, the absence of evidence to support the idea, fundamental to the model, that the brainstem activation of the forebrain is chaotic. She noted that on the contrary, brainstem circuits are highly ordered, generating not only specific motor patterns but also “complex organized behaviors … including sexual and rage behaviors that persist in decerebrate animals”. The latter behaviors are “instinctual and highly motivational, perhaps stimulating the wishes that emerge in dreams”. She also cited evidence that the cortex, far from having no control over the brainstem in REM sleep and dreaming, has influence “over the very neurons shown to be critical for the initiation and maintenance of REM sleep in the pontine reticular formation”. Elimination of these cortical inputs results “in a complete impoverishment of both rapid eye movements and PGO spikes, reducing them to the very stereotypic, highly ordered and hence low-information-content pattern of purely brainstem driven activity”. She suggested she “might posit that the physiology of REM sleep provides considerable support for Freud’s basic assumptions, according to which instinctual and highly motivational impulses arise from the brainstem and are in turn worked upon by the cortex where condensation, displacement, and symbol formation may control the continued activity of the brainstem and provide the complex and seemingly bizarre, though meaningful, content of dreams” [36].

Other difficulties with the activation-synthesis model are indicated in the sections below on lesion and imaging studies. Although the model has the virtue of drawing attention to developments in neurobiology and the potential for utilizing them in understanding dreaming, the specific effort is so flawed by the arbitrary, even tendentious, quality of its inferences as to have limited value in advancing our understanding.

Over time, some expansion in the activation-synthesis model began to allow for a greater and more functional role for the forebrain, particularly in learning and memory consolidation. In its most recent form, the “AIM” model, it attempts to explain in neurobiological terms the entire spectrum of “brain-mind” states based on where they fall on three dimensions: level of brain activation (“A”), thought to account for the quantity, complexity, and intensity of mental activity, source of input (“I”), either from external sensory or internal sources, and neuromodulatory balance (“M”), the ratio of aminergic to cholinergic influence, thought to account for mode of cognitive functioning, including the degree of directed thought, self-reflective awareness, emotion, insight, and memory [37]. REM sleep and its associated dreaming are then understood as comprised of a high level of activation (hence the intense mental activity), internal rather than external input, and aminergic demodulation, accounting in part for the diminution of directed thought, self-reflective awareness, “insight” into illogical elements, and memory.

Unfortunately, many of the fundamental shortcomings of the activation-synthesis model are retained. The “chaotic nature of the pontine auto-activation process” continues to be seen as an important factor in the bizarre qualities of dreaming. More broadly, the view is maintained that the brain in dreaming functions in a kind of fragmentary, un-integrated fashion; the brainstem stimulates many disparate elements of cognitive activity which the forebrain then has to “synthesize”. However, more coherence and organisation do come into play in the AIM model in the idea that emotion has a role in shaping dream plots. The hypothesis that aminergic demodulation is connected to some of the cognitive properties of dreaming will need to be tested, but it is a confusion of levels of discourse (psychological, neurobiological) to think this would “explain” those cognitive qualities as opposed to elucidating their neural correlates. Explanations of properties of mental activity must reside in the first instance in grasping their psychological nature and significance. The approach is greatly colored by the view that dreams are deficient, and in many ways pathological, forms of mental activity, seen in the pervasive use of terms like “hallucinosis”, “delusion”, and “lack of insight”; the task in understanding dreams becomes
in effect one of searching out their pathophysiology.

Other perspectives on dreaming have been developed from the neurobiology that follow more closely from the actual data. Winson [38,39], relying primarily on animal studies, has drawn creatively on neurobiology in conjunction with evolutionary findings on REM sleep and experiments in learning. His work centres on hippocampal theta rhythm, which has been shown to occur during wakefulness in a variety of subprimate mammals in situations in which species-specific behaviors important for survival are engaged, and also throughout REM sleep in subprimate mammals. Theta rhythm plays an important role (through “Long Term Potentiation”) in the storage of memory. And, in unit cell recordings from rats, hippocampal cells that have been active in encoding spatial information during prior wakefulness fire more frequently during subsequent sleep. Winson hypothesizes that during REM sleep, experience that pertains to species-specific behavior important for survival is integrated with past experience to form new behavioral strategies. He links this to findings regarding the evolutionary origins of REM sleep, and the adaptive necessity for a means of processing new information “off-line”, i.e. during sleep. In humans (who also may have theta rhythm [40,41]), he extends the hypothesis to suggest that in REM sleep, and dreams, it is information pertaining to specific behaviors that must be integrated but rather all waking experience that pertains to “psychological survival”. Here he links his thinking to authors such as Cartwright who propose an adaptive function for dreaming. He further notes that the intricate associations regarding relevant or similar events that emerge during the integrative process in dreaming are “strongly biased toward early childhood experience”. Winson believes that it is at about the age of two, when the hippocampus becomes functional, that REM sleep and dreaming take on their integrative memory function in humans.

An important strength of this interesting view is that it anchors its understanding of dreaming in animal findings and evolutionary considerations, through the association of dreaming with REM sleep. Winson feels that his hypothesis implies a very different view of the unconscious and associated brain functioning than Freud’s, but there may be a considerably greater degree of correspondence than he recognizes. For in humans, central issues involved in “psychological survival” originate in “early childhood experience” and have to do with the management of wishes and passions which become highly conflicted in the context of the development of crucially important dependent and loving relationships as well as an integrated and cohesive self. The model emphasizes an adaptive function, in agreement with a number of other recent views. It is not clear whether its concept of species-specific behaviors necessary for survival can fully encompass the findings regarding the relationship between REM sleep and drive that were discussed above.

Jones has evolved views of dreaming that draw predominantly upon a broad and rich range of elements of the neurobiology of REM sleep, as well as some of the perspectives of Winson. She emphasizes that the brainstem may provide “fundamental, species-specific information of complex sensorimotor behavioral programs”; “… this fundamental information … is also modulated and elaborated in the normal intact animal by forebrain and cortical processing and descending feedback to the brainstem … Thus. dreams may be made of fundamental sensorimotor and behavioral programs important in development, but these must also be modulated and elaborated by complex learned material throughout adult life” [42]. As indicated above, she notes that the behavioral patterns are “instinctual and highly motivational” [36], and perhaps relates them more broadly to drive than does Winson. She does emphasize the important role of theta rhythm in consolidating and potentiating new learning in regard to species-specific instinctive behaviors, and has contributed to the understanding of the role of cholinergic neurons in the basal forebrain in stimulating theta rhythm in the cortex during REM sleep [43]. Elsewhere, citing evidence from EEG spectral analysis, she has also noted that “the coherence in gamma activity between distant cortical areas is as high in REM sleep as during the most aroused waking states”, and that there are similar findings for the coherence of theta activity. This suggests “the possibility for integrated activity across widely distributed cortical regions” during REM sleep [44], consistent with a view of dreaming as highly organized mental activity.

Lesion studies

A very significant new contribution to the study of dreaming and its relation to the brain has been made through the approach of examining changes in dreaming that occur with lesions in different areas of the brain. Although numerous scattered reports of small numbers of subjects or particular types of lesions have appeared in the literature for many years, it was Solms’ contribution to sys-
tematically study a large sample of 332 neurological patients with widely distributed lesions and combine his findings with the earlier reports collated from the literature [45]. In his clinicoanatomical approach, Solms correlated reported changes in dreaming with the site of the lesion and the associated clinical syndrome and deficits, and utilized the findings to develop a neuropsychology of dreaming. An important strength of the approach is that it links data concerning the brain directly with reported qualities of dreams, rather than relying on indirect inferences based on previously understood relationships between areas of the brain and aspects of mental functioning and on the association between REM sleep and dreaming. A major finding was that there are two areas of the brain in which lesions led to complete cessation of dreaming. One area is at or near the parietal-temporo-occipital (PTO) junction; both unilateral and bilateral PTO lesions had this effect. Solms understood the loss of dreaming as based on this area supporting “various cognitive processes that are vital for mental imagery”, the right PTO area being essential for concrete spatial cognition and the left PTO area for quasi-spatial (symbolic) thought. The second type of lesion which led to cessation of dreaming was bilateral deep frontal lesions. Solms understood this effect as due to damage to fibers that connect the dopaminergic ventral tegmental area to the limbic system and frontal cortex, circuits that have been thought to be essential for instigating appetitive interactions with the world (the “seeking” or “wanting” command system), as well as for the regulatory elaboration of appetitive drives into adaptive form. Solms inferred that these motivational functions are also essential for dreaming, and that the “wanting” system may be the instigator of dreams. Both types of lesion associated with cessation of dreaming are located in the forebrain, and do not have any effect on REM sleep, as seen in laboratory studies.

A number of additional findings offer considerable further clarification of the cognitive functions and brain structures involved in dreaming. Loss of visual imagery in dreams occurs with lesions in visual association, but not primary visual, cortex; these patients experience concomitant loss of the capacity to conjure up visual imagery while awake. Other imagery modalities in dreams for which there were data available, including somatosensory, somatomotor, audioverbal, and motor speech imagery, appear to be unaffected by lesions in the corresponding areas of unimodal cortex which profoundly affect these functions during wakefulness. These findings provide evidence that “the perceptual and motor images we experience in our dreams are not simple, isomorphic products of nonspecific activation of perceptual and motor cortex during sleep; highly complex heteromodal representational mechanisms appear to be involved in the active construction of the manifest dream” [45]. Lesions in various anterior limbic structures lead to an inability to distinguish dreams from reality, often in conjunction with increased frequency and vividness of dreaming, and, during wakefulness, loss of reality testing, visual hallucinations, and delusions. This suggests that these structures are involved in exerting an inhibitory influence on the occurrence and intensity of dreams and dream-like mentation. Lesions in the dorsolateral prefrontal cortex, a region essential for executive functioning, self-monitoring, and volitional control, have no effect on dreaming, suggesting that those functions are not significantly involved in the dreaming process.

Solms’ findings provide neuropsychological evidence that the forebrain has a crucial, specific, and highly differentiated role in the dreaming process, with a variety of structures acting together in a concerted fashion. They support the view that dreams are “actively constructed through complex cognitive processes”. Many specific qualities of dreams can be accounted for on the basis of the particular configuration of forebrain structures involved.

Solms [46] argues for an essential detachment of dreaming from REM sleep and the brainstem, viewing REM sleep as only one of many sources that can activate the dreaming mechanism, which he locates entirely in the forebrain. However, this view cannot encompass the kinds of neurophysiological, neurobehavioral, and adaptive considerations related to the role of the brainstem in dreaming that were discussed above in the work of Jones and Winson, and more generally removes the study of dreaming from possible links with findings in animal research and evolutionary considerations. Although the subjects with brainstem lesions in Solms’ study and some other published reports did not report loss of dreaming, it has not yet been demonstrated that lesions in the brainstem that eliminate REM sleep do not lead to cessation of dreaming. Imaging studies (discussed below) have shown that the complex pattern of activation and deactivation of forebrain structures that Solms has connected with dreaming is consistently seen during REM sleep, but has not been found during NREM sleep (though the possibility that there are brief periods during NREM sleep when dreaming occurs and this activation pattern is seen has not been fully investigated). Similarly, the muscle atonia which apparently evolved to help protect against acting out of dreams is only found during
REM sleep. Finally, new findings on alterations in dreaming in patients with REM behavior disorder (also discussed below), a condition understood to result from neurodegenerative processes in the brainstem, provide evidence that the brainstem does indeed play a role in dreaming beyond that of mere activation. These findings strongly point to a more integral connection between REM and dreaming than in Solms’ model.

Imaging studies

The development of neuroimaging techniques and their application across the sleep-wake cycle is providing another valuable new source of data for the understanding of dreaming and its relation to the brain. The approach used in most studies to date has been to investigate the pattern of brain activation/deactivation during REM sleep, and compare it with NREM sleep and/or wakefulness. Prior knowledge of the functions of different regions and areas of the brain is then utilized to form a picture of mental processes during REM sleep, and by implication in dreaming. This approach permits a relatively broad-brush view to be developed of what brain regions, functions, and organisation may be involved in dreams. Although different imaging techniques and experimental procedures have been used by different groups, consistent findings have emerged [47–49]. A very specific, selective pattern of activation of forebrain structures during REM sleep suggests that the brain is organized to carry out particular functions in a concerted manner. Overall level of activity is high; structures in the brainstem, thalamus, and basal forebrain that mediate arousal are activated.

Particularly striking is the finding that parts of the hypothalamus, and the limbic and paralimbic systems, are more highly activated than during waking, suggesting a major involvement of emotion and drive (in sharp contrast to the activation-synthesis view that the dream process has little or no primary volitional or emotional content). The activation of the amygdala may be linked to the role of anxiety in dreaming. On the other hand, widespread deactivation of the dorsolateral prefrontal cortex found by most, but not all, of the groups correlates with diminished executive functioning in dreams. Overall, the imaging findings regarding forebrain structures involved in REM sleep are quite consistent with Solms’ lesion findings on forebrain structures in dreaming, each thereby lending additional credence to the other (though the imaging findings have not provided support for Solms’ detachment of dreaming from REM sleep). Maquet et al. [47], emphasizing the role of the amygdala, suggest that REM sleep is involved in processing “emotionally significant memories”. Nofzinger and colleagues [49] interpret the pattern of activation as supporting “the view that one function of REM sleep is the integration of neocortical activity with hypothalamic-basal forebrain regulatory and motivational reward mechanisms”. They see their findings as consistent with a role for REM sleep in memory consolidation, and as “quite in accordance with older, more general views that REM sleep, and specifically dream content, is associated with internally generated, or instinctual behaviors that subserve adaptive mechanisms”. Important advances in the direction of greater specificity will be made possible by the development and employment of imaging techniques that permit finer time, and also spatial, resolution, and by efforts to correlate imaging findings with qualities of individual dreams recalled upon awakening from REM, and also NREM, sleep.

Significant parallels can be drawn between the view of dreaming derived from the lesion and imaging studies and the psychoanalytic model derived from intensive clinical work. The highly specific and selective pattern of forebrain activation, consistent with structures acting together in a concerted fashion to carry out particular functions, is broadly supportive of the view of dreams as meaningful, complexly determined, and organized. The findings of activation of the appetitive, “wanting” system (Solms) and of structures involved with motivation and emotion, or “internally generated, or instinctual behaviors” (Nofzinger), support the importance of instinctual wishes in dreaming. The relative deactivation of the dorsolateral prefrontal cortex, on the other hand, is consistent with the diminishment of controlling/inhibitory (ego) functions, and perhaps contributes to the dominance of a different (primary-process) mode of functioning. The view that dreams involve conflicted wishes, wishes which are associated with danger and arouse anxiety, finds support in the prominent activation of the amygdala, which is involved with anxiety and the response to threat. The lesion and imaging findings can similarly be seen as broadly consistent with Jones’ view of dreaming based primarily on the neurophysiology, and elements of Winson’s adaptive-evolutionary view.

Dreaming in REM sleep behavior disorder

Part II of this paper is comprised of an extensive, in-depth treatment of dreaming in the parasom-
nias, including REM Sleep Behavior Disorder (RBD); here, some comments will be made regarding elements of dreaming in RBD which have particular relevance for issues raised and perspectives advanced in this first part. Although RBD is most often thought of in terms of the failure of muscle paralysis and acting out of dreams occurring during REM sleep, evidence has accumulated from a number of sources that the dreams themselves are strikingly altered in this disorder. Patients typically report that their dreams are more vivid, active, and especially aggressive or violent than before [50, 51], and the elevated aggression has been confirmed in comparison with the dreams of normal controls by objective raters [52]. Since RBD is very closely associated with certain neurodegenerative disorders and related brainstem pathology, these findings provide evidence that brainstem function has a greater role in dreaming than merely serving as a source of activation, as proposed by Solms. The regular, almost stereotyped alteration of dreaming in the direction of more aggression also contradicts the activation-synthesis view that the brainstem contributes random, chaotic stimulation; here, even a damaged brainstem is seen to make a specific and patterned contribution to dreaming. The findings seem most closely in keeping with the views advanced by Jones regarding the role of instinctual behavior patterns (in this instance aggressive patterns) arising from the brainstem in REM sleep and dreaming. Also of interest, clinical impressions have been reported to the effect that men with RBD (the disorder has a high male predominance) tend to have placid, mild-mannered personalities [53]. Fantini et al. [52] report findings that add to these impressions. Using the Aggression Questionnaire, which is thought to measure daytime aggressiveness as a stable personality trait, they found that patients with RBD had a lower mean score on the physical aggressiveness subscale (though not in overall aggressiveness) than normal controls. They also found a significant negative correlation in RBD patients between the Aggression Questionnaire subscale score for hostility and the percent of dreams with at least one aggression, as well as significant negative correlations between the subscale score for anger and the percent of dreams with at least one misfortune, and between the subscale score for physical aggression and the percent of negative emotions in dreams. These intriguing findings of inverse relationships between daytime and dream aggressiveness in RBD suggest that the neurodegenerative processes in RBD may interact with personality factors concerned with management of aggression during wakefulness in ways that require further elucidation.

References

Part II:  
Insights on dreaming from studying the parasomnias  
C. H. Schenck

Parasomnias, which are the behavioral, autonomic nervous system, and experiential disturbances that can accompany sleep, are now known to shed considerable light on various aspects of dreaming. The topics pertaining to dreaming and parasomnias to be covered in this section include the following:  
I Parasomnias and the “mental status exam of sleep”  
II Dream-enacting disorders: differential diagnosis  
III REM sleep behavior disorder  
IV Sleepwalking, sleep terrors and “dreamwalking” in adults  
V Epic dream disorder  

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In the spring of 2005 the American Academy of Sleep Medicine published its first revision of the International Classification of Sleep Disorders (ICSD-2) [1]. The author and his colleague Mark W. Mahowald served as Chairmen of the Parasomnias Committee for ICSD-2, in which parasomnias are defined as “undesirable physical events or experiences that occur during entry into sleep, within sleep, or during arousals from sleep. These events are manifestations of central nervous system activation transmitted into skeletal muscle and autonomic nervous system channels, often with experiential concomitants. Parasomnias encompass abnormal sleep related movements, behaviors, emotions, perceptions, dreaming, and autonomic nervous system functioning”[1]. Furthermore, “basic drive states” can emerge in pathologic forms with the parasomnias, as seen with sleep-related aggression and locomotion, sleep-related eating disorder, and abnormal sleep-related sexual behaviors. Parasomnias can affect people of any age, and are now known to be surprisingly common. For example, in adults violent behaviors during sleep have a 2% prevalence, sleepwalking has a 4% prevalence, sleep terrors have a >2% prevalence, sleep-related eating disorder has a >1% prevalence, REM sleep behavior disorder (RBD) has a >0.5% prevalence, and so on [1].

From the author’s cumulative experience with the parasomnias and the practice of sleep medicine, it has become apparent that a clinical cornerstone in the fields of Neurology and Psychiatry should also be recognized as a clinical cornerstone in the field of Sleep Medicine, which is the “mental status exam”. The assessment of mental status is comprised of various distinct functions, the sum interactions of which help form the ongoing, moment-to-moment phenomena of our consciousness and interactions with the environment. Parasomnias (along with narcolepsy) afford a special opportunity for considering how the component functions of the mental status can be dissociated and recombined dynamically across the various stages of sleep and across the boundaries of sleep and wakefulness, as shown in table 1. The Mental Status Exam of Sleep can help clinicians identify the “target symptoms” for treating a parasomnia, or any other category of sleep disorder. In other words, the sleep disorder diagnosis is alone not sufficient in either fully conceptualizing the disorder in a given patient or in formulating a treatment plan. A consideration of the mental status of sleep (and wakefulness) for that patient must also

### Table 1  
Mental status of sleep.

| contexts |  
| --- | --- | 
| within REM sleep |  
| within NREM sleep |  
| during entry into REM or NREM sleep |  
| during arousals from REM or NREM sleep |  
| during mixed states of sleep and wakefulness |  
| categories |  
| 1 motor-behavioral |  
| 2 dream-cognitive |  
| 3 mood-emotional |  
| 4 perceptual-hallucinatory |  
| 5 autonomic nervous system |  
| 6 eating |  
| 7 sex |  
| 8 convulsive-epileptic |  
| 9 vestibular (equilibrium) |  
| 10 memory |  

A full range (and time course) of activations, and dynamic associations, dissociations and recombinations of these mental status components exists during sleep, during entry into sleep, or during arousals from sleep, for all age groups and for both sexes. Transitional sleep-wake (i.e. hypnopompic) and wake-sleep states (i.e. hypnagogic), and also within-sleep states are represented in this table [41–45].
II Dream-enacting disorders: differential diagnosis

At least five disorders have been identified to involve recurrent dream-enacting behaviors. Besides RBD and sleepwalking, sleep terrors (Disorders of Arousal), three other conditions, viz. obstructive sleep apnea (OSA), nocturnal seizures and nocturnal dissociative disorders can manifest with dream-enacting behaviors [2]. This is a major reason why it is necessary for a patient who complains of a dream-enacting disorder to have a careful clinical interview, together with the bed partner, conducted by a sleep clinician that is followed by extensive overnight polysomnographic (PSG) and audio-video monitoring, with a sleep technologist in continuous attendance. The dream abnormalities with dream-enacting behaviors found with RBD and with sleepwalking, sleep terrors will be covered in the following sub-sections. I will now discuss the other three disorders that can manifest with dream-enactment.

1) OSA-induced “pseudo-RBD” was first described in 1996 in a report on 5 cases of OSA-induced arousals from REM sleep, with dream-related complex and violent behaviors [3]. All 5 cases were males, 51–69 years old. A 69-year-old man presented with a history of excessive daytime sleepiness (EDS) and dream-related behaviors, such as turning the pages of a newspaper or screwing in a light bulb. A 68-year-old man with a history of loud snoring and EDS had several episodes of hitting his wife in bed during attempted dream enactment while dreaming that he was in a fight. A 67-year-old man had a history of EDS and abnormal nocturnal behaviors in which he would shout, grab and injure his wife while dreaming of prior military experiences and of sporting events. A 52-year-old man had a progressive disorder of EDS and nocturnal dream enactment, when he would throw out punches and kick repeatedly while dreaming that dogs were biting his leg. A 51-year-old man would fall out of bed while asleep, and put his fist through a window. The PSGs of all 5 patients were diagnostic of moderately severe to severe OSA, but not for RBD (i.e. there was complete integrity of the customary REM sleep muscle atonia that prohibited any behavioral release during REM sleep). The “apnea-hypopnea index” ranged from 51 to 196 per hour, oxygen saturation nadirs ranged from 68 to 82%, and sleep efficiency ranged from 30 to 79%. The 3 patients treated with nasal continuous positive airway pressure therapy (nCPAP) all had resolution of their pseudo-RBD with control of OSA. Thus, in these cases of OSA, obstructive apnea-induced arousals from REM sleep with vivid dreaming presumably resulted in immediate, post-arousal, dream-enacting behaviors with locomotion, agitation and violence that resolved with nCPAP treatment. This state could also be called an OSA-induced “hypnopompic REM sleep parasomnia” that closely resembles actual RBD behaviors.

In a recent publication entitled, “Severe obstructive sleep apnea/hypopnea mimicking REM sleep behavior disorder” [4], 16 patients (11 men, 5 women, mean age, 59.6 ± 7.7 years) presented with dream-enacting behaviors and unpleasant dreams (e.g. being attacked or chased by an unknown person or animal, falling down abruptly, arguing with someone) that were highly suggestive of RBD – but all these patients also had snoring and EDS. Abnormal sleep behaviors emerged throughout the night with a frequency that ranged from once every two weeks to several times a night. The sleep behaviors witnessed by the bed partners included gesturing, punching, kicking, and other aggressive behaviors. Two patients had assaulted their spouses, five had fallen out of bed, and two had lacerated their face and arms during dream enactment. Whereas video-PSG in the sleep lab excluded RBD and documented the presence of normal REM sleep atonia and without REM sleep phasic motor overactivity, it was diagnostic of severe obstructive sleep apnea-hypopnea, with a mean hourly apnea-hypopnea index of 67.5 ± 18.7 (range, 41–105), and all abnormal sleep behaviors occurred during apnea-hypopnea induced arousals from REM and NREM sleep. Nasal CPAP therapy eliminated the abnormal behaviors, unpleasant dreams, snoring and EDS in all 13 patients who had agreed to undergo this therapy. Repeat video-PSG of these 13 patients while they were on nCPAP therapy documented the complete resolution of OSA while again documenting the absence of any “REM sleep without atonia” or frank RBD. Therefore, OSA-induced “pseudo-RBD” was definitively proven in this study.

2) Nocturnal seizures can manifest as recurrent abnormal dreams, nightmares, and dream-enacting behaviors – including vigorous and violent behaviors. One dramatic example involved a 65-year-old man who was reported to have the sudden onset of frequent nightmares and dream-related behaviors precipitated by a right temporal lobe infarction [5].
In a typical episode, “he would suddenly bolt upright, pace around with a terrified expression on his face, and shout in a dysarthric voice … At times he related frightful visions (men coming into his room), and occasionally would give vivid details”. PSG showed that no episode emerged from REM sleep, but typically from stages 2 and 3 NREM sleep, “with approximately 20 seconds of EEG evidence of awakening while the patient remained behaviorally asleep. The episode of abrupt movements and shouting then obscured the EEG record”. Anti-convulsant therapy with diphenylhydantoin of these stroke-induced, complex partial seizures produced complete remission of all symptoms, including nightmares and dream-related behaviors.

Another report described a 58-year-old man with a 6-year history of vivid dreaming associated with ambulation and screaming; one time he awakened while striking the molding around his bedroom window [6]. PSG revealed “frequent repetitive polyspike discharges … in REM sleep accompanied by generalized clonic activity lasting up to 20 seconds. Frequent brief myoclonic jerks were also noted during REM sleep … After the longest episode he mumbled and made purposeful movements … Otherwise REM atonia was maintained”.

A third report described a 16-year-old male who experienced recurrent purposeful movements, cursing, and “auto-aggressive behavior” during sleep, with some subsequent recall of these episodes; PSG revealed slow spike-and-wave activity arising from REM sleep [7]. Anti-convulsant therapy with carbamazepine completely resolved his sleep and presumably dream-related problems.

3) Nocturnal (sleep-related) dissociative disorders comprise a unique, female-predominant category of “psychiatric parasomnia”, insofar as this behavioral-experiential nocturnal disorder is a direct manifestation of a psychiatric disorder (i.e. dissociative disorder) that emerges during sustained EEG wakefulness after an awakening from sleep or just prior to the onset of sleep [1, 8]. Prolonged (or shorter-lasting) complex behaviors in bed, or elaborate nocturnal wanderings can occur, which at times include driving a car, or even boarding an airplane (a prime example of a “fugue state”). The events occur with negligible self-awareness and no subsequent recall. Behaviors at times are “sexualized” (e.g. repetitive pelvic thrusting) and can be paired with defensive behavior and vocalisations. Perceived “dreaming” and dream-enacting behaviors at times occur, with the “dreams” typically representing memories of past sexual and physical abuse. These memories that are experienced as “dreams” occur during altered states of EEG wakefulness, during drowsiness or after an awakening from sleep. The abuse-related memory retrieval that is experienced as a dream resides at the core of the dissociative process, since the emotional distress associated with reliving psychological trauma is unconsciously lessened by embedding the memory in a dream-like or a frank dream state while one remains awake in an altered state of consciousness. On the other hand, perceived dreaming during nocturnal dissociative episodes may not have any obvious link with past abuse, as found in the case described below that was contained in our sleep center’s initial report on this newly described parasomnia [8].

Case: Exclusively animalistic sleep-related (nocturnal) dissociative disorder
A 19-year-old male, accompanied by his adoptive parents, presented with a 4-year history of elaborate episodes emerging from the nocturnal sleep period approximately 1–2 times weekly, when he would act like a large jungle cat. These episodes typically began 1–2 hours after falling asleep, when he would leave his bed while growling, hissing, crawling, leaping about, and biting objects, for as long as one hour. He then would collapse abruptly on the floor, perspiring profusely, and be completely unresponsive. Although always subsequently amnestic for his actions during the night, the morning after an episode he would invariably recall a particular recurrent “dream” of being a lion or tiger let out of his cage by a woman zookeeper whom he then followed down a path. She held a “piece of raw meat” in her hand, but he would never be able to leap up to snatch it “because of an invisible force field” holding him back, which always made him feel “disappointed and frustrated”. These “dreams” always ended with “someone shooting a tranquilizer gun at me” and then he would fall down and become unconscious – which is when his “dream” merged with reality, as he lay on the floor in a room in his home, completely unresponsive.

He considered the “dream” action, which closely mirrored his actual behaviors (for which he was ostensibly amnestic), to be “very vivid and real”, and expressed interest in recreating the dream during his waking life by making a movie of it. Although the “dream” plot was always identical, the face of the woman zookeeper varied from episode to episode and was never a familiar face. He emphasized that during this “dream” he felt completely like an animal and
had no awareness of actually being human, nor was he ever aware of interacting with members of his household while moving around during his “dreams”. (In fact, his parents and often also his sister attempted to intervene in each of his episodes.)

His family had never heard him speak nor interact verbally with them during these spells, and he never acted in any sexual manner. His postures and behavioral repertoire (including loud, eerie growling and an impressive transformation of his hands into facsimiles of paws) were consistently those of a large cat, as documented by home videotaping. He successfully navigated the environment, as when he would open the refrigerator with his mouth, put uncooked bacon between his teeth (that presumably corresponded with the piece of “raw meat” in his “dream”), and then proceed to prowl around the house.

His family commented on his recurrent feats of “super-human strength”, such as leaping far from his bed, lifting a mattress with his jaws and dragging it across a room, or even lifting a marble table with his jaws. He frequently left imprints of his teeth on the wood furniture during these nocturnal episodes, but never left the house, nor did he sit or stand up: his movements were constantly quadri-pedal. He remained unresponsive to people during and immediately after these spells, despite having his family talk, shout, shake him or splash cold water on his face. Sometimes he demonstrated oppositional behavior, such as when he actively avoided his mother or father or resisted his mother’s attempts to wipe his perspiring brow, or when he tried to jerk a towel away that she was holding in his mouth to prevent him from cracking his teeth when he bit the furniture. Whenever his father held him upright, by standing behind him during an episode, he would engage in prolonged, continuous, quadri-pedal locomotion, as was demonstrated on a home videotape. (This is “classic” for activation of “Locomotor Pattern Generators” in the brainstem of mammals [9], which can be experimentally induced through electrical or specific chemical stimulation of that lower brain region.)

He never lost control of his bowel or bladder during these episodes, and he never demonstrated repetitive “tonic-clonic” movements or stereotypes suggestive of an epileptic attack.

He had injured his lips and gums on numerous occasions from biting sharp objects, and had also bruised and lacerated himself all over his body during these nocturnal episodes.

The onset of his nocturnal sleep-related disorder had no recognized precipitant, nor did any particular episode have an identifiable trigger. Numerous neurological examinations and waking EEGs had been normal. He was never observed to have a daytime dissociative spell.

This patient was generally regarded to be personable and well-behaved, and he had several close friends. He never demonstrated strange or objectionable daytime behaviors. There was no history of physical, sexual, or verbal-emotional abuse since the time he was adopted at the age of 10 months. During his interviews with me, he was polite and friendly, did not appear psychologically “disturbed”, and did not exhibit any peculiar mannerisms or ways of acting.

He was studied overnight in our sleep lab for two consecutive nights. On the first night, two of his characteristic episodes were recorded, and each arose from clear-cut EEG wakefulness. The first episode occurred 53 minutes after he had fallen asleep, during which time he had cycled through all 4 stages of NREM sleep. Beginning with a spontaneous EEG awakening from Stage 1 NREM sleep (that had been present for several minutes), he growled intermittently for 2 minutes while he remained motionless in bed with eyes closed and behaviorally appeared to be asleep. This began several minutes after an epoch of Stage 1 NREM sleep had terminated in sustained EEG wakefulness – and with his remaining in bed and still appearing asleep. He then abruptly left the bed and crawled around the room, hissing, growling, loudly grinding his teeth and pulling the mattress with his jaws. He also chewed and swallowed portions of the airflow monitoring device. After 6.5 minutes, he abruptly collapsed on the floor while his hands continued to be contorted as if they were paws. After another 2 minutes he was up again, crawling and growling for 4.5 minutes before a final collapse and 30 seconds of clinical unresponsiveness. Normal wakeful EEG activity continued throughout this entire event. He then consciously emerged from (or “snapped out” of) this spell and described his typical “dream” in full detail, but was amnestic for all his actions.

The second episode emerged 1 hour 15 minutes after the first episode (the patient having again cycled through NREM and REM sleep). During EEG wakefulness, he growled for 15 seconds before crawling out of bed, knocking a lamp over, biting that lamp, chewing and swallowing portions of another airflow monitoring device and repeatedly banging his head against a wall. The entire episode lasted over 9 minutes and stopped abruptly with a collapse; 20 minutes later he became responsive and reported “the same dream again, nothing different”. A wakeful EEG was maintained throughout this second episode, and no
seizure-like EEG activity was evident during either of the two episodes.

Therefore, both episodes in the sleep lab that emerged during well-established wakefulness were virtually exact replicas of what was recorded at home on videotape.

This 19-year-old male was the first patient ever documented, both clinically and by PSG monitoring, to have an exclusively (nocturnal) sleep-related dissociative disorder, and also an exclusively animalistic dissociative disorder. In fact, he was diagnosed to have a nocturnal Multiple Personality Disorder, since he fulfilled official psychiatric diagnostic criteria that included: (i) the existence within a person of two or more distinct personalities or personality states (each with its own relatively enduring pattern of perceiving, relating to, and thinking about the environment and self); (ii) at least two of these personalities or personality states recurrently take full control of the person’s behavior.

The videotaped behaviors of this young man, both during the two episodes in the sleep lab and during the episode recorded at home, clearly indicate that during these lengthy episodes the behaviors were exclusively animalistic, which would seem to indicate that the mode of perceiving and interacting with the environment was also exclusively animalistic. The mechanism(s) underlying an exclusively animalistic and sleep-related dissociative disorder are unknown, especially since there was no known history of sexual or physical abuse.

He was offered treatment with hypnotherapy, with the goal being for him to learn and utilize a self-hypnosis technique at bedtime, as a means of gaining more control over himself during the sleep period while he was in the process of falling asleep. However, the patient and his family were not interested in another form of “psychological therapy”. (Obviously, the content of his “dream” involving a female zookeeper holding a piece of “raw meat” that he could not snatch from her because of an “invisible force field”, which culminated with “someone shooting a tranquilizer gun at me”, could easily be subjected to psychodynamic interpretation.)

The ICSD-2 has officially added sleep-related dissociative disorders as a recognized parasomnia [1], with the essential features being that they can emerge throughout the sleep period during well-established EEG wakefulness, either at the transition from wakefulness to sleep or within several minutes after an awakening from stages 1 or 2 NREM sleep or from REM sleep. Sleep-related dissociative disorders comprise a sleep-related variant of dissociative disorders, which are defined in the DSM-IV as “…a disruption in the usually integrated functions of consciousness, memory, identity, or perception of the environment” [10]. The general similarity of the behaviors found with sleep-related dissociative disorders to the behaviors found with various parasomnias justifies their inclusion within the parasomnias section of ICSD-2 and indicates how they comprise a distinct sleep-related variant of dissociative disorders.

III REM sleep behavior disorder

REM sleep behavior disorder (RBD) is characterized by abnormal behaviors emerging during REM sleep that cause injury or sleep disruption. RBD is also associated with electromyographic (EMG) abnormalities during REM sleep that serve as the neurophysiologic substrate for allowing REM behavioral release. The EMG demonstrates an excess of muscle tone or phasic EMG twitch activity during REM sleep [1, 2]. A complaint of sleep-related injury is common with RBD, which usually manifests as an attempted enactment of distinctly altered, unpleasant, action-filled, and violent dreams in which the individual is being confronted, attacked, or chased by unfamiliar people or animals. Typically, at the end of an episode, the individual awakens quickly and becomes rapidly alert (as is common for all awakenings from REM sleep), and reports a dream with a coherent story, with the dream action corresponding to any sleep behaviors that are observed by a bed partner, roommate, or sleep laboratory technician.

An important aspect of RBD worth emphasizing is that it is a dream disorder almost as much as it is a sleep behavior disorder, since approximately 90% of reported patients complain of abnormal dreaming and dream-enacting behaviors that began with the onset of RBD [2]. Furthermore, successful treatment of RBD virtually always involves the tandem control of the abnormal dreaming and the abnormal (dream-enacting) sleep behaviors, and relapse of these core features of RBD also occurs in tandem whenever the patient fails to take clonazepam at bedtime (i.e. the standard therapy of RBD). Thus, the dream and sleep behavioral disturbances of RBD appear to share a common pathophysiology, the implications of which will be discussed later in this section. It is also of interest to note, vis-à-vis the Freudian theory of dreams, that release from the shackles of REM atonia with the consequent ability to act out dreams has unveiled a realm of dream-enactment that appears to be devoid of sexuality [2].
although definitive research on this topic has not
yet been conducted, and also the dreams in RBD
patients (apart from dream-enactment) have also
not yet been systematically examined.

Sleep and dream-related behaviors in RBD re-
ported by history and documented during PSG
monitoring include talking, laughing, shouting,
swearing, gesturing, reaching, grabbing, arm flail-
ing, slapping, punching, kicking, sitting up, leaping
from bed, crawling, and running. Walking, however,
is quite uncommon with RBD, and leaving the
room is especially rare and probably occurs by
chance, with the individual running through an
open doorway. The eyes usually remain closed
during an RBD episode, with the person attending
to the dream action and not to the actual envi-
ronment; this is a major reason for the high rate of
injury in RBD. Also, chewing, feeding, drinking,
sexual behaviors, urination, and defecation have
not been documented to occur in REM sleep – nor
in the REM sleep associated dreaming during
dream-enactment. The findings in human RBD in
regards to the categories of behaviors observed
in REM sleep, and categories of behaviors not
observed in REM sleep, mirror the findings from
an experimental animal model of RBD produced
by pontine tegmental lesions [2].

Because RBD occurs during REM sleep, it usu-
ally appears at least 90 minutes after sleep onset
unless there is coexisting narcolepsy, in which case
RBD can emerge shortly after sleep onset during
a sleep-onset REM period. RBD is usually a long-
standing, progressive condition.

The chronic form of RBD is male-predominant
and typically emerges after the age of 50 years,
although any age group can be affected. Our
center has reported that 65% of men ≥50 years
of age who were initially diagnosed with “idiopa-
thic” RBD eventually developed a parkinsonian
disorder, with a mean interval of 13 years from
the onset of the RBD to the onset of the parkinso-
nian disorder, and with a range extending from 2 to
29 years [11, 12]. Furthermore, in some of these
patients, the characteristic dream disorder of RBD
emerged months before the behavioral disorder
of RBD, leading to the observation that a change
in (dream) consciousness can be the first symptom
of parkinsonism, the classic signs of which may not
emerge for more than a decade.

An increasingly recognized precipitating factor
of RBD in males and females of any age is psycho-
tropic medication use, particularly venlafaxine,
selective serotonin reuptake inhibitors, mirta-
zapine, and other antidepressant agents – with the
exception of bupropion (a dopaminergic anti-
depressant) [13].

Diagnostic criteria for RBD are listed below,
with time-synchronized audio-video-PSG moni-
toring being essential for establishing the diagno-
sis of RBD [1]:

A. Presence of REM sleep without atonia: the
EMG finding of excessive amounts of sustained
or intermittent elevation of submental EMG
tone or excessive phasic submental or (upper or
lower) limb EMG twitching.

B. At least one of the following is present:
   i. Sleep-related injurious, potentially injuri-
      ous, or disruptive behaviors by history
   ii. Abnormal REM sleep behaviors document-
        ed during polysomnographic monitoring

C. Absence of EEG epileptiform activity during
REM sleep unless RBD can be clearly distin-
guished from any concurrent REM sleep-relat-
ed seizure disorder.

D. The sleep disturbance is not better explained by
another sleep disorder, medical or neurological
disorder, mental disorder, medication use, or
substance use disorder.

Patients with RBD are typically described as
having calm and pleasant personalities, and do
not display irritability or anger while being awake.
Also, these people did not suddenly become this
way with the onset of their RBD, but always
have had this personality style, as verified by their
spouses of 25–50 years and by first-degree family
members. They have been successfully employed
and have enjoyed the company of loving families
and good friends. There is no evidence that they
have been building up repressed anger or aggres-
sion over the course of their lives, and then in
late-life ultimately release these negative feelings
during their REM sleep. The strong association
of RBD with Parkinson’s disease and other brain
disorders also downplays any proposed “repressed
aggression” theory of RBD. There thus seems to be
an intriguing set of brain-mind-personality-para-
somnia interactions with RBD. An important study
that has recently been published explores this topic
in a systematic manner [14].

In this study, dream characteristics were sys-
tematically assessed in RBD patients and con-
trols, along daytime aggressiveness tendencies,
by having them recall their most recent dreams
and by having them complete the Aggression Ques-
tionnaire (AQ). Verbatim dream descriptions were
scored and analysed according to the Hall and Van
De Castle method. The results showed that RBD
patients had a higher percentage of dreams with at
least one aggressive episode than controls (66 vs.
15%, p <0.00001), a higher aggression/friendliness
interaction ratio (86 vs. 44%, p <0.0001), and a
greater frequency of animal characters (19 vs. 4%,
p = 0.0001). On the other hand, compared to controls, none of the RBD patients had dreams with sexual elements (0 vs. 9%, p <0.0001). In regards to aggressive tendencies during wakefulness, the two groups did not differ in total AQ scores, except for a lower score on the physical aggressiveness subscale in RBD patients compared to controls (16.5 ± 6.4 vs. 20.4 ± 8.3, p = 0.034). There was no correlation between dream aggressiveness and either age, duration or frequency of RBD symptoms. Therefore, despite normal levels of daytime aggressiveness, patients with RBD had dreams characterized by an increased proportion of aggressive elements. In their discussion, the authors pointed out previous research indicating that children have higher rates of aggression and higher rates of animals in their dreams compared to adults, presumably related to the development of threat-avoidance skills. Given the authors' current findings on dreams in RBD, “it may be hypothesized that chronic RBD, as a part of a widespread neurodegenerative process, would lead to a release of ontogenetically early dream patterns” [14]. Nevertheless, the validity of this conclusion could be questioned on several fronts, such as the quality of aggression in the dreams of children vis-à-vis RBD patients could differ substantially. In a related vein, as elucidated by Corner in the Afterword to a recent book by this author [15], the phasic EMG abnormalities in human RBD appear to represent the pathological release in later life of the most primitive form of motor activity found in the ontogenetic development of organisms throughout the animal kingdom. This motor activity in early development is subsequently suppressed to a large extent during REM sleep with the adaptive emergence of motor inhibitory systems [16, 17].

In 1977 Hobson and McCarley published a seminal and provocative paper entitled, “The brain as a dream state generator: an activation-synthesis hypothesis of the dream process” [18]. A core feature of that hypothesis is that during REM sleep there is ongoing activation of the cerebral cortex by ascending activating signals from the brainstem that allow the cortex to formulate coherent dreams. What is relevant about this dream hypothesis in regards to RBD is that in both the experimental animal model and in the chronic human disorder there is brainstem pathology and the activation of specific categories of dream-enacting (or “sleep hallucinatory”) behaviors along with the absence of other categories of dream-enacting behaviors. (In the experimental animal model, the site and extent of the brainstem lesion correlated with the category of the expressed REM sleep behavioral repertoire that emerged as presumed “hallucinatory”, i.e. dream-related, behaviors [2].) Furthermore, with human RBD, there is activation of particular categories of dreams along with suppression of other categories of dreams (e.g. physically active and aggressive dreams predominate, whereas sexual dreams are suppressed). Hobson has recently refined and upgraded this “Activation-Synthesis” dream model with the “AIM” model (activation, input, modulation), whereby “brain-mind space” across sleep and wakefulness is defined along three axes: level of central nervous system activation, sensory input (endogenous vs. exogenous), and neurotransmitter modulation (aminergic vs. cholinergic). Mahowald has provided an excellent overview of Hobson’s AIM model in the context of understanding consciousness across sleep and wakefulness [19], with an in-depth consideration of Edelman and Tononi’s “dynamic core hypothesis” of the neural substrates of consciousness [20, 21]. (The latter hypothesis analyses RBD as a behavioral and experiential state that does not originate in the external world [21].)

Finally, this author (CHS) has written a book that contains 26 first-hand accounts of RBD dream-enactment provided by patients and their spouses, in order to allow a more broad appreciation of the phenomenology of the recurrent, altered, nocturnal sleep and dream experiences found with RBD [15]. The following are some examples of RBD dream-enactment contained in this book:

One dream when I kicked my wife was a scene from my childhood when I rode a bicycle and dogs chased me, biting at my legs, and I kicked one dog, but I was really kicking my wife. In another dream I was backpacking, and somebody had stolen some of my gear and I ran up to them and kicked them as hard as I could. They were above me and I was kicking up. What I actually did was kick the wall and I broke my big toe. It was black-and-blue and swollen and hurt badly.

The dreams are always basically the same sort of type, and could be illustrated by the dream I had the other night: I was in a car, I was parking in a ramp, and the car started to move backwards, as if it were about to go down the ramp. I jumped out of the car to try to stop its movement, and as I became awake and oriented, I realized that I had jumped out of bed and I was pushing against the bed. That is a very typical kind of dream for me. Sometimes if it’s not a car, then it’s a train. Usually, I have a sense of accelerated motion on an inclined plane and I will do something to prevent what seems to me to be dangerous.
He has done this when it wasn’t a violent dream. One night I awakened and the bed covers were just going up and down, up and down, so I woke him up and I said, ‘What in the world are you doing?’ And he started to laugh, and he laughed and laughed and I said, ‘What is so funny?’ He said, ‘I’m riding a bicycle.’ So what he was actually doing was non-violent – he was just riding a bicycle, just pedaling. Another time he was sitting up in bed, pushing out with his arms, and I awakened him and he said he was playing volleyball. And then he was stomping his feet up and down on the bed, stomping his feet. He said he was killing a cockroach; it was about six inches long.

Once when I hit her, I had a dream that somebody was on the other side of a screen door from me and wanted me to hit him. Every time I’d go to hit him, he’d move his face first, so I’d keep trying to hit the face on the other side of the screen door. A week ago we were playing hockey in my dream, and I was going to body-check two guys at once, and I thought, ‘Well, I’m going to have to throw a cross-body block,’ so I did that and ended up on the floor. I don’t know how, but I hit my arm on the nightstand and I hit my head on something else. I bruised myself up quite badly.

I thought I was with a childhood buddy, and we were standing on the wing of an airplane. Both he and I liked airplanes a lot when we were young. Another airplane came right beside us and started moving ahead and we were standing on the wing, but lower than the wing on the other airplane, and the wings were going to overlap and knock us off. I remember hollering, ‘Get the hell out of here,’ and we just dove head-first off the wing, but what I actually did was dive head-first over the end of the bed with the blankets, pillows – everything going with me. There was a table sitting there and I just scraped the edge of that table with the side of my head and ear. It woke me up immediately and I thought, ‘Oh my God, if I would have hit that table with my forehead, I would have either caved it in or I’d have broken my neck.’

The dreams that I really remember are when there are spiders all over me. They are golden spiders, and I’m knocking them off. When I’ve gone camping, I would be in a sleeping bag that was zipped up when I fell asleep, and then I would wake up after I hit my way through the sleeping bag, while dreaming that animals were after me – but no animal was actually around. I have jumped far from the bed into a dresser table with a mirror on top during dreams of tigers coming after me.

IV Sleepwalking, sleep terrors and “dreamwalking” in adults

Classic descriptions of sleepwalking and sleep terrors mention that episodes occur early in the night, there is virtually no self-awareness during the episodes, there is often no associated dreaming (and when present, consists of brief fragments without plot), and there is either no subsequent recall or else just limited recall of events from the preceding night. While these observations may hold true for most children and adolescents with the disorders of arousal from NREM sleep, the situation can be – and often is – quite different in adults with sleepwalking and sleep terrors. In fact, a substantial number of the 25 adult patients with sleepwalking, sleep terrors whose first-hand accounts are shared in my previously mentioned book on RBD and other parasomnias [15], describe vivid, and at times lengthy and plot-driven, dream-enacting behaviors during their episodes, and have considerable recall of these events the next day. Also, some felt completely awake during their episodes – until they were awakened from sleep. In addition, these episodes not infrequently occurred during the middle stages – and at times even during the later stages – of sleep, and not just within the first hour or two (when slow-wave sleep predominates), as emphasized in the “classic” descriptions.

“Dreamwalking”

Dreaming while walking about (“dreamwalking”) is rarely found with RBD – and particularly when going from one room into another room, which has never been reported in RBD (in fact, with RBD, going into another room occurs by chance, when the affected person happens to run through an open doorway rather than into a wall or furniture). Instead, when “dreamwalking” is present, it is usually found with sleepwalking in adults (also described as “somnambulism associated with hallucinations” by Kavey and Whyte [22]). The misconception of “dreamwalking” being *ipso facto* a manifestation of RBD has recently surfaced in a publication entitled, “An early description of REM sleep behavior disorder” [23]. The authors reported finding an early description of RBD by the celebrated French writer named Anthelme Brillat Savarin who presented the case of a “somnambulist” monk in his book, *Physiologie du Gout [Physiology of Taste]* that was published in 1825.

Quoting from the original text by Savarin, the authors of the journal article presented the following “very singular fact told me [i.e. Savarin] by Dom Duhaget, once prior of the Chartreuse convent”:
There was a monk ... who was looked upon as a somnambulist. He used often to leave his cell, and when he went astray, people were forced to guide him back again. Many attempts had been made to cure him, but in vain. One evening I had not gone to bed at the usual hour, but was in my office ... when I saw this monk enter in a perfect state of somnambulism. His eyes were open but fixed and ... he had a huge knife in his hand. He came at once to my bed, the position of which he was familiar with, and after having felt my hand, struck three blows which penetrated the mattress on which I lay ... I saw an expression of extreme gratification pervaded his face. The light of two lamps on my desk made no impression, and he returned as he had come, opening the doors which led to his cell, and I soon became satisfied that he had quietly gone to bed ... On the next day I sent for the somnambulist and asked him what he had dreamed of during the preceding night ... 'Father', said he, 'I had scarcely gone to sleep when I dreamed that you had killed my mother, and when her bloody shadow appeared to demand vengeance, I hurried into your cell, and as I thought stabbed you. Not long after I arose ... I thanked God that I had not committed the crime I had meditated.' I then told him what had passed, and pointed out to him the blows he had aimed at me ...

A number of arguments can be presented in support of sleepwalking rather than RBD as the basis for the parasomnia episode just described.

1) The monk was a known somnambulist, who on the night in question opened his cell door twice during the same parasomnia episode, once to leave his cell at the beginning of the episode and then to reenter his cell at the end of the episode. Somnambulists open doors, but never RBD patients, who rarely have their eyes open, as they are attending to their dream world with their eyes shut. In fact, the prior observed the monk to have his eyes open and "fixed" without any reactivity to the light from two lamps on the prior’s desk: this is a classic observation for sleepwalking. The rare RBD patient who has his eyes open during an episode would probably awaken when exposed to the light of a lamp.

2) The monk knew exactly where he was going, based on the horrifying dream that he had just experienced immediately prior to leaving his cell. In fact, his purpose in sleepwalking was to go to the prior’s cell (and he also knew where the bed was located in that cell) to avenge the murder of his mother perpetrated by the prior. Sleepwalkers can engage in such purposeful behavior when there is associated dreaming, but not a person with RBD, who would throw punches in bed or charge out of bed and run into a wall or furniture while going after a murderer in his or her dream. The problem with sleepwalking is that while a person can negotiate the actual environment, and open doors and go from one room to another (or leave the house and even drive an automobile), there is a major suspension of critical thinking and judgment, with automatic behavior that may or may not be associated with dreaming. If dreaming is present, the contents of the dream are fully accepted as fact, and the affected person proceeds accordingly, which in the monk’s case meant that he had to avenge the murder of his mother, and he knew exactly where to go, and he went there, i.e. the prior’s room. Such behavior is very inconsistent with RBD behavior.

3) The episode occurred very shortly after the monk fell asleep, which is far more indicative of a NREM sleep parasomnia (which can emerge as soon as 15 minutes after sleep onset) than of RBD (which typically emerges at least 90 minutes after sleep onset, when the first REM sleep period appears, unless narcolepsy – with sleep-onset REM periods – is also present, but there was no evidence suggestive of narcolepsy in the description of the monk).

(A full critique of this case has recently been published [24].)

I will now share some case vignettes of vivid dream-enacting behaviors, including plot-driven and dreamwalking scenarios, in patients with sleepwalking, sleep terrors described in my aforementioned book [15]. The first case involved a “positive stress” (associated with Christmas Eve) promoting an episode in a woman with lifelong sleepwalking. The second case involved enormous negative stress promoting an episode in a man with lifelong sleepwalking, sleep terrors. The third case also involved enormous negative stress promoting the de novo onset of sleep terrors. What is so intriguing about the third case is that instead of developing sleep onset and/or sleep maintenance insomnia in the face of severe stress, as would be expected, this 34-year-old man developed a de novo parasomnia manifesting as sleep terrors, sleepwalking.

A 25-year-old married woman, with lifelong sleepwalking, while asleep on Christmas Eve had an elaborate dream about Christmas, and in that dream she placed a doll under the Christmas tree as a gift for her one-year-old daughter – but on Christmas morning she awakened to discover that during the night she had actually carried her infant daughter from her crib and placed her unscathed under the tree.

A 38-year-old man with lifelong sleepwalking, sleep terrors describes the following episode that occurred 16 days after the sudden death of his
brother and 14 days after his wife separated from him:

I start having a very vivid, terrifying, horrible dream of a huge stockinged-face man, about 350 pounds, and six-and-a-half or seven feet tall, holding a huge machete in his hand which he is bringing up, then swinging it down on me. All of a sudden — out of nowhere — I was outside somewhere in a field, it was very dark, I could barely see the outlines of the trees, but the moon was so bright, I don’t know if it was a full moon, but it was so bright. So when he is lifting and about to swing the machete full force at me, I am up looking around and see what is about to happen (while actually standing up in the double bed — but in my mind, in my dream, I am out in a field). I run away full-bore in the dark — and hit the wall so hard that an extension cord gets ripped off the plug, and only the metal prongs stay in the wall socket. Just before I hit the wall, or simultaneously with it, I felt the pain of the machete cutting me in the back — in the exact same place where the ripped electrical extension cord cut me. It was a one-inch deep gouge off my skin that ran 6 inches down from my shoulder blade to my lower back. I came within 6 inches of hitting the corner of a dresser, which would have then smashed my head in the temple area and I probably would have died. I almost pushed the wall all the way to the outside. There was a hole in the wall from my shoulder blade area down to my lower back, where I had smashed into it.

A 34-year-old man developed acute-onset, persistent sleepwalking, sleep terrors triggered by major stress at work:

I had injured my back at work in January, herniating a disk, and the assistant administrator at the nursing home where I worked began doing everything she could to get me fired. What she did was very obvious to the other department heads and some of the staff. The assistant administrator really “turned up the heat” in the spring and the night terrors started in May. Some of the situations at work were reenacted in the dreams, so it was easy to see how they related. In the first dreams, it was often the people with blank eyes, or some other trait, which tipped me off to the fact they were the ones who would harm me when the opportunity arose. Sometimes I would be walking down the street and realize I was being shadowed by one or more of these individuals. I would try to escape, they would attack, and I would be screaming when I woke up away from my bed.

In another dream I was walking down an open plank staircase, already aware someone wanted to attack me. When I looked back over my shoulder, one of the individuals with blank eyes was hiding directly behind the stairs and burst out through the stairway at me. I awoke shrieking and trying to run away. Many nights I would end up smashing into the wall directly at the foot of the bed, indicating that I had hurled myself straight out over the foot of the bed. Other times I would fly out of the side of the bed and seem to crash horizontally against the wall.

The worst dream I ever had occurred when we were camping. I dreamed I was walking through an older Western-style town and there were numerous head of cattle in the street. I had been forewarned to be on the lookout as one of the cows would try to attack me. I looked behind and a large cow was approaching. She opened her mouth and instead of a tongue, a large knife came out of her mouth with which she tried to stab me. I could not run away, I was actually in a sleeping bag, so I tried to fight. I was screaming, “What are you, who are you?” When I woke up, I could not stop screaming and crying hysterically, even though I was fully awake. My wife kept trying to calm me but to no avail. My sleeping bag was soaked with sweat though it was only about 40 degrees that night. It must have taken well over an hour to calm me. It was not difficult to interpret that dream. Shortly before I was told to resign from my position at the nursing home, effective three weeks prior to our wedding, a good friend had warned me that the director of nursing, who weighed about 250 pounds, would stab me in the back if she had the chance.

Since that time, I’ve had a really bad dream about once a month. Sometimes I’m being attacked by a person or some other being which I can fight, while other times the dream is more like an unfolding impersonal plot which I have to foil. One night when we had company, my wife and I were sleeping on the floor in my den when a portion of the baseboard flipped down and two slender missiles were aimed at us through the opening. The looked like the tailights on a ’59 Cadillac. I knew they were about to be fired at us, so I whispered to my wife, “Get up, we’ve got to go.” I was trying to drag her out of the room as she was stumbling to her feet. When I turned on the light, I was aware it had just been another dream.

Many times the dreams involve the juxtaposition of lights. In these dreams I am aware of a situation when at some point the moving lights would line up or form a certain pattern and a bomb had been set to go off at that time. Sometimes I would dream I was walking and the lights would appear on my clothing or on the side of a building and I would be screaming as I tried to run away.

One night I had a dream in which there were two small, flashing red lights, which I knew would cause
a bomb to go off when they moved together. I saw them start to move closer together, so I tried to get out of the bed and run. I awoke immediately, however, and realized the lights were actually the flashing red column on my digital alarm. I lay down again to go back to sleep, but as a safeguard I put my extra pillow over the clock just in case it really was a bomb. Two or three nights ago, I dreamed I was in a factory, working at a conveyor belt which carried suitcases. The situation was that when this suitcase decorated with flowers on it came around, it was going to be a bomb. A few minutes later here it comes down the line. I grabbed it and tried to get away from the area before it blew up. When I got down the hall and into the living room, the light from the lamp awakened me, and my wife was asking me what I was doing. It was then I realized the ‘bomb’ was just a pillow.

V Epic dream disorder

Beginning in 1986, as our sleep center was becoming more familiar with the characteristic dream disturbances of RBD, and as we were also becoming increasingly aware that adults with sleepwalking and sleep terrors could have precipitous and sometimes elaborate dreaming during their recurrent NREM sleep episodes, we also started seeing patients who presented with a distinct set of dream-related complaints that we eventually named “epic dream disorder”. In 1995 we published findings from our initial series of 20 patients in an abstract entitled, “A disorder of epic dreaming with daytime fatigue, usually without polysomnographic abnormalities that predominantly affects women” [25]. I will now summarize the salient findings from this series, present two clinical vignettes, and describe subsequent reports from three other centers in two additional countries on this intriguing, newly recognized dream disorder.

In the introduction to our 1995 report, we stated that “nightmares” were officially regarded at the time as frightening REM sleep dreams, with sleep terrors and RBD serving as the two main differential diagnoses for disturbing dreams. We then proposed another category of disordered dreaming – identified during routine clinical practise at our sleep disorders center – characterized by relentless, “epic” dreaming that was experienced to occur throughout sleep, leaving the affected individual feeling exhausted upon arising from sleep in the morning, followed by ongoing fatigue during the daytime.

Twenty patients with epic dream disorder were gathered over a 9-year period during routine clinical practice at our multi-disciplinary sleep disorders center. All patients but one were evaluated by this author (CHS), to whom all new patients with dream and/or parasomnia complaints at that time were preferentially referred. Patients completed a standard, comprehensive sleep center questionnaire, and were clinically interviewed. PSG studies using standard recording and scoring methods with expanded EEG and EMG monitoring were scheduled, since we wanted to investigate whether the complaint of epic dreaming was associated with a motor-behavioral parasomnia, nocturnal seizures, or another type of prominent sleep-disruptive disorder that could account for the complaint of non- restorative sleep in the morning. A multiple sleep latency test (MSLT) was conducted the day after the overnight, hospital-based PSG studies. Patients also completed psychometric tests. This was a female-predominant clinical group, with 85% (17/20) being female. Mean age at referral was 34.8 (± SD 11.2) years. Mean duration of the epic dream disorder was 3.6 (± 6.7) years in 13 patients, with 7 patients reporting a longstanding dream disorder having an indeterminate duration. Almost all the patients were employed and more than half were married.

Epic dreaming was the primary complaint in 70% (14/20) of patients. Epic dreaming without nightmares occurred in 30% (6/20) of patients; 70% (14/20) complained of both nightmares and of relentless, neutral-content dreaming, such as endlessly walking through snow or mud, or endlessly working on the job or at home with household chores, without attendant emotions, apart from the sensation of exhaustion. The dream disturbance shared by all patients was the perception of endless dreaming with constant physical activity within the dreams. Patients described having a “dream motor running all night long”, or “not having the mind shut down during the night”, or experiencing intense acceleration and spinning in their dreams. Nightmares were rarely related to any real-life situation.

In 35% (7/20) of patients, epic dream disorder had an abrupt onset that was either spontaneous or linked to the onset of benign positional vertigo, multiple sclerosis (MS), rheumatoid arthritis, or severe, acute stress. In addition, a male patient had previously been reported to suffer from “pathologic lucid dreaming” [26] (to be described below) that evolved to become an epic dream disorder. Epic dreaming occurred nightly in 90% (18/20) of patients, and 4 nights per week in 10% (2/20) of patients. Caffeine and alcohol consumption was negligible or moderate in nearly all patients.

PSG studies, completed in 80% (16/20) of patients, were interpreted as being clinically unre-
always ordered in any patient, with REM sleep latency always ≥64 minutes, and with REM sleep per cent of total sleep time of being 20–25% in 13/16 patients (range, 14–31%), apart from one patient taking amitriptyline who had 0% REM sleep. Patients had dream recall after awakenings from both NREM and REM sleep, although dream recall was non-systematically elicited by the attendant sleep technologist during spontaneous awakenings. Neither sleep terrors, RBD, or narcolepsy was detected by the PSG and MSLT studies. MSLTs, completed in 75% (15/20) of patients, were normal, with a mean sleep latency during each MSLT of ≥6 min, without REM sleep.

A history of psychiatric disorder (e.g. dysthymia; major depression, anxiety) was present in 35% (7/20) of patients, but there was no direct association with epic dreaming, apart from one schizophrenic patient whose epic dream disorder was a direct extension of her daytime delusional symptomatology. Treatment was generally ineffective, despite a broad range of interventions (cognitive-behavioral, hypnosis, relaxation and pharmacologic therapies).

To summarize the three core complaints related to epic dreaming: first, the perception of relentless, neutral-content dreaming – without emotionality – throughout the night; second, the dream characters engage in constant physical activity throughout the dreams; third, the feeling of exhaustion upon arising in the morning, with subsequent daytime fatigue. Our conclusion was that epic (i.e. continuous, relentless) dreaming with daytime fatigue is a chronic, idiopathic, female-predominant, and relatively treatment-resistant disorder without characteristic PSG correlates. We also considered that our data supported findings from various dream investigators that sustained dreaming can occur in both NREM and REM sleep, a topic that has subsequently received increased formal attention [27].

At this point, it is worth reviewing the case of pathological lucid dreaming that had evolved into epic dreaming in three distinct stages: from uncomplicated lucid dreaming, to problematic lucid dreaming, to epic dream disorder. The first description of this case encompassed the first two stages in a report entitled, “A case of pathological lucid dreaming presenting to a sleep disorders center” [26].

Lucid dreaming – formally discovered by LaBerge – is a unique state of coexisting wakeful and dream consciousness in which a person not only is aware of dreaming while dreaming, but he or she can communicate with others through volitional movements of the eyes and fingers during REM sleep, as verified by PSG studies in sleep labs [28, 29]. Emotional arousal usually accompanies lucidity: “even the most prosaic lucid dreams tend to begin with an unmistakable sense of excitement and delight” ([30], p. 118). Problematic lucid dreams have been reported, e.g. “pious lucid dreams were very frequently followed by what [van Eeden] called ‘demon-dreams’, in which he was typically mocked, harassed, and attacked by what he supposed to be ‘intelligent beings of a very low moral order’.” ([30], p. 175) It is unfortunate that van Eeden “was never able to free himself from his demon-dreams, and his efforts to rid himself of them met resistance throughout his life” ([30], p. 176). In contrast, Saint-Denys was able to overcome lucid dreams of “abominable monsters” through willful resolve in the lucid state ([30], p. 176–9).

To our knowledge, we were unaware of any previous report involving a PSG and clinical sleep evaluation of problematic lucid dreaming [26].

A 28-year-old single, male theatre manager had lifelong lucid dreaming that became problematic 2 years prior to referral, without identified precipitant. He reported that “I’ve always been able to dream what I wanted to dream about – I could play 18 holes of golf by myself or with anybody else”. He would enter lucidity only when flying in a dream, which is a common entry into lucidity [30]. He had considered the lucid state to be “a lot of fun … I put a big smile on my face in the dream … I always looked forward to sleep”. He had up to 3 lucid dreams nightly, and often would be chased by others – but was always able to fly away.

Two years before referral, “things got out of control in my dreams, and I wasn’t having fun anymore”. He could no longer escape from people chasing him, shooting at him or “beating me up – it was terrible, and I would wake up feeling that I had been hit by a truck, with severe headaches, muscle pains, and exhaustion”. However, medical and neurologic examinations and extensive diagnostic testing (including EEGs looking for epileptic activity) were unremarkable.

Treatment with psychotherapy and with various hypnotic medications were ineffective. However, the anti-convulsant diphenylhydantoin, which was prescribed on the suspicion by his physician that atypical epilepsy was causing his dream disorder, “was a wonder drug for me, I had no more disturbing dreams and awakened feeling great”. Of note is that both normal and pathological lucid dreaming were suppressed by diphenylhydantoin. Whenever he discontinued this medication, there was full
relapse of abnormal and normal lucid dreaming within four days, which remitted promptly with resumption of the medication. However, four months before referral to our center, a sustained, partial relapse of his abnormal lucid dreaming occurred, with the emergence of dreams in which he would fall off buildings, and be “beaten to a pulp”. He also experienced uncontrollable sobbing, i.e. intense negative emotionality, during these lucid dreams.

This patient underwent an extensive clinical and PSG evaluation at our center, which included a search for epileptiform activity in the scalp EEG. However, these studies were unremarkable and his sleep was objectively normal. Epilepsy was not diagnosed. From a psychiatric perspective, there was no history of major depression, anxiety disorder, or any other condition that required treatment with psychotherapy or medication, and he had never been hospitalized. His clinical interview was unremarkable. The only abnormality was detected by the Minnesota Multiphasic Personality Inventory (MMPI), which suggested tendencies for paranoia, impulsivity, and “somatizing” (i.e. channeling psychologic distress into physical symptoms). These findings may relate to his disturbing dreams that involved being chased, shot at, and beaten up, which are consistent with paranoia. Also, his experience of extensive physical symptoms upon awakening is consistent with somatizing. It is unfortunate that he had not previously completed an MMPI, since it would have been of interest to compare the current MMPI findings with those from an MMPI completed prior to the onset of his dream disturbance two years beforehand, in order to address the issue of whether the current MMPI findings reflected a longstanding predisposing factor for his dream disturbance, or instead were (in part) a consequence of his persistent dream disturbance.

When his diphenylhydantoin dose was increased, and his blood level reached the therapeutic range (for treating epilepsy), he then once again achieved control of his abnormal lucid dreaming. This benefit was maintained during twice-yearly clinic visits for more than 3 years.

We quoted from Hunt that “nightmares and lucid dreams. I would dream, but my dreams were always looking and looking for it in my dreams. I work in my dreams. I would dream, but I wouldn’t work in my dreams, and wake up so tired from them. Before MS, I would dream, but I wouldn’t work in my dreams. I would dream, but my dreams were always fun, and I never got tired from them. They were always little dreams that you forgot about. [Now] I never get the work done, it is just too hard, working and working and working, but I never get the job done. The closets are so messy that I can never get to the bottom of them. The walls are so big, I never get done painting them. There is never an end to the mud I am walking in, I just never get done walking. For two years, there was a faceless man always helping me. I was in a room that I had to clean, and it was deep with junk all over. I did not know where to start, so I was cleaning and cleaning, and here came this faceless man, and he was with me for about two years in my dreams, helping me clean. Isn’t that funny?”

statement may possibly have applied to our patient, in whom pathologic lucidity developed for unknown reasons.

The response to an anti-convulsant medication either suggested an underlying epileptic contribution to his abnormal lucidity, since cases of complex partial seizure disorder (viz. “temporal lobe epilepsy”) have been reported in which the primary or even sole clinical manifestation of the epilepsy was abnormal dreaming that was controlled with anticonvulsant medication (in such cases, the “epileptic equivalent” was the abnormal dreaming), or may have been consistent with a non-epileptic basis for the abnormal lucidity, since various non-epileptic clinical disorders are known to respond to anticonvulsant medication.

Ultimately, the patient developed epic dreaming, without any associated lucidity, which persisted after discontinuation of diphenylhydantoin therapy, but he refused to consider any therapy for his epic dream disturbance.

Epic dreaming – clinical vignettes

I) A 60-year-old widowed woman with multiple sclerosis [32] and no psychiatric history reported “working hard in my dreams, all night long. Before multiple sclerosis I would dream, but I wouldn’t work in my dreams”. The following comments were documented during an audiotaped recording of our clinical interview, with the patient’s permission:

I’ve had lots of physical activity in my dreams since having MS: walking in hard snow, walking in mud, cleaning walls, scrubbing floors, cleaning up closets – I am always cleaning closets. Sometimes I will have lost something, and I am looking and looking and looking and looking for it in my dreams. I work in my dreams, and wake up so tired from them. Before MS, I would dream, but I wouldn’t work in my dreams. I would dream, but my dreams were always fun, and I never got tired from them. They were always little dreams that you forgot about. [Now] I never get the work done, it is just too hard, working and working and working, but I never get the job done. The closets are so messy that I can never get to the bottom of them. The walls are so big, I never get done painting them. There is never an end to the mud I am walking in, I just never get done walking. For two years, there was a faceless man always helping me. I was in a room that I had to clean, and it was deep with junk all over. I did not know where to start, so I was cleaning and cleaning, and here came this faceless man, and he was with me for about two years in my dreams, helping me clean. Isn’t that funny?
II) A 34-year-old man (encountered after publication of our initial series of 20 epic dreaming patients) reported on the dream consequences from drinking a great excess of espresso coffee one night after dinner: “It was so much work for me. I never stopped moving in my dreams.” The following comments were written down during our discussion:

After downing six small cups of espresso to end a fine dinner, I still managed to fall asleep with accustomed speed, but then experienced continuous dreaming throughout the entire night, with the dream characters – including myself – being in perpetual motion. It was so much work for me, I never stopped moving in my dreams, and the next morning I awoke with my body feeling completely exhausted.

The man’s wife confirmed that he did not move around in bed that night while he was continuously dreaming. Nor did he have nightmares in the usual sense of the word. Rather, he just kept dreaming and dreaming in relentless fashion, with non-stop movement in his dreams of himself and the other dream characters, and without associated emotionality.

In this man, a night of epic dreaming was induced by caffeine excess shortly before he fell asleep. There have been reports of RBD being induced or aggravated by caffeine excess, including coffee and chocolate over-consumption, as reviewed [13]. However, RBD is characterized by both a dream disturbance and sleep behavioral disturbance. Furthermore, the dream disturbance of epic dreaming is quite different from the abnormal dreaming in RBD, in which the affected person is being threatened or attacked by unfamiliar people or animals in a nightmarish scenario replete with emotionality. It is at present not clear why caffeine excess may induce epic dreaming in some people and RBD in others – or no apparent dream or sleep behavioral dysfunction.

The second report on epic dreaming was a case in Canada described in 1996 by the dream researchers Zadra and Nielsen [33]. A 35-year-old woman without psychiatric history had presented to the authors’ dream and nightmare center with a longstanding complaint of epic dreaming. Her experience of “relentless dreaming” was reported to occur 4 to 5 times a week. On two occasions (13 years previously and earlier during the year of presentation) the woman had consulted her family physician with the complaint of “dreaming all night long” with subsequent daytime fatigue. The medical evaluation revealed no physical problems. Anti-anxiety medication had failed to improve her epic dreaming.

The subject reported that the thematic content of her epic dreams typically involved performing job-related work or running great distances. In contrast, nightmares occurred approximately once every 3 to 4 weeks and were described as being either anxiety-producing chase and pursuit dreams or else extremely sad dreams from which she would awaken crying. The subject’s husband reported that she would frequently talk in her sleep and that the sleep-talking was often clear and elaborate. He also confirmed that she frequently had vivid dreams within 10–30 minutes of falling to sleep and in the morning she would invariably recall long and detailed dreams.

The patient was monitored for two consecutive nights in the sleep laboratory. PSG findings showed no clinical abnormalities. None of the dreams reported in the sleep lab involved the themes that typically characterized her dreams at home. Sleep-talking occurred on two occasions, both out of stage 3 NREM sleep, and consisted of a few loud but unintelligible words. Therefore, epic dreaming was absent from the dreams collected during two PSG studies. However, this woman did not report experiencing epic dreaming on a nightly basis at home, and only two PSG studies were conducted. The authors concluded that home dream diaries and that 3–5 or more consecutive PSG studies in the sleep laboratory might provide a more fruitful approach for better understanding the patterns of dream recall and dream content associated with the clinical complaint of epic dreaming.

The final two reports on epic dream disorder originated in Taiwan, allowing for an Asian perspective to compare with the first two reports from North America. The first of these was entitled, “Polysomnographic and clinical correlates of epic dream complaints: a retrospective study of 28 Taiwanese adults” [34].

Over a 1.5-year period, 28 healthy adult patients referred themselves to the first author’s sleep clinic in Taiwan with the dual chief complaints of constant dreaming throughout sleep on most nights, but without increased physical activity of the dream characters; and also daytime fatigue, but without excessive daytime sleepiness. The evaluation of all 28 patients was conducted by one author, a board-certified neurologist with specialty training in sleep disorders medicine, whose sleep clinic routinely evaluated a full range of adult sleep complaints. A clinical evaluation was followed by an overnight PSG study of all patients in the hospital sleep lab. A sleep lab technologist questioned each patient in the morning about any dreams during the preced-
ing PSG study, but did not attempt to elicit dream recall during spontaneous nocturnal awakenings. PSG arousals were not counted, and psychometric tests were not administered. The data in this report were analysed in a retrospective manner.

This group of 28 epic dreamers was 61% male (n = 17) and 39% female (n = 11), with a mean age of 39.0 ± SD 10.3 years (males 41.5 ± 10.5; females 35.2 ± 9.1 years; range, 25–63 years). The mean duration of epic dreaming was nearly 8 years, but there was a very broad range of 1–30 years for the males and 1–16 years for the females. This series of 28 epic dreaming patients comprised approximately 13% of all new patients presenting to that sleep clinic during the same time period, of which 55% were male.

Two groups of epic dreamers could be distinguished on the basis of their dream content. The “story” epic dreamers formed a group of 5 patients (4 male) who reported that their constant dreaming was like a never-ending television “soap opera”, which would immediately resume after an awakening. The dreamer usually experienced emotional neutrality during these dreams, with the content involving a cohesive, linear story (with emotions displayed by the dream characters, but not felt by the actual dreamer who was the observer in the dream). The story involved activities on the part of family, friends, office staff at work, etc. “Story” epic dreaming occurred most nights in all 5 patients.

The second group comprised 23 patients with “non-story” epic dreaming, who also perceived dreaming throughout sleep nearly every night, but the dream content did not involve a story with a plot. This group reported dreams with random, disconnected content, devoid of emotionality, which never formed a discernible story. After returning to sleep after a nocturnal awakening, a different dream would immediately begin, in contrast to the “story” epic dreamers, who would resume an already established, ongoing dream.

Both groups of epic dreamers commonly complained that their brains and minds were being overworked during sleep, which they believed made them feel fatigued in the morning. Nevertheless, there was no complaint of increased physical activity of the dream characters within the dreams (although the characters did move around), nor was there any complaint of bizarre or nightmarish dream content. Although a few patients reported a history of abrupt-onset epic dreaming, there was no apparent association with stress, a medical or psychiatric disorder, although psychological testing was not performed nor was a psychiatric interview conducted. During nocturnal awakenings at home, patients in both groups near-ly always reported having just been dreaming. The “story” epic dreaming in 5 patients (4 males) began on average around the age of 23 years, whereas the “non-story” epic dreaming in 23 patients (13 males) began on average around the age of 33 years.

Most of the patients (78.6% [22/28]) had clinically unremarkable PSG studies, with less than a quarter (21.4% [6/28]) having sleep fragmentation disorders consisting of either moderately severe obstructive sleep apnea (OSA) during REM sleep (n = 5), or severe Periodic Limb Movement Disorder (PLMD) with a high arousal index (n = 1). There was also a major shift towards light sleep in all patients, with increased percentages of stages 1 and 2 NREM sleep, decreased percentages of both stages 3/4 NREM sleep and of REM sleep, and a modestly increased number of awakenings. (However, this could have represented a “first-night” adaptation effect in the sleep lab.) Nevertheless, total sleep time and sleep efficiency were unremarkable in all sub-groups of patients, and REM-latency was not reduced in any sub-group.

An MSLT was not performed on any patient, given the lack of any history of daytime hypersomnolence. Most of the patients (22/28) had a bed partner, but there was never a bed partner complaint of problematic sleep-related behaviors or sleep-talking. The morning after their PSG studies, all patients confirmed having had their usual epic dreaming throughout the preceding night.

Therefore, this series of 28 Taiwanese patients with epic dreaming was male predominant, in contrast to the previously reported series of 20 epic dreamers from our sleep center in the United States which was 85% female. The two series had comparable mean ages at presentation (35 vs. 39 years), with mildly divergent mean ages of epic dreaming onset (27 vs. 35 years). Another difference between the Taiwanese and American epic dream groups concerns the complaint of increased physical activity of the dream characters, which was a universal finding in the American group, but a non-existent finding in the Taiwanese group. Whereas patients in the American group attributed their daytime fatigue to having increased physical activity during their relentless dreaming, patients in the Taiwanese group attributed their fatigue to having their brains and minds overworked during their relentless dreaming. The basis for this difference in the subjective attribution of fatigue is unknown, but may be related to differences in culture, sex, daytime activity level, and other factors.

This series of Taiwanese epic dreaming patients was further divided into three groups: first, the “story” epic dream group, with onset during adolescence and early 20s, and normal PSG findings;
second, the “non-story” epic dream group, with a somewhat older age of onset, and normal PSG findings; third, a “non-story” epic dream group, with a considerably older age of onset, and abnormal PSG findings consisting of sleep fragmentation during REM or NREM sleep on account of OSA or PLMD. By “normal PSG findings” we refer to clinically unremarkable findings, since there was considerable suppression of stages 3/4 and REM sleep, which may have been a “first-night effect” or perhaps a PSG correlate of epic dreaming.

The striking divergence between the universal complaint of relentless dreaming throughout sleep and the reduced per cent of REM sleep for the entire group should be noted. It is now known that dreaming does not occur exclusively during REM sleep; in fact, >50% of awakenings from NREM sleep are accompanied by recall of cognitive activity or frank dreaming [27]. Therefore, epic dreaming could be a disorder of exaggerated NREM dreaming which, when paired with REM sleep dreaming, would result in the perception of relentless dreaming throughout the night.

Two questions raised by these data concern whether the prominent lightening of sleep (shift towards stages 1 and 2 NREM sleep) found in nearly all 28 patients could have enhanced the recall of dreams, and whether the excessive awakenings from REM and NREM sleep in the six patients with OSA or PLMD also could have enhanced the recall of dreams.

An active debate exists as to whether there is one dream generator or two dream generators (one each for NREM and REM sleep) [27]. Furthermore, the question of “phantom REM sleep”, with physiologic components of REM sleep (i.e. incompletely declared REM sleep) intruding into NREM sleep as a dream-promotor, has been raised regarding the genesis of dreaming in NREM sleep [27]. Therefore, epic dreaming may result from excessive activity of dream generators, including excessive “phantom REM” intrusions into NREM sleep. The presence of both “story” and “non-story” epic dreamers suggests a differential activation of complex dream production systems that are responsible for organizing story-like plots within dreams [35].

It is currently unknown whether these patients were, in fact, dreaming more-or-less continually throughout the night and across all sleep stages, since that retrospective study did not test the relationship between dream recall and sleep stage during nocturnal awakenings in the sleep lab. A basic question regarding epic dreaming, therefore, is whether dreaming actually occurs during most of sleep (including slow-wave NREM sleep [36]), or whether dreaming is misperceived to occur throughout most of sleep. In other words, epic dreaming could be a form of “dream state misperception” analogous to “sleep state misperception” [37–39] in which the affected person incorrectly estimates the amount of PSG-documented sleep obtained (i.e. major discrepancy between subjective and objective sleep). This brings up the issue of the “Mental Status of Sleep” already proposed earlier in this section. In regards to epic dreaming, a perceptual disturbance may be linked with dreaming and recall (i.e. memory) of the dreaming, so that a heightened perception of dreaming may somehow result in the complaint of epic dreaming. This group of 28 epic dreamers may thus be a heterogenous group consisting of bona fide epic dreamers (with etiologic heterogeneity) and those with “dream state misperception”. Nevertheless, irrespective of the presence of bona fide epic dreaming or of dream state misperception, there is a nearly inextricable link between the complaint of relentless dreaming and morning/daytime fatigue. Methodologic limitations of this retrospective study included the lack of systematic dream collection, the lack of correlating dream recall with REM vs. NREM sleep stages, and the absence of a psychiatric interview and psychologic testing.

The fourth report on epic dream disorder was published in 2005 from a different Taiwanese center [40]. Twenty-two patients (14 females, 8 males; mean age 34 years, range 18–61 years) who complained of epic dreaming were recruited from a neurology clinic. A psychiatric interview and the Health Personality and Habit (HPH) Scale (self-rating) were administered. One night PSG was conducted, presumably in-hospital, and the reported findings were generally unremarkable, with a 13.1% wake time after sleep onset presumably being predominantly a “first-night effect”. The slow-wave NREM sleep per cent was mildly reduced (9.9%), perhaps being another “first-night effect”. Four patients had a respiratory disturbance index of >5/hour, and another patient had a PLM index of 18/hour, but there was no comment on any associated arousals. Five patients had alpha EEG intrusions in NREM sleep, a finding without any known specific clinical correlate. Three additional patients had a spontaneous arousal index throughout sleep of >15/hour, which may also have been to some extent a “first-night effect”. Approximately two-thirds of the patients demonstrated a tendency for psychopathology on the HPH scale (anxiety, depression, personality disorder), and one-third of the patients were clinically diagnosed with either an anxiety or depressive disorder. Although the authors concluded that epic dreaming appeared...
to emerge in the context of increased arousals from “heterogeneous pathology”, it is unclear to what extent their data supported that conclusion. Furthermore, the preponderance of patients with increased arousals from sleep across the spectrum of sleep disorders do not report epic dreaming, so other predisposing factors must also be present.

Therefore, epic dreaming has now been reported in 71 patients encompassing two racial groups (Asian and Caucasian) residing in Taiwan and North America, with the North American group being female-predominant (85.7% [18/21]), and the Taiwanese group being gender-neutral (50% [25/50]). The mean age at presentation was remarkably similar in all four publications (34–39 years), and in most cases epic dreaming had been present for years, if not many years, beforehand, indicating that epic dreaming is usually a long-standing, persistent condition, with an underlying sleep disorder uncommonly being identified, and when present not being severe. Medical and psychiatric disorders likewise rarely play a contributing role. Phenomenological subtypes of epic dreaming have been suggested, such as “story vs. non-story” epic dreaming; or epic dreaming with or without increased physical activity of the dream characters; etc. Successful therapy to date has not been identified. Thus, epic dream disorder remains an intriguing and enigmatic condition that has not yet been sufficiently described in the medical literature to be included as a diagnostic entity in the current revision of the International Classification of Sleep Disorders (ICSD-2).

Prospective research on epic dreaming, with systematic clinical evaluations, PSG monitoring and dream diaries and analyses are thus encouraged across racial, ethnic, sex, and age groups, and also across various medical, psychiatric, and sleep disorder groups. There should be quantification of dream data, with utilization of physical activity scales from a scaling system adapted for language differences. Also, the basis for continuous and discontinuous dream stories would need to be stated and quantified, so that the level of continuity or discontinuity is clearly understood.

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