Chapter 6
J. Allan Hobson’s *Dreamstage* in Context

**Introduction**

In April 1977, the exhibition *Dreamstage: A Multi-Media Portrait of the Sleeping Brain* opened at Harvard’s Carpenter Center. The exhibition was the brainchild of psychiatrist and neurophysiologist J. Allan Hobson, who, together with Robert McCarley, had been exploring the neurophysiology of the brain during sleep, attempting to describe the biochemical mechanisms behind the dreaming process. Two visual artists collaborated with Hobson on *Dreamstage*: the photographer Theodore J. Spagna Jr. and the media artist and composer Paul Earls. Central to the exhibition was a live sleeper, readings of whose heartbeat, brain waves, eye movements, and muscle tones were converted into visual laser displays and synthesized music (College Museum News 333). The exhibition, combining science and art, exhibition with performance, proved popular, drawing some 6,000 visitors during its first few weeks and over 10,000 in total (Dolnick). A few months later, in December 1977, Hobson and McCarley would publish their groundbreaking study of the dreaming brain in *The American Journal of Psychiatry*, “The Brain as a Dream State Generator: An Activation-Synthesis Hypothesis of the Dream Process.” One of the explicit aims of the article was to offer a (final) refutation of Freudian dream theory from the perspective of neuroscience. Its other, related aim was to locate dreaming firmly in the biochemical processes of the brain.

While the attempt to describe the dream state in neurophysiological terms is not inherently authoritarian or anarchic, the production history of *Dreamstage*, its aestheticization of scientific processes, and Hobson and McCarley’s search for a specific “dream generator” overlap with a number of contexts and discourses that recruit sleep and dream science into their political logics. The first discursive context for the rise of dream (neuro)science is the movement in psychotropic pharmacology from the effects-oriented tranquilizer era to the cause-oriented Prozac era. Blockbuster psychiatric medicines, starting in the late 1980s with Prozac and continuing until the present (2019), were marketed as intervening precisely in highly localized brain functions. The quest for the “depression-generator” mechanism in the brain, notably, runs parallel to that for the “dream-generator,” the holy grail of Hobson and McCarley’s work. Second, Hobson and McCarley’s work on dreaming contributed to the anti-Freudian wave in
psychiatry and psychology, culminating most famously in the important anti-Freudian revision to the Diagnostic and Statistical Manual of Mental Disorders, published as the DSM-III in 1980. In other words, dream science and its related neurobiology were part of the transformation of the definitions and borders of psychiatric and psychological practice. Third, Hobson and McCarley’s thesis about dream generation fit the mold of technological or material determinism that permeated an increasingly technophile West. Dreaming, in this mode, became part of the utilitarian work of the brain, serving primarily to more efficiently fulfill functions, such as learning—the brain as bureaucratic machine. The combination of increased pharmacology of the brain and the idea that sleep was part of an individual’s daily “work” further encouraged the intrusion of medicine into the domain of sleep through the development and marketing of sleeping pills—with the entire structure of sleep oriented around the hours of the capitalist working day. Dream science, especially in its public manifestation in Dreamstage, was an important testing ground for pharmaceutical advertisement and the visual language of science’s commodification. Accordingly, this chapter first discusses Hobson and McCarley’s work on dreaming in relation to these overlapping discursive contexts before shifting to an analysis of Dreamstage. The first section charts the parallels between the discourse on the science of dreaming and the parallel discourse surrounding the precision understanding, targeting, and commodification of neurobiological structures. The second section argues that a critical component of the rise of dream science was its push to overcome the Freudian legacy. This allowed dream science to define dreaming in purely material terms, as one discernible phase of the biological sleep cycle (REM sleep). The third section places dream science of the late 1970s and 1980s against the backdrop of discourses on technology and capitalism, focusing specifically on the relationship between sleep/dreaming and work.

The Science and Commodification of Sleep
The opening of Hobson’s Dreamstage at Harvard’s Carpenter Center in 1977 came at a pivotal moment in the treatment of sleep disorders (and mental disorders in general) between the euphoria of the early tranquilizer period and the rise in the mid-1980s of a new class of drugs.

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91 This reading of the exhibition fits into the history of public exhibits combining scientific and art that Flora Lysen defines as “corporate spectacle.”
based on the regulation of neurotransmitters like serotonin. Prozac, the most famous of the neurotransmitter drugs, hit the market in 1987, ushering in a sea change in the pharmaceutical industry as it related to psychotropic drugs and in the public’s relation to brain science. By the late 1980s and early 1990s, the first sleeping pill to utilize the new paradigm, Ambien, became available. Use of pharmaceutical sleep aids grew steadily throughout the following decades to tens of millions of prescriptions per year. By 2014, an estimated 4% of all U.S. adults used sleeping pills to combat sleep disturbance (Romm).

In the late 1970s, the glow of prescription tranquilizers had faded, giving way to a period of panic about the side effects of tranquilizer use (Herzberg “The Pill You Love” 79-103). The primary target of critics of the use of tranquilizers was the drug Valium, a benzodiazepine sold by the pharmaceutical company Hoffman-La Roche. It was Hoffman-La Roche that provided twenty of the thirty thousand dollars necessary to launch Dreamstage at the Carpenter Center, thereby bringing Hobson’s dream science together with the producer of the then dominant sleep-aids: Valium, of course, and the more specific Dalmane—another drug in the benzodiazepine family (Institute of Medicine Staff 48-52).

Hoffman-La Roche’s first blockbuster benzodiazepine tranquilizer was not Valium, but the chemically-related Librium, which went on sale in 1960 and immediately became the top-selling medication for an array of perceived psychic ailments—most significantly “anxiety,” the forerunner of “depression” (Tone 135). Since sleep disturbance was considered a key symptom of psychic trouble, Hoffman-La Roche made sure to advertise Librium’s soothing nighttime effects. Designer Rolf Harder’s “Escape to Reality” advertisement for Librium (fig. 5.1), for example, proclaimed that it was an effective treatment for alcoholism; its message read, in part: “In the treatment of acute episodes such as impending or active delirium tremens or hallucinosis, injectable Librium relieves tremor, fear, anxiety and restlessness and induces restful sleep” (Harder).

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92 The cultural history of legal psychotropic drug use can be found in the following works: Lewis, Moving Beyond Prozac; Herzberg, Happy Pills in America; Tone, The Age of Anxiety.
93 Studies reveal that the use is even greater in other areas. For example, over 7% of Brazilians regularly use hypnotics (Kodaira, Silva). Recent trends in Spain show hypnotics follow only alcohol, tobacco and cannabis as the preferred drug of teens (Carrasco-Garrido, Pilar et al.). Rates of sleeping pill use have also risen in Israel (Cohen et al.). Finally, results are significantly higher in “high-stress” demographic areas, such as among medical students (Dalui et al.).
The connection between tranquilizer use and improved sleep recurred in most Librium advertisements. In another ad, it is stated that, “A college student with ‘long-standing anxiety neuroses’ showed an immediate improvement after he began taking 25 mg of Librium three times a day. His nightmares stopped, he became more affable and relaxed, and his grades improved” (Tone 134). Librium’s advertising budget was immense for its day, reaching $2 million in its first year on the market. By the mid-1960s, Librium was targeting the seemingly ubiquitous nervous disorder of anxiety—contributing to the creation and maintenance of this ubiquity. A 1964 advertisement for Librium positioned the drug as a palliative “for the Age of Anxiety,” featuring a pair of anxious male eyes above scenes of everyday stress and allusions to Cold War fears (fig. 5.2) (Tone 136).
A few years later, an infamous Librium ad, “College Girl,” appeared in a medical journal directed at college physicians. Its appearance makes explicit what had been implicit in much of the Librium campaigning up to this point (though not in the two ads above): the gender targeting of the advertising and the link between tranquilizer use and the social, cultural and political position of women in American society. The ad, a young and seemingly distressed woman is carrying books. The headline beneath her says: “A Whole New World . . . of Anxiety.” The text of the advertisement runs:

Exposure to new friends and other influences may force her to reevaluate herself and her goals . . . Her newly stimulated intellectual curiosity may make her more sensitive to and apprehensive about unstable national and world conditions . . . Today's changing morality

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94 The overrepresentation of women in drug advertisements about mental disorders and the reinforcement images of women as domestic and as mothers has persisted and even grown in more recent advertising campaigns (Metzal 11). I will return to this when discussing the hypnotic Lunestra later in this chapter.
and the possible consequences of new freedoms may provoke acute feelings of insecurity. (Colen)

In its first year on the market, Librium won 20% of the tranquilizer market, “with doctors writing more than 1.5 million new prescriptions for Librium each month” (Tone 137-138).

The gender, race, and class targeting of the tranquilizer market did not begin with Librium, but had its roots back in the context of the explosion of the first great postwar blockbuster tranquilizer drug, Miltown (*Happy Pills* 54-56). Though advertising for Miltown and its successor drugs stressed its potential as a treatment for both men and women of the middle and upper classes, minor tranquilizers such as Librium and Valium were predominantly prescribed for women. By the 1970s, Valium had far outpaced all other tranquilizers on the market and had established a powerful consumer identity built around the alleviation of everyday stress, tension, and anxiety.

One of the key symptoms Valium targeted, according to its advertisements, was insomnia—the same claim that had been made for Miltown and Librium. “High prescription rates reflected medical responsiveness to women’s expressions of distress but also a willingness among doctors, more than 90 percent of whom were male in 1970, to code nervousness, stress, and insomnia as distinctly ‘female’ problems” (Tone 96). Hoffman La Roche capitalized on the soporific effects of drugs like Librium and Valium by launching another benzodiazepine, flurazepam, specifically as a sleeping pill under the name Dalmane. Dalmane dominated the sleeping pill market in the 1970s, all but eliminating competition from barbiturate drugs and other older modes of sleep drug therapy (Institute of Medicine Staff 48-52). As the following advertisements from the 1970s and 1980s (figs. 5.3-5.5) indicate, the prototypical insomnia patient was an “anxiety-ridden” white woman.

What is perhaps more interesting about the Dalmane campaign, however, is how “scientific” the marketing strategy is. References abound to the latest trends in sleep research, including the ability to measure brain waves during sleep to determine the episodic stages of sleep (fig. 5.4). The advertisements present data to support claims about Dalmane’s efficacy. Technology is emphasized in the form of the EEG and other apparatuses. In fig. 5.4, a sleep scientist appears in contour outlines above the scene (God-like) to oversee the sleep cycle of the woman patient. The intended message is quite clear—the regulation of sleep by Dalmane is a
modern and scientifically sound practice ("Proved in the sleep laboratory…. Proved clinically…. Proved over time"—fig. 5.3), rooted in the most advanced understanding of the brain and the brain’s functioning during sleep.

Fig. 5.3: Dalmane: “One Less Concern for your Patient with Insomnia.” Slate Star Codex
Fig. 5.4: “Dalmane: Fewer Nighttime Awakenings” Reddit
https://www.reddit.com/r/drugads/comments/7dyuym/1974_dalmane_flurazepam_hci_when_restful_sleep_is/
Despite Hoffman La Roche’s attempt to create a sophisticated science-based marketing campaign around Dalmane, the underlying vagueness of the science supporting benzodiazepines combined with the multilayered movement that arose in the mid-1970s against tranquilizer use—focusing on Dalame’s “cousin” Valium—pushed pharmaceutical companies to exploit new neurological discoveries to develop an emerging class of drugs that focused on regulation of the release, reception, and reabsorption of neurotransmitters. The rhetoric of this move from the coarse-acting or rudimentary benzodiazepines to the more “targeted” neurotransmitter regulators emphasized scientific breakthrough, technological advancement, precision, and, perhaps the sum of these parts, the ability of doctor and patient to gain control over the patient’s mental functioning.
The move from benzodiazepines to a new class of psychotropic drugs was accompanied by a transition from the vague term “anxiety” to the more clinical term “depression.” Much of the nervousness or anxiety discourse was reframed in the rhetoric about depression, which came to be seen as the root cause of these other symptomatic problems. Among the symptoms of depression was insomnia.\(^{95}\) In fact, the link between sleep disorder and depression had been established well before the emergence of drugs targeting the neurotransmitters, as can be seen by the Hamilton Rating Scale for Depression, which was developed in the 1960s to quantify a patient’s depression. Three of the HRSD’s seventeen categories asked the subject about insomnia, thus establishing a strong link between the two categories (Hamilton). The degree of specification became even more pronounced as the science of the brain developed throughout the 1970s and 1980s, providing neurophysiologists with a more detailed understanding of the functions of the brain on both micro and global levels. The understanding of depression, for example, moved from a quantitative psychological approach represented by the HRSD to a neurobiological analysis of localized brain function. In the case of depression, this meant primarily an identification of the root cause of depression in the brain’s regulation of the neurotransmitter serotonin. In *Happy Pills in America*, David Herzberg gives a compelling account of the scientific optimism (or euphoria) surrounding neuroscience and related pharmacology that permeated the era of the development and eventual commercialization of the next “wonder drug,” Prozac. This optimism did not stop at managing psychic illnesses or disorders; it boldly imagined what Dr. Peter Kramer called the “cosmetic” improvement of everything from sexual performance to memory to intelligence and creative achievement (*Happy Pills* 171-173). Despite this optimism, the ability to convert deeper knowledge of the brain into effective pharmaceuticals remained elusive. The exceptions to this were drugs that relied on the manipulation of the neurotransmitter serotonin.

Prozac, the first “selective serotonin uptake inhibitor” went on sale in 1987 and quickly became the first blockbuster mood drug following the rise of the benzodiazepines and the subsequent (or even synchronous) panic over the ill-effects of Valium in the mid-late 1970s:

\(^{95}\) The link between insomnia and depression can be found in both popular culture and clinical studies: See, for example, Buysse; Bei; Staner.
What made Prozac so special was its supposed selectivity and relative lack of serious side effects, which allowed whole new populations of less seriously ill Americans to take it. Not surprisingly, numerous utilization studies revealed that these new populations of pill takers tended to be well-off, white, and female—those with the resources and habits that gave them ready access to prescription medicines, and also those culturally prepared to embrace as “sickness” the kinds of mental states now open to treatment with Prozac. (Herzberg, *Happy Pills* 177)

The specificity of Prozac differentiated it from the earlier tranquilizer treatment of anxiety and depression. This, in turn, allowed the drug, as Herzberg demonstrates, to fit into a variety of shifting cultural discourses about mental illness, gender roles, class, and race. The commercial and cultural discourse around Prozac was less about managing anxiety or depression and more about overcoming both in order to seize personal opportunity (*Happy Pills* 179-180). The transformation occurred during the day and night—one of the promises of Prozac being the regulation and the sleep-wake cycle and the mitigation of sleep disorders, including insomnia, without soporific effects on the pill’s consumer (*Happy Pills* 182). The confident claims about “restful nights,” however dressed up in seemingly scientific garb, were nothing more than empty advertising—as studies reveal that SSRI’s have unpredictable effects on a consumer’s sleep with some experiencing better sleep and others seeing sleep actually worsen by the antidepressant treatment (Wichniak 1). But the discursive assertion is what matters here: the science of neurotransmitter manipulation gives doctors and especially patients a sense of understanding about, and control over, the functioning of their brains.

The emphasis on the targeted and simplistic—and therefore less invasive—treatment method is famously on display in one of the first major television ad campaigns to promote the SSRI Zoloft. The advertisement came after the U.S. FDA shifted its policy for consumer-targeted television ads, thereby spurring a massive increase in pharmaceutical advertisements (Donahue 683-689). The campaign stars a small, white “depressed” blob that, through its implied treatment by Zoloft, overcomes depression and finds happiness and the companionship of others—like butterflies, birds, and ladybugs. Sunshine and chirping replace storm clouds, rain, and thunder. An almost giddily positive reflection on the success of the campaign appeared in *The New York Times* in 2005:
Zoloft’s blob advertisements began running in May 2001. They are directed and illustrated by Pat Smith, an animator whose résumé includes directing the former MTV cartoon show “Daria.” The popularity of the commercials can be measured not only in their longevity, but also in the volume of online commentary the blob has inspired. On one message board, participants discuss how sweet-looking the blob is and express a desire for a stuffed animal version.

The commercials’ appeal may lie in their simplicity: childlike animation and elementary-school explanations of mental illness. But the Zoloft campaign is much more sophisticated than its basic elements suggest. For the drug itself, the two commercials successfully communicate a complicated biochemical fact: that anxiety and depression can be treated with the same pill. (Arthur)

The “biochemical fact” underlying the Zoloft television ad campaign is the regulation of serotonin. The advertisement “dramatizes” this regulation in a language, both textual and visual, that can be easily understood (fig. 5.6).

![Fig. 5.6: Zoloft Advertisement Still: Nudd, “6 Pharma Ads.”](https://www.adweek.com/brand-marketing/pharma-feel-good-ads-170424/)

The thrust of the advertisement’s presentation of the regulation of the neurotransmitter serotonin is quite clear. Zoloft forms blockages at the border of the “nerve,” increasing the level of
serotonin present in the brain. The increase in serotonin makes consumers of the drug happier. The ads’ slogan, “When you know more about what’s wrong, you can help make it right,” fits into the key discursive element of the Prozac era: the message that precise knowledge translates into consumer control. This idea of control or even self-sufficiency underlying (rather paradoxically) the decision to take Zoloft is emphasized at the start of the ad. A smoothing but confident male narrative voice asserts, “You know when you’re not feeling like yourself.” The narrative voice then presents the viewer with a number of potential symptoms. The implication is that these symptoms are somehow at odds with the true or deeper self: “You may feel sad and cry a lot”; “you lose interest in things you once loved”; “you may feel anxious and can’t even sleep.” This segment of the ad ends with, “You just know when you don’t feel right.” The contrast between the seemingly simple science and the vagueness, subjectivity, and indeterminacy of the diagnostics produces an internal tension in the Zoloft advertisement, one that it attempts to overcome through its confidence, soothing tone, and the binary clarity of its visual strategy.

It is important that from Miltown to Prozac (and Zoloft)—so from the 1950s to today—the marketing of psychotropic medication for common “nervous disorders” has emphasized the benefit of balancing relief during the waking hours with more restful sleep. Sleep improvement, in this rhetorical zone, is vital for the success of any “nervous disorder” medication that targets a wide consumer base. The evolution of more targeted sleeping pills traces the path from the Valium era to the Prozac era quite closely. Benzodiazepines like Dalmane and Halcion were almost entirely pushed out of the pharmaceutical market by drugs that targeted neurotransmitters. The first of these drugs to hit the market, Ambien, became, like Prozac, both a mode of treatment and a consumer product with a distinct identity, fusing with discursive constructs about science, technology, and the user’s socio-economic status. While the marketing strategy for Prozac was to establish the regulation of serotonin levels as the key to understanding and treating depression, that for Ambien focused on a lesser known neurotransmitter, GABA: gamma-aminobutyric acid (Parker 50). Like Prozac, Ambien discourages GABA from being received by receptor neurons and thus promotes an increase in the presence of the neurotransmitter, which works to slow the brain, encouraging its transition from a state of being awake to a state of being asleep. The keys to the success of Ambien, like that of Prozac, were the purported lack of negative side effects (in
contrast to the benzodiazepines) and the drug’s simplicity, targeting precisely one chemical in the brain instead of the coarser “global” approach of the earlier treatments.

Ambien’s “works like a dream” commercial (2000) captures the key points of this post-Prozac discursive structure, albeit without illustrating the specific science of GABA “balance” in the brain, since GABA does not have the brand-power and marketing appeal of serotonin. Still, the ad places Ambien firmly in the era of sleep science. The commercial opens with a confident and smoothing female voice telling the viewer, over a dynamic soundtrack, “There is a rhythm to life. We sleep at night and wake in the morning.” The voice goes on to claim, “It’s the sleep cycle that helps keep us in a healthy balance” (Works like a Dream). After a brief introduction to the idea of insomnia and sleep disturbance, the commercial presents the viewer with an array of visual images that indicate the vibrancy of the moment of waking up refreshed. These images include a nest of birds chirping, the slow motion unfurling of a purple morning glory, and a litter of five puppies scampering away from a shared bed. These “nature” images precede the scene of a man waking up well rested and, having regained the “natural balance” between waking and sleeping, being ready to embrace the day.

Dreaming becomes part of the economy of the sleeping pill market, according to the marketing schemes. Ambien’s slogan “works like a dream” communicates both that Ambien works really well and that it works to enable access to the oneiric state. This idea of sleeping pills as gateways not only to sleep proper, but to dreaming, is made explicit in a 2005 television commercial for Rozerem, a drug targeting the transmission and reception of melatonin. In this “dream-like” scenario, the protagonist of the commercial, a middle-age white male suffering from insomnia, encounters Abraham Lincoln and a talking beaver in his kitchen—along with a figure in an old-fashioned diving suit preparing something at the counter in the background. The thrust of the ad is that the figures from the man’s dream life miss him and want him back. This obvious point is underscored with the text “your dreams miss you,” which appears about two-thirds of the way through the minute-long spot. A male narrative voice then explains to the viewer, “If you can’t sleep, you can’t dream,” implying that Rozerem will help its consumer overcome insomnia and re-discover a more active dream life (Nudd).

Since the 1950s and the discovery of REM, sleep science and dream science have been closely joined—as one would expect. By the time Hobson began his quest for the dream-generator mechanism in the brain in the late 1960s, much was already known about the
physiology of sleep. The key discovery of modern sleep science was that the state known cumulatively as “sleep” was in fact a conglomeration of diverse sub-states with the core difference appearing between non-REM or “deep sleep” (also called “slow wave sleep”) and REM or Rapid-Eye Movement sleep (Rock 7-8).

The discovery of the phasic nature of sleep presented two key initial questions for sleep research. First, what accounted, neurologically speaking, for the shift from one state to another? Second, was dreaming sleep, or “D sleep,” as Hobson terms it, related to one or more particular phase(s) in the sleep cycle—and if so, how? It was this second question that Hobson and McCarley confronted in their 1977 article, “The Brain as a Dream Generator.” The central thrust of this article is that the event of the dream is “determined and shaped” by “physiological processes”; it is not the product of specific and traceable psychological dynamics. Dream impulses, claim Hobson and McCarley, are activated as the brain undergoes its transition into the physiological state of dreaming sleep. These impulses are then organized as a “dream” by a process of “synthesis” of the information provided by the brain stem to the forebrain. Thus, Hobson and McCarley name their theory the “activation-synthesis hypothesis.” The article summarizes the main contours of the idea:

The most important tenet of the activation-synthesis hypothesis is that during dreaming the activated brain generates its own information by a pontine brain stem neuronal mechanism… We hypothesize that this internally generated sensorimotor information, which is partially random and partially specific, is then compared with stored sensorimotor data in the synthesis of dream content. (Hobson and McCarley 1336)

The triggering mechanism for the process of brain state change between non-dreaming and dreaming sleep, as between non-REM and REM sleep, was neurochemical, in this case the strengthening presence of the neurotransmitter acetylcholine. Though preliminary, Hobson and McCarley claim that cholinergic agents (those stimulating acetylcholine) or agents that inhibit the reception and absorption of acetylcholine can artificially generate and otherwise influence the length and intensity of D-sleep. They write: “In summary, these results support the hypothesis that the pontine brain stem is the generator zone for the D sleep state. The trigger mechanism for
the whole system, including the eye movement generator, may be cholinoceptive and the executive zones are probably in the reticular formation” (1339). They continue:

…the activation-synthesis hypothesis of dreaming can be stated as follows: during D sleep, a cholinergic mechanism in the reticular formation of the pontine brain stem is periodically activated. The consequences of this activation are as follows:

1. The forebrain is tonically activated, probably via the midbrain reticular formation that is also responsible for its activation during waking. Thus the forebrain is made ready to process information.
2. The spinal reflexes are tonically inhibited, possibly via the bulbar reticular formation and the LC; thus motor outflow is blocked despite high levels of activity in the brain, including the motor cortex.
3. The oculomotor and vestibular systems are phasically activated by the pontine reticular formation so as to produce eye movements. This circuitry, in its entirety, is an internal information source or generator that provides the forebrain with spatially specific but temporally disorganized information about eye velocity, relative position, and direction of movement. Information may similarly be derived from the brain stem generators of patterned motor activity.
4. At the same time that internal information feedback is being generated by the activation of various motor systems, exteroceptive input to sensory systems is phasically blocked. They may intensify the relative impact of the endogenous inputs to the brain, accounting for the intensity of dream imagery and preventing sleep disruption by the externally generated excitation. (1340)

With these hypotheses, Hobson and McCarley propose that the process of dream activation, duration, and intensity can be understood physiologically—and that such an understanding opens up these processes to manipulation and control. The idea of biological control over sleep and dream inducement and duration overlaps with the general scientific thrust in the late 1970s and 1980s to assert a scientific control over the micro-processes of the brain.

Writing ten years after the publication of the 1977 article, Hobson makes a specific connection between dreaming and mental illness:
If even the minute imbalance of chemicals in a minute region of the brain can influence the whole system and change its state, our conceptual model is important in understanding not only normal conditions (such as REM sleep and dreaming) but abnormal ones (such as mental illness). (Hobson, *The Dreaming Brain* 202)

Hobson and McCarley’s work is part of the neuroscientific drive to define the precise functioning of the human brain in terms of the relationship between local function, information transmission, and general brain “states.” According to Hobson and McCarley, dreaming could be physically defined. It was no longer merely a set of images or emotional attributes—dreaming was a brain state with a certain triggering mechanism, a periodicity, and an underlying neurochemical foundation that could be manipulated or even controlled by external chemical assertions. This discourse of precise understanding of brain chemistry and neuron relationships, coupled with the idea that control could be achieved through chemical inputs, contributed to the shift from popular conceptions of the brain as a largely inscrutable entity or machine to the notion of the brain as a relatively open target for pharmacological enhancement. The “dark continent” of the brain suddenly appeared mapped. Views on sleep and dreaming, likewise, were subsumed into this increasingly scientific/technological and pharmacological discourse.

**Dream Science, Freud, and Power**

Hobson and McCarley begin their pioneering 1977 essay “The Brain as a Dream State Generator” with a claim that they are engaged in nothing less than leading a paradigm shift in how people think about dreams. “Since the turn of the century,” they claim at the article’s opening, “dream theory has been dominated by the psychoanalytic hypothesis that dreaming is a reactive process designed to protect consciousness and sleep from the disruptive effect of unconscious wishes that are released in sleep” (1335). This rhetorical move allows Hobson and McCarley to construct the terms of the paradigm shift. Dreams are no longer primarily a psychological phenomenon. They are first and foremost a neurobiological phenomenon—and if they have psychological importance, it is only accidental and either minimal or quite transparent, lacking the complex dream-censor and difference between manifest and latent content of the Freudian system. After their presentation of the activation-synthesis model of dream generation
and formation, Hobson and McCarley turn to its implications for psychology, explicitly contrasting their paradigm with psychoanalytic theory. They identify four major implications. First, dreams are not generated for psychological reasons but as a product of physiological phenomena, casting doubt on the primary importance of the psychological significance of dreaming. Dreaming has a “preprogrammed, neurally determined genesis.” In other words, wishes, urges, or impulses do not generate dreams, neurons do. They add, “In fact, the neural mechanisms involved can now be precisely specified” (1346). Second, the specific dream imagery is stimulated by the neurobiological processes of the pontine brain stem and not by the “cognitive areas of the cerebrum,” meaning that unlike what is claimed by Freud and psychoanalysis, “the dream process is thus seen as having…little or no primary ideational, volitional, or emotional content” (1347). While there might be content that is grafted onto the dream imagery in later stages, the dream content does not indicate psychological conflict between impulse and censor but is “genotypically determined”—dream imagery is biologically hardwired, occurring automatically. Third, the relationship between the dream- and image-producing brainstem and the more “advanced” forebrain is one of raw production and synthesis. The forebrain takes what the brain stem offers and weaves the dream together—synthesizing the impulses the best it can, based on what it receives and what it knows. This role of synthesis contrasts directly with the idea of “censorship” in Freudian theory. A dream’s strangeness, then, has no inherent psychological meaning—it is the result of a forebrain trying desperately to organize a flood of random, meaningless impulses. Finally, fourth, while Freud posits that the forgetting of dreams is a mode of repression, Hobson and McCarley demonstrate that this forgetting is a result of natural neurochemical processes: “dream amnesia can now be modeled in a testable way as the result of a different balance between cholinergic and aminergic neuronal activity and the resulting effects on second messengers and macromolecules” (1347). In sum, according to the activation-synthesis paradigm dreams are not provoked by impulses or wishes; dream imagery has no symbolic meaning; dream content is not censored—there is only manifest content—but rather an attempt to synthesize non ideational stimuli from the brainstem; and dreams fade upon waking because of a shift in the brain’s state and not because of psychological repression.

For Hobson, the 1977 article with McCarley and the launching of *Dreamstage* at the Carpenter Center mark the beginning of the composition of a more detailed historical and
popular scientific presentation of the activation-synthesis theory of dreaming. An important stage of this process was the publication of Hobson’s book *The Dreaming Brain: How the Brain Creates both the Sense and the Nonsense of Dreams* (1988). The book places Hobson in the middle of two related movements in psychiatry—1) the attempt to locate psychiatry on a more rigorously “scientific” and “empirical” foundation; and 2) the campaign to rewrite the history of psychiatry in order to present psychoanalysis as an aberrant and unfortunate “interlude” between an initial wave of scientific psychiatry in the nineteenth century and a “New Psychiatry” emerging in the 1970s and 1980s with roots in the first postwar decades. In this sense, the “Acknowledgments” section of the book is telling—as it places Hobson both at the center and at the intersection of these two movements:

Critical feedback and support for my thinking about the book’s subject grew out of two related groups. On the inside was the New Psychiatry Seminar, a quasi-revolutionary band of young psychiatric malcontents who creatively complained to and quarreled with me from 1983 to 1986 in the New Psychiatry Seminar. Willard Quine wryly dubbed us “Freudians Anonymous.” Ned Hallowell, John Ratey, and David Mann were the ringleaders of this band. On the outside was the still evolving discussion among a group of critics that includes Charles Brenner, Frank Sulloway, Adolf Grunbaum, Paul Roazen, and Frederick Crews. (xvi)

This is a noteworthy cast, to be sure, announcing to the reader that the book is a product of discussion among the most vociferous anti-Freudian thinkers of the 1980s (Grünbaum, Crews) and a collaboration with the leaders in New Psychiatry movement, which sought to uproot any and all Freudian influence from psychiatric discourse and to rebuild psychiatry on a purely neurobiological foundation with a diagnostic practice based on seemingly more empirical and demonstrable criteria. Most interesting among this acknowledged group are Hallowell and Ratey, who popularized attention-deficit hyperactivity disorder (ADHD) in the book *Driven To Distraction: Recognizing and Coping with Attention Deficit Disorder from Childhood Through Adulthood* (1994), which advocates for professional psychiatric diagnoses of the “disorder” and drug treatment to manage its neurologically-based symptoms. ADHD, like depression and dreaming, was claimed to be about neurons, not neurosis.
Hobson’s dream science, then, should be situated in the overlapping contexts of the emergence of a “New Psychiatry” based on “empirical” diagnostics and neurological information, the increasing specialization of neuroscience and its related pharmacology, and the rise of a generation of critiques of Freud and his psychoanalytic system. In this light, it is not surprising that Hobson shared discursive strategies with the most influential piece of the “New Psychiatry” movement, the DSM-III. The DSM-III represents a major revision to the categorization and diagnostic analysis of mental illnesses. The central thrust of the shift from the DSM-II to the DSM-III was to eliminate traces of the psychoanalytic tradition and to ground psychiatric diagnosis on what the authors of the revision claim was empirical, scientific evidence that could be verified through clinical testing. The framework of the approach to the DSM-III, according to the analysis of Bradley Lewis, matches the framework of Hobson’s dream theories in several significant ways. Lewis defines DSM-III’s medical or “disease model” thusly:

Though the DSM-III developers claim to use a neutral rhetorical frame, when we connect their work with the models-of-madness literature, we see that they actually use a very rigid “disease model” (also called the “medical model”). The central tenets of the disease model include the following:

- Mental pathology is accompanied by physical pathology
- Mental illness can be classified as distinct disorders that have characteristic common features
- Mental illness is biologically disadvantageous and handicapping
- The causes of mental pathology are explicable in terms of physical illness

The disease model in psychiatry forces psychiatric observation and research to emphasize signs, symptoms, formal mental-status exams, lab tests, differential diagnosis, pathophysiology, etiology, medical treatments, and prognosis. The larger rhetorical frame for the disease model is based on natural science frames of objectivity, precision, and reliability. (107)

For Lewis, the DSM III’s rhetoric of “objectivity, precision, and reliability” leads to a number of problematic outcomes. He writes:
The rhetorical frame of the disease model tends to

• naturalize and reify “mental illness”;
• feed into the medicalization of deviance;
• feed into psychiatry as an agent of normalization, state control, and multicultural oppression;
• feed into the pharmaceutical industry boondoggle; and
• rest on a natural-science model approach to humans that excludes other approaches and excludes multiple approaches. (109)

*DSM-III* was produced by a closed circle of homogenous psychiatrists all dedicated to the same professional direction—a return to the roots of biological, empirical/scientific psychiatry and a rejection of psychoanalysis and psychodynamic models. The *DSM-III* team was almost exclusively male, white, and academic, and their categorizations reflected these social and cultural positions. Beyond the individuals involved, the *DSM-III* set out to eliminate any conflicting or alternative approach to dealing with mental, psychological, or behavioral issues. The explicit target, of course, was Freudian analysis—but other perspectives that diverged from the official *DSM-III* line were also excluded. Furthermore, the *DSM-III* justified and strengthened the transformation of traits into symptoms, and symptoms into diseases, thereby providing physicians with the tools to understand patients (Lewis 112-113). This “understanding” furnished psychiatrists with the means by which to intervene in the patient’s case, most often pharmacologically. The combination of the perceived systematization of diagnostics in the *DSM-III* and the rise of “precision-based” psychotropic drugs like Prozac, based on the latest “targeted” neuroscience, formed a potent node of social and professional authority, one that would dominate the cultural sphere of psychiatry and psychology for the following two decades (at least) before it began to unravel. *DSM-III*, New Psychiatry, and the emergence of “targeted” neuroscience converged to create by the 1990s the dominant and dominating figure of contemporary medicine, society, and culture—the drug-prescribing psychiatrist, a marginal figure in the 1970s. It would take the professional annihilation of the Freudian establishment to secure its power—and a central pillar of Freudian power was its hold on the interpretation of dreams.
Hobson’s dream model is framed by the discursive regimes outlined above—the rhetoric of precision and targeting that fueled the pharmaceutical industry, the biological determinism that underpinned the New Psychiatry, and the exclusivity that discourages or banishes modes of conceptualization other than empirically based “objective” science. Hobson deploys these discursive strategies in his battle with the shadow of Freud. In the opening of *The Dreaming Brain*, he writes, “A new way of viewing dreams, as transparent, their significance available to the dreamer unaided by prophet or psychoanalyst, derives from the objective studies of modern sleep science and neurobiology” (3). This “objective” approach, Hobson claims, goes beyond dreaming. Since dreams exhibit common features with “mental illnesses,” knowledge of one area leads to enlightenment in the other:

Dreaming could thus be a mental product of the same kind of physiological process that is deranged in mental illness. This conclusion gives the scientific study of the dream process implications beyond the realm of dreaming itself: since all of the major signs of mental illness can be imitated by normal minds in the normal state of dreaming. The study of dreams is the study of a model of mental illness. (9)

The conflation of dreams with mental illness pathologizes the dream. As part of this drive to see dreaming as only a physical brain state, dreaming itself is redefined as part of the sleep cycle (REM sleep). It is no longer a “third” state between waking and sleep. Toward the end of Hobson’s *The Dreaming Brain*, the “dream” has merged, blended or become coterminous with REM sleep. Hobson writes:

The emerging functional picture is of a tidelike shift of chemical predominance within our brains as we sleep. Underlying—and explaining—the change from our waking orientation (toward external information and externally directed action) to our REM-sleep orientation (toward internally generated information and suppressed action) is a major shift in the metabolic orientation. Waking is concerned with information acquisition, catabolic energy expenditure, and action upon the world; REM sleep is concerned with information shuffling, anabolic energy conservation, and suspended animation. Sleep may thus serve development and maintenance of the nervous system, perhaps with
reorganization of the nervous system’s own information. It appears that our brains and our minds are in a tidal ebb and flow: from concern with the outside world to concern with the internal events that are brain activity itself. (194)

Hobson’s conflation of dreaming with REM sleep pushes in the direction of the full biologization and materialization of dreaming. This definition of dreaming shifts discussion of a dream’s meaning to a dream’s function, in this case “the development and maintenance of the nervous system.”

Hobson’s notion of dreaming as having a material function was pushed by contemporaries in varying directions, some very much beyond the scope of Hobson’s own conclusions. For Francis Crick and Graeme Mitchison, dreams function to purge unneeded or useless information created by neural connections during the day in order to avoid “overloading” the brain. Dreams, in other words, promote forgetting in order to maintain the system. Crick and Mitchison see dreaming as a functioning of brain circuitry—and as more or less coterminous with REM sleep. Contrary to this, other dream researchers advocate theories that dreams promote memory by re-inscribing memory impulses into the neural circuitry by a process of rehearsal. It is interesting that both the “overload” thesis and the “rehearsal” thesis connect the analysis of REM sleep and dreaming to the rising discourse about the functioning of computer systems. The brain, thus, is not only materially understood—but increasing understood as the body’s computer. Dream analysis in the brain-as-computer model was popularized by Christopher Evans in his 1983 book *Landscapes of the Night*.

The renewed movement to banish the legacy of Freudian psychoanalysis from psychiatry in the mid-late 1970s and continuing into the 1980s necessitates a reckoning with Freudian dream analysis and a replacement of dream interpretation with the new paradigm of dream understanding that stems from the previous decades of sleep science research. Dreams, once seen as a set of internally generated images or sequences during sleep, are transformed into a set of external, material properties—observable and measureable. This diagnostic definition fits the mold of the rising New Psychiatry movement, which considers mental states and mental disorders as based on material, biological brain conditions. The conflation of dreaming with REM sleep solidifies dreaming’s brain-based condition, thus attacking (as I discuss below) the very conception of a *dreamscape*. Finally, the understanding of dreaming as a physical state
connects the discourse on dreaming with discourses about analogous systems like computers, advancing the notion of dreaming as “functional,” as a “tool” of system’s maintenance. The new paradigm for understanding dreaming thus becomes an expression of the nexus of science, technology, and capitalism.

**Dreams, Technology, and Capitalism**

In *24/7*, Jonathan Crary describes contemporary life’s intolerance of sleep as a mode of being that resists the two central organizing activities of capitalist existence: work and consumption. Sleep, Crary says, is unproductive—one cannot simultaneously sleep and work. In addition, sleep disrupts an individual’s process of consumption of material, services, and information—thus providing one of the only zones of non-acquisitive activity left in society. He contrasts sleep with its opposite, sleeplessness: “Sleeplessness is the state in which producing, consuming, and discarding occur without pause…” (17). Modernity’s campaign against sleep, Crary argues, has been successful, reducing the average North American’s sleep time from ten hours per night around 1900 to a mere six and a half hours in the 21st century. Not satisfied with this reduction, the military-industrial-technological complex (including the pharmaceutical industry) has its sights set on the complete eradication of the need for sleep, which would also eliminate dreaming.

Though sleep has not yet been replaced through technological means, it has been despoiled, according to Crary, by means of technology and pharmacology—both related to the broader culture of nonstop capitalism. Technology becomes the conduit for the continuous flow of goods, services, and information. The inability to disconnect from one’s apparatus, to unplug from the flow of online activity, stretches the parameters of the workday into all of waking time. Even if a subject is not “working” while engaging in online activity, this subject is adding to the flow of work in some form—whether by consuming or simply by providing data for the generation of other business. A recent study indicates that the need to stay connected even during the traditional sleep period (the night) motivates around 50% of people under the age of 35 to check their phone at least once per night (White). These intrusions into the nocturnal period typically reserved for sleep are paired with people’s growing desire to be looking into their screens before sleep and directly upon waking. More and more, in other words, sleep is becoming a period between check-ins with the screen-world, an interval that is increasingly
intolerable to the technology-using subject. According to PEW, 25% of people in the U.S. are “almost constantly” online, with the percentage rising to nearly 40% for those under 40 (Perrin). Such “encroachments” into sleep, for Crary, create the conditions for a contemporary type of insomnia, which necessitate a market response: “All of the encroachments on [sleep] create the insomniac conditions in which sleep must be bought (even if one is paying for a chemically modified state only approximating actual sleep)” (18). Crary presents a definition of contemporary sleep in the following way: “…sleep is now an experience cut loose from notions of necessity or nature. Instead, like so much else, it is conceptualized as a variable but managed function that can only be defined instrumentally and physiologically” (13). From the instrumental perspective, sleep is connected to productivity or a subject’s ability to wake up and continue working.

The connection between sleep and work is a fundamental pillar of the medicalization of sleep. A 2009 television advertisement for the sleeping pill AmbienCR, for example, opens with a restless, insomniac woman unable to sleep. The scene then cuts to her at work the next day in her office cubicle looking bedraggled as she is unable to focus on her deskwork and instead gazes up at a hallucination of a rooster that crows from the top of her partition (fig. 5.7).

Fig. 5.7: AmbienCR Rooster Commerical, still 1. Youtube: https://www.youtube.com/watch?v=NG1hdWb8yBM

After taking AmbienCR, the formerly incapacitated woman enters her office looking confident and ready for the workday (fig. 5.8).
The confident woman is able to engage productively (talking on the phone) while her colleague in the adjacent cubicle is now plagued by the insomnia-rooster (figs. 5.9 and 5.10). This emphasizes the ubiquity of the problem—work is under direct threat from sleeplessness.
The storyboard of this AmbienCR commercial makes a direct connection between a restful night’s sleep and a productive day of work—sleep, the commercial contends, is valuable because it facilitates work. In the Rozerem commercial discussed above, the sleepless man complains, “I just have all this stress at work,” which by implication is preventing him from sleeping. Abe Lincoln reassures the man, “It happens to a lot of people,” and the talking beaver adds, “… more than half of adults report experiencing some kind of insomnia at least a few nights a week” (Nudd). The logic of the commercial is that work stress leads to insomnia, which can be overcome through medication—in this case Rozerem—allowing access back into one’s dreamlife, and, presumably, a more productive workday. The harnessing of sleep in support of work (white-collar work) has its roots in the benzodiazepine movement, is central to the marketing of Prozac and other SSRI anti-depressants and other behavioral psychotropic medications, and is the dominant lens through which post-benzodiazepine sleeping pills are presented to the public.

The case of the advertising campaign for the drug Lunesta opens up another level of sleep’s relationship to capitalism—in this case equating a good night’s sleep and its dreamlike quality to the fantasy of white, upper-middle class suburbia. The television commercial follows the florescent green Lunesta Luna moth as it checks in throughout one night on three female sleepers. The commercial opens (figs. 5.11 and 5.12) with the moth hovering above a woman at time intervals from 11:30pm to 4am, showing her blissfully asleep.
The green moth then visits other sleepers and landscapes, gathering a set of images that contextualize the sleeping woman encountered at the beginning of the ad. Three visual themes present themselves: the purity and beauty of nature, the wholesomeness of suburban life, and the security of the physical structure of the family house. The first theme, that of natural purity, reflects a merging of a kind of dreamscape (albeit a corporate construction of one) with upper middle class aspirations of living in a world free of pollution, trash, and mess—an untouched world with ample space and nonthreatening nature (figs. 5.13 and 5.14).
The images of the town where the sleeper seems to live are likewise idyllic—the nighttime is peaceful, silent, and safe (figs. 5.15 and 5.16).
The natural world as pure, beautiful, untouched, and nonthreatening, and the space of the town as quiet, peaceful, and (as symbolized by the church in fig. 16) wholesome frame the depiction of the private sphere of the single family house as a zone of total safety. Images of other intimate spaces foreshadow the sunrise at the house of the sleeping woman (figs. 5.17-5.19).
The commercial suggests that the bliss of the woman upon waking has less to do with the influence of the Lunesta than with her existence in a white, upper-middle class fantasy world cleansed of anything that might violate this corporatized ideal (fig. 5.20)—or that using Lunesta will provide access to this type of life.
Notably, in the realm of advertising, sleeping pill sleep is portrayed as empty, dreamless sleep. In some sense, this is accurate, as one of the recognized effects of sleeping pills is that they inhibit memory upon waking, thus erasing traces both of nighttime disturbances and of dreams. As Ian Parker writes in “The Big Sleep”:

…insomnia is a condition not just of losing sleep but of being disturbed by sleeplessness. Indeed, most people with prescriptions for insomnia never visit a sleep lab, trusting their own assessment of a sleep deficit. This emphasis on the subjective also makes the amnesiac effect of sleep drugs oddly advantageous to those who manufacture them: the drugs inhibit people from creating memories of waking during the night. (50)

While sleep, as Crary argues, exists in some tension to the world of nonstop capitalism, it might be more accurate to say that it has been adapted to the modern capitalist mode of work and consumption, and defined by a combination of scientific discourses and corporate representations. Dreaming, now one stage in the sleep cycle, is primarily thought about in terms of its biochemical properties, function, and utility—or it is erased entirely as an uncontrollable element with a potential for “disturbance.” The Dreamstage exhibition, to which I will move now, was a key moment when the scientific discourses on neurobiology became public and aestheticized in ways that foregrounded the next phase of corporate or capitalistic pharmacology.
Dreamstage

The Dreamstage exhibition that took place at Harvard’s Carpenter Center for the Arts was divided into two main parts—a “dark space” that featured a live sleeper and multimedia displays along with a “light space” for visual arts and scientific materials. In the dark space, readings from the sleeper were translated into laser displays and soundscapes. Blue laser traces represented rapid eye movement. EEG readings were translated into red, green, and multicolored beams. Muscle tone and heart beat were registered in golden light. In addition to this laser-light show, the readings of the live sleeper were fed into a synthesizer and converted into complex soundscapes. The live sleeper remained visible through one-way glass. In addition to the laser displays and soundscapes, the dark space showed slide projections of a cat’s brainstem tissue as well as stopgap photographs of sleepers taken at regular intervals throughout a single night. In the light space, Dreamstage turned into a more conventional science exhibition, documenting the rise of modern sleep science and the neurophysiology of the sleeping brain. The overarching thrust of Dreamstage was captured in the exhibition’s press release, “Graphic material will illustrate aesthetically remarkable aspects of brain science; drawings and paintings will represent the scientist as artist; the beauty of the brain’s form and function will be emphasized in other graphic media” (Dreamstage Archive).

In the exhibition catalog, Hobson writes, “Dream theory has changed very little since Freud’s time, whereas the state of neurophysiology has markedly matured, making it quite feasible to study the dream process at the level of the neuron” (Dreamstage Catalog). “The level of the neuron” refers to the examination of the physical attributes of the brain during sleeping and dreaming, which can then be read against the dream plot—not in order to “interpret” dreams but to explain the physical mechanisms underlying them. The move from interpretation to explanation relies on a set of strategies—both rhetorical and aesthetic—that together support a broader scientific-technological paradigm for understanding phenomena. Dreamstage’s scientific-technological discourse around sleep and dreaming mirrors the related discourses around the growing precision of psychopharmacology, the understanding of brain function, and the relationship between sleep and capitalist formations of work and consumption discussed previously in this chapter.

On the rhetorical level, Dreamstage presents a narrative of scientific progress that moves from the mysticism and dream analysis of the ancient world through Freud to the step-by-step
scientific discovery of the basic building blocks of the physical properties of sleep and dreaming. The story *Dreamstage* tells is driven by a combination of intrepid (and objective) research scientists and an increase in technological sophistication. Scientific understanding and technological development, in other words, go hand and hand, with the former often predicated on the latter.

*Dreamstage* begins this story by introducing the invention of methods to record brain wave activity (EEG) and the related discovery of sleep stages, including REM and non-REM sleep. *Dreamstage* describes the first recording of electrical waves in the brain as a moment of scientific clarity, banishing superstitious and outmoded beliefs:

> The discovery that electrical activity of the brain could be recorded in the form of brain waves (EEGs) by placing electrodes on the scalp was made in 1929 by Hans Berger…Berger’s discovery voided, once and for all, the Aristotelian hypothesis that the mind was situated in the heart and clearly demonstrated that the physiology of consciousness was regulated by the brain. (Dreamstage Catalog)

EEG measurement was the technological basis for the distinction between REM and non-REM sleep. The *Dreamstage* catalog captures this moment:

> … the discovery of REM sleep and its association with dreaming did not take place until 1953. Two investigations, Aserinsky and Kleitman…happened to notice the sleep of their subjects was characterized by rapid eye movements and EEG activation, in the absence of external stimulation. Soon after, they established that this internally-induced brain arousal (REM) was the physical substrate of dream consciousness.

Like the banishment of “outmoded” and scientifically laughable conceptions of the heart as the center of consciousness, the discovery of the “physical substrate of dream consciousness” moves the discourse on dreaming from one of interpretation and mystery (or mysticism) to one of analysis and objective understanding—like Freud, utilizing the language of scientific objectivity and paradigm shift. As an observable phenomenon, then, dreaming could be fully explicated as a
set of physical properties within a broader system of sleep, which could likewise be fully described as a physiological process:

The discovery of the cyclic alternation of REM and NREM sleep was laden with scientific portent: first, it meant that sleep was highly differentiated, not as a single state or even a succession of states, but rather as a continuously changing process, an oscillation between extremes with peaks in REM and troughs in Stage IV; second, it implied that sleep was controlled by a brain oscillator, a biologic cock with a period of 90 minutes; third, it implied that sleep serves a continuously shifting set of functions instead of just one, that of rest. (Dreamstage Catalog)

The narrative here flows like a detective story—one discovery opens up new pathways for the scientist to pursue. In this case, the discovery that sleep was comprised of a set of states that cycled at fairly regular intervals through the night implied the existence of a certain neurochemical mechanism at work. To understand dreaming, therefore, one needed a sophisticated and precise understanding of the localized functions of the brain. The Dreamstage catalog presents this understanding in a pithy, unambiguous form—the confident and “factual” language of the scientist:

Neurons that activate the brain during waking and dreaming sleep are located in the anterior reticular formation; their axons project toward the cortex. The rapid eye movements of dreaming sleep are initiated by neurons situated in the pontine, or central, brainstem reticular formation. Neurons that inhibit muscle tone are found in the posterior reticular formation; their axons project toward the spinal cord.

The increasingly specific analysis of the brain and its localized function pushes toward Hobson’s key conclusion, the discovery of the dream-generation mechanism. Hobson cannot claim certainty about this conclusion, but in the context of the progressive story of the triumph of neurophysiology, it is compelling:
The electrical activity of giant pontine cells, as measured by the frequency of action potentials, is lowest during waking and highest during dreaming sleep. Exactly the opposite occurs in the nearby locus coeruleus, or LC, cells. In other words, the increase in the rate of giant cell activity at the onset of dreaming sleep is mirrored by a decrease in the activity of LC neurons, suggesting that the two cell groups are reciprocally mediated. It is thought that LC neurons probably inhibit giant cells, and that dreaming sleep begins when the inhibition is withdrawn and the excitability of the giant cells is allowed to increase. Giant cell excitation, probably mediated by acetylcholine, in turn may ultimately result in a restoration of the LC inhibition, which would bring the dreaming sleep episode to an end. (Dreamstage Catalog, italics in text)

The technological-scientific narrative of progress has set the key terms for the neurological understanding of dreaming. Dreaming no longer stands alone as a state, but appears in combination with sleep as “dreaming sleep.” As such, dreaming is subsumed into the sleep cycle, understood as an automatic biological process that follows the circadian rhythms of the 24-hour cycle. The mechanistic view of dreaming extends to its initiation and its conclusion—Hobson’s on-off switch located in seemingly precise terms in the interface between the “giant cells” and the neurons of the locus coeruleus.

Hobson’s dream takes place in the brain—and there is no longer a dreamscape but only a territory that is a representation of biological materiality. While an anarchistic dreamscape is one that defies mapping, the new territory of the dream, the brain, can be mapped with increasing precision. The more the dream comes to belong to the territory of the brain, the more open it is to manipulation and control by the scientist. A key example of the implications of this shift in the territory of the dream can be seen toward the end of Dreamstage’s catalog, as represented visually in fig. 5.21:

A specific example may help to clarify this concept: suppose you are dreaming and in your dream you see the back of a man who is standing at an intersection. Suddenly, the man turns to the left and runs across the street. The explanation for this event in the dream would be that REM-generating pontine cells activated nearby eye movement neurons, specifically those that move the eyes to the left. The cerebral cortex registered
this activity and attempted to make sense out of it in light of what previously occurred in
the dream. The logical solution, based on the speed and direction of the eye movements,
was to move the man to the left and rapidly across the street (Catalog).

![Fig. 5.21: Dreamstage Catalog: Harvard University, Carpenter Center for the Arts](image)

This example of the tracing of movement and direction fits with Hobson’s mapping of the brain.
The dreamscape has transformed into a reflection or secondary generation of the territory of the
brain, an illusion or delusion, opening the way to the establishment of the analogous relationship
between dreaming and psychosis as both projections of physiological brain states. “Through the
use of the dream we will show that the normal brain is functionally capable of generating many
of the signs of psychiatric illness” (Dreamstage Archive).

In its “light space” displays, Dreamstage presents a linear narrative of technology and
scientific discovery. At the same time, in both the light space and the dark space the
visualizations of the brain in the form of the laser displays, rendering of neurons and neural
networks, projections of feline brain tissue, projections of “abstract landscapes” taken from
photomicrographs of neurons human, etc. take on an aesthetic function as well as a rhetorical one
(Dreamstage Archive). On the aesthetic level, the exhibit aims to present the brain as an object of
beauty and exceptional complexity, a view of the brain far removed from its typical depiction as
a lump of rather unpleasant looking gray matter. As for the mechanisms of dreaming, which,
according to the constructed narrative, one can only properly understand by moving to hyper-
specific analysis of localized brain function, the exhibition presents the beauty of the brain as
existing on the cellular level.
The “light space” exhibit, in keeping with its presentation of a short history of neuroscience, begins with early neuroscientific pioneers of the late 19th and early 20th centuries. Images from Cajal and Facundo Valverde introduce the viewer to the concept of the neuron, or brain cell, and the community or environment of neural relationships (figs. 5.22 and 5.23).

**Fig. 5.22:** Santiago Ramon y Cajal drawing of nerve cells. Hobson, Dreamstage Museum: http://allanhobson.org/pages/dreamstage03.html

**Fig. 5.23:** Facundo Valverde drawing of nervous system connections. Hobson, Dreamstage Museum: http://allanhobson.org/pages/dreamstage04.html
In the exhibition catalog, Cajal’s drawings are paired with a representation of a human brain, producing the visual effect of combining the micro and the macro, the aesthetic and the objectively scientific gaze (Cajal’s and Valverde’s drawings operating, I think, on both levels. This was recognized by Hobson in his proposal for the exhibition: “The rendering of structural features of the brain, especially in the drawings of anatomists, is often nothing short of artistic…” (Dreamstage Archive)) (Fig. 5.24):

![Fig. 5.24: Dreamstage Catalog](image)

Such a pairing of images of micro-level brain cells and a macro or global depiction of the brain establishes a key rhetorical position: the brain, far from consisting of undifferentiated “grey” matter, is complex and beautiful. Hobson stresses this depiction in his project proposal, writing in a way that reveals his attempt at rhetorical positioning, “The humanistic orientation of the exhibit will counter trends…to view man as a machine and to view his behavior as subject exclusively to external control. We will stress the beauty, the order, and the creative capacity of the human brain; in doing so, we hope also to communicate a view of the scientist as humanist—
man trying to understand himself” (Dreamstage Archive). On the other hand, the brain—beautiful, creative, imaginative—is also *representable* and therefore in some way “simple.” Simplicity was one of the key concepts that characterized the linkages between neuroscience, pharmaceutical advertisements, and psychiatric definitions. “The activation-synthesis model can account for dream nonsense and for dream meaning in terms of an extremely simple and economical set of principles, without recourse either to the collective unconscious or to a dynamically repressed unconscious in accounting for either the occurrence of dreams or for their unique properties” (Hobson, *Dreaming Brain* 15). Hobson clearly wants to position the “simplicity” of his science against the “complexity” of Freudian theory. Part of what made Freudian dream theory “complex”—and this was exaggerated in post-Freudian psychoanalysis—was that dreams contained no “nonsense,” every aspect of the dream-text was seen as containing layers of latent content.

The notion of a combined micro and global understanding of the brain was critical both for the mapping of what became the physical dream space, which depended on an understanding of specific neuron activity and how this activity was situated in the brain, and for the seeming achievement of mastery over brain function by dream scientists. The ability to represent the brain becomes tantamount to grasping it, to being able to manipulate it, to intervene in it. A significant moment in this story of increased scientific control over the brain came with the publication in 1968 of Alvin Berman’s atlas of a cat’s brainstem, *The Brain Stem of the Cat: A Cytoarchitectonic Atlas with Stereotaxic Coordinates*. Hobson utilizes images from the atlas for *Dreamstage* (fig 5.25).
Fig. 5.25: Alvin Berman photograph of a sagittal cross section of a cat's cerebellum and brainstem, from his brain atlas. Hobson, Dreamstage Museum: [http://allanhobson.org/pages/dreamstage11.html](http://allanhobson.org/pages/dreamstage11.html)

To further aestheticize brain science, *Dreamstage* included the work of a printmaker who based his imagery on Berman’s atlas (fig. 5.26).

Fig. 5.26: John Woolsey, lithograph of a cross section of a cat’s lower brainstem. Hobson, Dreamstage Museum: [http://allanhobson.org/pages/dreamstage20.html](http://allanhobson.org/pages/dreamstage20.html)
The mapping and aestheticization of the cat’s brain point to a concealed layer of violence not only in the *Dreamstage* exhibit but also in the history of the study of the anatomy of the brain. Throughout the *Dreamstage* exhibition, the cat is situated in relationship to the human being. In the exhibition proposal, Hobson writes, “The use of animal models for neurobiology has implied validity through side-by-side demonstration of the sleep cycle in man and his pets” (Dreamstage Archive). The work of Theodore Spagna, who used time-elapse photography to capture a subject's full night of sleep next to his cat, creates precisely the homology between human and animal that Hobson calls for in the exhibition proposal (figs. 5.27 and 5.28).

*Fig. 5.27: Theodore Spagna: Dreamstage Catalog*
Figs. 5.27 and 5.28 present, compositionally, themes of the relationship between science, technology, and the human (and animal) body. First, technology allows the artist to capture a series of identically framed photographs over the course of a single night. This capacity is predicated on an innovative use of technology, in this case the “intervalometer-controlled camera” (Dreamstage Catalog). The looming image of the device (in the catalog it appears as an overlaying onionskin) adds a dramatic effect to the image—symbolic of the outsized importance of technology in the analysis of sleep. The camera is also symbolic on other levels: it captures sleep science’s project of monitoring subjects during sleep, a process pioneered by Aserinsky and Kleitman in their Chicago sleep laboratory in 1953; and it represents the scientist-artist as an agent of surveillance, with the human reduced to a subject to be studied and, by extension, controlled. In the photographs, the cat appears at first to be something of a prop, but as the exhibit continues, it becomes the homologous human and, thus, the medium through which the scientist can “penetrate” the human brain. Spagna senses this in the exhibition proposal when he writes, “…the sleeping humans appear to serve as zeitgebers for their pet dogs or cats,” implying that the human and pets sleep cycles seem to have merged (Dreamstage Archive).

The foundational step in establishing the homology of cat and human is the direct brain comparison—cats have human-like brains. Fig. 5.29 depicts an onionskin with similar brain diagrams and labels overlaid on the sleeping human and cat:
The imagery is backed up by text in the catalog, “…the similarity in cat and human brain electrical activity tend to make the cat an ideal animal model for studying sleep and dream phenomena” (Dreamstage Catalog). It is noteworthy that the cat is not simply an “animal” but an “animal model.” In fact, the “animal model” provides the basis for nearly all of the subsequent conclusions about brain function featured in Dreamstage and in Hobson and McCarley’s theories in general. These conclusions rest on the physical manipulation of the cat’s brain through techniques like measuring EEG activity in the sleeping cat’s brainstem through the insertion into its brain of microelectrodes; scarring or “lesioning” the cat’s brain in order to isolate certain interactions and functions; and performing lobotomies on cats (decerebration) to isolate brain regions from one another. From this viewpoint, then, Berman’s Atlas of the cat’s brainstem is more than a simple mapping—it is a strategic charting of terrain in the service of violent conquest. A description revealing the violent conquest of the terrain of the cat’s brain occurs in the Hobson and McCarley’s breakthrough 1977 article:

*Large lesions* of the pontine reticular formation prevent the occurrence of desynchronized sleep for several weeks in cats. This suggests that the pontine reticular formation may be
the site of an executive or triggering mechanism for desynchronized sleep. Pre-pontine transections and forebrain ablation have no effect upon periodicity or duration of the skeletal, muscular, and oculomotor manifestations of D sleep. The data indicate that the trigger, the power supply, and the clock are pontine…. Small lesions of the dorsal pontine brain stem, in the region of the locus coeruleus (LC), may eliminate the atonia but no other aspects of desynchronized sleep. This suggests that inhibition of muscle tone is somehow dependent upon the integrity of the LC. The elaborate motor behavior that characterizes the D sleep of cats with LC lesions has been described as “pseudo-hallucinatory. (Hobson and McCarley 1339, emphasis mine)

Though the cat becomes the “animal model” and subject for nearly all of the significant brain experimentation in the realm of sleep and dreaming, it vanishes when the scientific gaze zooms in, allowing the viewer to cross back over the species-border to the human. If the cat’s brain has become (at least in part) an aesthetic entity through the photography and multimedia exhibitions, the processes revealed through its violent manipulation turn into something like animations or cartoons with the animal feature (and certainly the violence) nowhere to be seen (fig. 5.30). The link between fig. 30 below and the Zoloft advertisement (fig. 5.6) discussed in a previous section of this chapter cannot be missed. The commercially powerful Zoloft image is but the close cousin of this easily digestible expression of the neurotransmission process in Dreamstage.
The core or central attraction of the Dreamstage exhibition was the “performance” of a live sleeper, whose brain and body measurements were expressed in colored projections and as a soundscape. At the heart of the exhibition’s concept, then, was a sleight-of-hand—the sleeper appeared to the exhibit-goer as the human subject upon observation of which the scientists had made their leaps of knowledge into sleep and dreaming. In fact, beyond the measurement of electrical activity in the brain (and quite imprecisely in terms of localization of activity), the vast majority of scientific experiment and discovery had been not with the human subject but with the “animal model”—the cat. *The New York Times*, for example, covered the Dreamstage exhibition through the lens of the MIT student, Ben, hired to sleep in the exhibition environment. The article leads with a quote from Ben’s journal in which he describes the feeling of trying to fall asleep in front of the thousand people who came to the exhibit on opening night. Later on, the article describes the sleep-performance:

While Ben sleeps—nude but covered with a silver lame spread—behind one-way glass in full view of visitors to Harvard’s Carpenter Center for the Visual Arts in Cambridge, a dozen electrodes monitor his heart, muscle tone, eye movement and brain waves. The impulses are converted by a laser and a polyphonic synthesizer into light and music—
squiggly, dancing lines of colored light projected on the exhibit’s walls, and haunting, electronic music, hinting of some future world. (Winfrey)

“Hinting of some future world”—this is the lingering promise of the seeming revolution in the understanding of sleep and dreaming. The “future world,” despite the positive presentation of the New York Times, points past aesthetics to a world of monitoring/surveillance, manipulation, and control. Such imperious impulses are made manifest in a piece from The New York Times magazine in July 1977. When the discussion in the piece turns to nightmares and other stubbornly bothersome dreams, the article asserts a solution in the prevailing spirit of the times and in line with the scientific discourse of the Dreamstage exhibition. “To help people beset with unproductive and unpleasant dreams, several researchers are developing methods for controlling dreams” (Cherry 34).

Dreamstage can be seen as presenting a techno-capitalist conception of dreaming. It could be argued that the exhibition does not, in fact, present dreaming at all—or sees dreaming only as a “stage” of sleep rather than as creating a stage for action or event. This conception includes a technological monitoring and recording of the physiology of sleep and the aestheticization of this surveillance apparatus and the data is produces; the erasure of the violence endemic to a history of scientific research based on interventions into living brains—foremost the “model brains” of cats, but also from the era of psychosurgery that finds no mention in the Dreamstage literature or any of the reports on it; a simplification of the massive complexity of the workings of the brain into consumable concepts (the “on/off” switch for dreaming) and easily digestible didactic imagery; the progressive and linear narrative of increasing scientific understanding and the banishment, similar to the rhetoric in Freud, of myth or superstition; and finally the implicit and explicit promises for the commodification of scientific knowledge in the notion of sleep and dream control, primarily targeted at removing the interference in the form of tiredness, moodiness, etc. with the capitalistic demands of work.

Conclusion
Dream science has erased the dreamscape. In its place, it has projected a fully mapped neurophysiological territory of dreaming. This territory is defined geographically in terms of localized brain function, temporally in terms of circadian rhythms, socially or even “legally” in
terms of the interaction of neurons through the substance of neurotransmitters, politically in terms of the hierarchies of brain function (the brain stem dominating the cerebral cortex), and economically in terms both of seeing dreaming as a maintenance mechanism and as part of the process of general state of productivity.

This creation of the new territory of dreaming, defined in scientific-technological-capitalist terms did not begin or end with Hobson and McCarley’s work in the 1970s or with the Dreamstage exhibition at Harvard’s Carpenter Center in 1977. Nonetheless, Dreamstage was a key public event in a process of molding ideas about sleep and dreaming to the culture of postwar capitalism. The creation of the neurophysiological territory of sleep and dreaming helped foster and sustain the commodification of sleep (and by extension dreaming)—and of neural processes in general. This terrain helped launch “wonder drugs” like Valium and facilitated the transition from “primitive” psychotropic drugs—like the benzodiazepines—to the “sophisticated” drugs like Prozac, Zoloft, etc. The same foundation for anti-depressants like Prozac propelled a wave of sleep-aids like Ambien and Lunesta, which grew into multi-billion dollar drug empires. By the first decade of this century, this neurobiological territory, in other words, was dominated by multinational drug-makers, who spent hundreds of millions of dollars blanketing the media with advertisements—advertisements that utilized the language and visual strategies of the cartographers of the brain. The discovery and mining of neurotransmitters like serotonin could be equated with the general capitalist impulse of massive natural resource exploitation in the name of profit and power.

Does this mean that in the era of dream science, the anarchic potential of the dreamscape has disappeared? Perhaps not. Dream science has shown a dreaming brain that makes a qualitative shift in state between waking and the various phases of sleep, supporting the notion that the dreamscape is, in fact, a discrete place or space, one just as “real” as the perception of waking life. Such state-changes put pressure on notions of rigid identity; subjects, judging from brain states, are always in flux, always adjusting to impute, to context, to stimuli. In addition, while the interface between science and the public tends to be through simplified notions of the brain function and claims to knowledge that are partial or hypothetical, more specific disciplinary work reveals a brain that is unimaginably complex, containing a system of connections and information exchange that is barely understood, perhaps barely understandable. This woven maze of connections challenges notions of the hierarchy of brain function and forms
a true biological model for democratic, anti-hierarchical thinking. In other words, it is not necessarily the dream science itself that is authoritarian; it is the instrumentalization of dream science through the discursive logic of advanced/digital consumer capitalism that lend the neurobiological dreaming sleep its authoritarian character.