

## Chapter Five

## DREAMING STORIES

*Even in our sleep,  
 pain that does not forget  
 falls drop by drop upon the heart  
 and in our own despair,  
 against our will,  
 comes wisdom to us  
 by the awful grace of God.*

– Aeschylus

Aeschylus, writing in the fifth century B.C., was uncannily accurate. Every night when we fall asleep we slip into a realm we do not control. Researchers have discovered that the dreaming brain searches for emotionally fraught memories, the “pain that does not forget,” and revisits them with input from all over the cortex. It does so while silencing the “will,” the prefrontal cortex.

In dreams, even the most stolid and unimaginative of us creates wonderfully singular images and stories: *I am late to catch a train. I am on a long journey on a bicycle. I live in a spacious old mansion next to a waterfall. Something frightening is living in the basement. The roof is leaking. I am flying over a marshy landscape pumping the air with my arms.* Through these metaphors wisdom may come to us. Although, like Aeschylus, some still attribute this “grace” to God, science now attributes dreams to natural processes.

Dreams can nudge, remind, or sometimes shock us out of preoccupation with the trivial to focus on what really matters, on our instinctual duties to our family, community, and our own self-development.

Despite dream researchers' evidence, many scientists still consider dreaming nonfunctional—the nonsensical result of the random firing of resting neurons. Most surprisingly, most evolutionary psychologists as well either ignore dreaming or casually dismiss the idea that it may have adaptive significance. Prominent evolutionary theorists Daniel Dennett, Steven Pinker, and Donald Symons have offered their opinion that dreaming is likely a byproduct of some other trait, rather than a process selected in itself.

In a duel played out in the pages of *The New York Review of Books*,<sup>i</sup> the usually perspicacious Steven Pinker responded to Stephen Jay Gould's attack on evolutionary psychology by offering up dreaming, much as Lot offered his daughters to the restless mob in Sodom. So focused on defending evolutionary psychology from attack, Pinker seemed blind to the value of the children he sacrificed.

Gould had mocked evolutionary psychologists who made up adaptive stories for traits that may have simply tagged along with other traits. However, selection is fierce against wasted energy, and dreaming takes an unusual amount of it. The body devotes enormous resources to dreaming: 20 percent of every 24 hours, 50,000 hours in an average lifetime, nearly 6 years of our lives. Further, the human brain is a very expensive organ. Although it only accounts for 2 percent of body mass, it uses 13 percent of our energy; and dreaming consumes more energy than any waking brain state. Fanatic dieters know that sleeping burns more calories than watching TV. During the last stages of pregnancy, when the fetus dreams around the clock, 70 percent of the energy the mother supplies goes to the fetal brain.

Because dreaming consumes so much energy, from an evolutionary standpoint it is highly unlikely that it is non-functional. Natural selection should have eliminated such a large and wasteful drain of time and energy long ago. Behavioral ecologists who look at how species spend time and energy find that small differences in allocation of those resources can make the difference between success and failure. If dreaming did not do something important, those individuals who dreamed less would have more time and energy for other essential activities. Over many generations this economy would spread and eventually dreaming would be selected out of the gene pool.

Natural selection, the impersonal process that consistently blinds the eyes of cave-dwelling creatures to save energy, would just as surely jettison dreaming. Dreaming can be dangerous for the organism—the dreaming animal shuts out external stimuli and responds to threats more slowly. Yet all advanced mammals dream. When deprived of dreaming, humans have become psychotic and lab animals have died.<sup>ii</sup>

In fact, dreaming is apparently so useful that evolution developed it twice. Birds also have a dreaming sleep, although it appears to have arisen independently as the result of convergent evolution, rather than descent from a common dreaming ancestor. Dreaming seems to play a role in how birds learn their beautiful and distinctive songs. Some songbirds can sing their species-typical song even if deafened or kept from hearing other birds. Other songbirds will sing the dialect they heard (but never sang) as nestlings in the next breeding season. Researchers believe that dreaming provides these species the auditory feedback necessary to produce their characteristic songs.<sup>iii</sup>

Sleeping is a state of active disengagement from the outer world. Sensory inputs are blocked so that even if someone opens your eyelids while you are dreaming you do not see. The sleeping brain passes through stages characterized by distinct electroencephalogram (EEG) recordings. During slow-wave (SW) sleep, EEG recordings characteristically show the large amplitude, low-frequency oscillations that give it its name. During rapid eye movement (REM) sleep, however, the brain's EEG looks awake. REM sleep is associated not only with eye movement, but also rapid heartbeat, fast breathing, muscular atonia, and vivid dreaming. Whether we remember or not, we all dream several times a night, cycling through REM and SW sleep about every 90 minutes. Dreaming occurs in all sleep stages but is most likely to occur during REM sleep. Even fetuses' eyes move back and forth under their transparent lids.

Little controversy surrounds the function of SW sleep. Researchers agree SW sleep aids in rejuvenation of the nervous system. But the neurologically hyperactive REM sleep is not explicable as a form of rest. Furthermore, when investigators deprived rats of total sleep, REM sleep, or SW sleep, they found that rats died, not only from sleep deprivation, but also deprivation of only REM.<sup>iv</sup>

Most sleep researchers who have looked at dreaming have become convinced that dreams are functional. Many have a favorite story of how dreams have helped, even rescued them. Stanford University's William Dement, a life-long smoker, reports he dreamed in terrible vividness of his diagnosis and death from lung cancer. Terror and grief changed to gratitude when he awakened and realized he was still alive. He says he never smoked another cigarette. Although many dismiss dreams, those who have been helped by their startling images and mind-expanding metaphors need little convincing that the dreaming brain is up to something important.

Within the last decade research in neurophysiology and cognitive neuroscience has produced compelling evidence that dreaming is, indeed, important in fetal brain development, learning, memory, insight, and emotional problem solving. Yet for the public, and even within academic psychology, little is known of this remarkable research.

### **Nobel Prize Dreams**

Eighteenth-century chemist Dmitri Mendeleev was puzzling over what underlying rule could order the chemical elements. He said later, “I saw in a dream a table where all the elements fell into place as required. Awakening I immediately wrote it down on a piece of paper.”<sup>v</sup> We still use his dream-inspired periodic table of the elements. Friedrich Kekule claimed to have discovered the ring structure of benzene after dreaming of a chain of carbon and hydrogen atoms turning itself into a circle, like a snake biting its tail. In 1921 Otto Loewi awoke from a dream at 3:00 a.m. He “got up immediately and went to the laboratory, and performed an experiment on a frog heart according to nocturnal design.” He received a Nobel Prize for his proof that nerves use chemical substances to pass the nerve signal between cells. Descartes attributed his integration of mathematics and philosophy, as well as his theory of dualism to his dreams. The brilliant mathematician Srinivasa Ramanujan said the Hindu goddess Namakkal appeared to him in dreams and presented him with mathematical formulae that he would verify after waking. He is only one of many mathematicians who have claimed to have found mathematical solutions in their sleep. Another Nobel Prize winning insight came to Frederick Banting, who realized in a dream how to isolate the hormone missing in diabetics. James Watt dreamed of walking through a shower of tiny lead pellets instead of rain and realized that if molten lead fell through the air it would harden into spherical shapes. This insight revolutionized the manufacture of lead shot. In 1919 Gandhi dreamed of the idea of nonviolent mass strikes, a simple and elegant strategy that eventually brought down English rule.<sup>vi</sup>

### **The Royal Road**

Traditional cultures have long considered dreams meaningful, but modern Western science largely ignored dreaming until Sigmund Freud published *The Interpretation of Dreams* in 1898. In that highly readable treatise Freud proposed that dreams are the *via regia*, or royal road, to the unconscious. He believed that humans are bedeviled by sexual and aggressive impulses, which are held in check when we are awake. During sleep, he hypothesized, with the internal censor less vigilant, generally repressed impulses erupt in dreams and endanger sleep. The dream disguises these unacceptable desires and allow us to get our rest. Interpreting dreams, therefore, gives us a glimpse of these mostly unconscious desires. Freud believed that we dream *in order to sleep*—to discharge energy that otherwise builds up and results in wakefulness or psychosis.

Accordingly, dreams were considered bizarre because the censor safeguards sleep by disguising more obvious, frankly sexual and aggressive themes.

This theory had immediate resonance with a number of psychiatrists of the day, including Carl Jung. Jung eventually broke with Freud over the latter's insistence on the exclusivity of sexual and aggressive drives in human development. Jung also came to believe that by dreaming our mind works on daily problems of living and reminds us of deep and ancient archetypal duties. He felt dreams are not disguised but are simply metaphorical.

However, Freudian theory dominated American psychiatry departments for the first three quarters of this century. The hope of validating Freud's theories in the laboratory inspired most early sleep researchers. William Dement, an early pioneer in REM sleep research, sought to verify Freudian theory experimentally. But, he found that schizophrenic subjects' patterns of dreaming were no different from that of normal people. Freudian theory predicted otherwise. This created another breach in a theory already under attack by biomedical psychiatrists, unable to confirm other hypotheses of Freud's, and by behaviorists who believed it unscientific even to talk about unobservable, unconscious processes.

It became unpopular to study dreaming, and venerable researchers like Dement saw their funding sources evaporate. As Freudian theory collapsed, biological psychiatrists adopted the extreme position that dreams are just psychic waste products. Psychiatry textbooks suggested that gullible people found meaning in their dreams by deluding themselves into making sense of the brain's random nonsense.

Harvard University dream researcher J. Allan Hobson, typical of many experimental scientists, scoffed at those believing that dreams could tap into the wisdom of the species. Hobson, along with Robert McCarley, developed the "activation-synthesis" hypothesis of dream generation. These researchers discovered that dreams result when nerve-cell activity from primitive brain structures stimulates the higher brain centers. Observing this mechanism, Hobson and McCarley concluded they had found the answer to *why*, not just *how* we dream. They proposed that the dream is the mind's attempt to make sense of meaningless activity. Hobson wrote, "It may thus be as unwise as it is unnecessary to regard their nonsensical aspects as hyper meaningful, and as unhealthy as it is unscientific to indulge in symbol interpretation."<sup>vii</sup>

### **Levels of Analysis**

But McCarley and Hobson made a fundamental error regarding levels of analysis. They mistook an explanation about *how* a biological trait works for an explanation about *why* it exists. This is a semantic and logical error so easy to make

that it is still endemic in biological psychiatry. One can answer a question about why a trait takes a particular form from a number of perspectives. For example, the question, “Why do geese fly south for the winter?” can be answered with reference to day length, levels of hormones and neurotransmitters, and the history of the flock. These are all what evolutionary biologists call “proximate mechanisms” or immediate causes, and might be more accurately termed *how* rather than *why* responses. “Ultimate” evolutionary explanations involving long-term causation would answer the *why* with reference to the historical adaptiveness for a goose in migrating to an area of greater food availability ahead of winter.<sup>viii</sup> Pitched battles have raged over what turns out to be a “Wait, you’re both right!” situation, where correct answers are offered for both *how* and *why* questions.

In fact, while biological psychiatry accepted the activation-synthesis model as having definitively shown us that dreams are random noise, Hobson himself became convinced that dreaming helps us to practice activities essential for our survival. He credited such somnolent preparation for his own ability to fend off a much larger mugger competently and fiercely, although he is not an experienced street fighter. He began keeping a dream journal, and wrote in 1988 that he now agrees with Jung that dreams are creative and transparently meaningful.<sup>ix</sup>

### **What Are Mammals Dreaming About?**

Aristotle noticed that sleeping dogs sometimes twitch and bark as though they were chasing prey, and he correctly surmised that animals also dream. But how can we learn what they dream about? Almost three decades ago an ingenious study by Michel Jouvet of the University of Lyon allowed researchers to observe behavior corresponding to the animal’s dreams.<sup>x</sup> As described above, during REM sleep the brain generates signals that, in an awake animal, would result in coordinated movements if the motor neurons to muscles were not inhibited.

Jouvet destroyed the neural tract responsible for the sleep paralysis that keeps mammals from acting out their dreams. As the cat moved into REM sleep, it staggered to its feet and behaved as though it were hunting prey, its eyes partly open but unseeing. Likewise, dreaming rats search for food. Based on this research Jouvet proposed that dreams allow the animals to practice skills vital to their survival.<sup>xi</sup> In dreams mammals can compare daily experience against mental models—models they have created from the interaction of today’s learning with ancient genetically encoded instincts.

### **REM Sleep in Brain Maturation**

It does not surprise us that precocial mammals—those born fully furred and able to run about—come out of their mother’s womb with sensory abilities intact. Yet we know that when in adulthood sight is restored to blind people born with cataracts,

they initially cannot see because the necessary neural connections have yet to be developed by interaction with the <sup>xii</sup>environment.

How then can a foal come out of the womb able to see the world? It can also stand, walk, suckle, and emotionally attach to its mother, keeping its nose close to her side. Even a human baby—born altricial, almost fetal—can see clearly just the distance to the face of a person holding her. Somehow it also has an innate preference for the human face.

Developmental psychologists have also found that babies expect the force of gravity, the inertia of massive objects, and the apparent connections of causation. When researchers produce illusions that seem to defy these natural laws, babies look startled.<sup>xiii</sup>

By thirty weeks after conception the human fetus spends all of its time in REM sleep. The developing brain directs spontaneous, repetitive activity that helps to direct brain maturation. By firing in a genetically determined pattern, these neurons stimulate the oculomotor and vestibular neurons they contact, organizing sensory and motor responses.<sup>xiv</sup>

Presumably this is how the baby is born with a visual focal point of 12 inches and a liking for the human face. Human newborns are so well prepared to live in the world that, within days of being born, they recognize faces and voices and smells of familiar people.

In their book, *The Scientist in the Crib*, Alison Gopnik, Andrew Meltzoff, and Patricia Kuhl describe research showing that very young infants possess highly sophisticated reasoning and representational systems. Their research led them to conclude that newborn babies “have a deeper conception of what it is to be human. . . . From the moment we first see other people, we see them *as* people. . . . We arrive in the world with a set of profound assumptions about how other people are like us and how we are like other people.” They write, “Nature ingeniously gives us a jump start on the Other Minds problem. We know, quite directly, that we are like other people, and they are like us.”<sup>xv</sup>

But how are these representations hardwired? How could such complex information as “sense of self” and “idea of mother” be encoded in the genome? The number of neural connections needed for “sense of self” probably amounts to more than the amount of information encoded in the genes.

Although Gopnik and her colleagues do not speculate on how this jump start is achieved, dreaming is the best candidate for a mechanism that prepares the baby’s nascent sense of self and its expectations that it will be born into a world with certain physical and biological realities and a mother to care for it. The genome may need only set some parameters that

define “emotional attractors” for the developing brain to dream into representation the budding ideas of mother, mechanics, and other minds. In other words, innate structures form the framework, and dreaming may develop more elaborated structures. Once she is born, interplay between environmental and phylogenetic information further develops the baby’s expectations and ideas about the world.

The basis for thought, memory, and mind lies in the incredibly large number of connections that can occur in the human brain. Each neuron can make up to 50,000 connections, and the human brain has over 11 billion neurons. Neurobiologists fondly point out that the number of possible sites of information exchange here outnumber molecules in the universe. This explains the uniqueness of human beings. Even identical twins are quite distinct, the result of a process of individuation that begins early in embryonic development. Memory is developed by the growth and strengthening of unique and specific neural links all over the brain.

How is genetic knowledge developed and maintained? Both genetic instructions and life experiences become knowledge in the same way, by proliferation and pruning of neural connections. Precocial birds and mammals have to know how to accomplish a number of complicated activities at birth, including seeing, moving about, eluding predators, bonding with mother, and finding food or nursing. Later they must know how to court, mate, and raise offspring, but long periods of time may elapse before they need to draw upon particular pieces of knowledge. Dream researchers have long suspected that dreaming is one of the ways birds and mammals learn and maintain instinctual knowledge.<sup>xvi</sup>

The brain structures involved in long-term memory are more active during REM than even when we are awake. Dreams allow animals to rehearse movements. Mental imagery of a motor action uses the same motor representations and central neural mechanisms as those used to generate the action itself. The pyramidal tract cells of the motor cortex fire during REM sleep in exactly the same way as in waking motor movement, although an inhibitory system blocks their signals to the muscles. As far as the underlying brain mechanisms are concerned, dreaming practices actions just as real action.<sup>xvii</sup> Researchers recently demonstrated that twenty percent of the improvement in a motor skill, such as playing sports or music depends on getting the final two hours of sleep.<sup>xviii</sup>

Experiments on the visual system development of kittens, who spend most of their early life asleep, find that sleep contributes as much to developmental changes in vision as does visual experiences. Researchers found that kittens with one occluded eye accommodate neurologically to this change during sleep just as during wake. In fact, congenitally blind people dream in images and, amazingly, their drawings of their dreams are indistinguishable from those of sighted people.<sup>xix</sup>



### **Why Did Dreaming Evolve?**

Fish, amphibians, and reptiles do not dream. How and why did dreaming evolve in mammals? The spiny anteater, a very primitive egg-laying marsupial, has an enormous prefrontal cortex and is one of the few mammals that does not dream. The prefrontal cortex, located under the forehead, is the most evolutionarily recent part of the brain and is responsible for the increased behavioral flexibility that differentiates mammals from reptiles. Larger frontal lobes mean a larger head and a tighter passage through the birth canal. Jonathan Winson hypothesized that dreaming allowed mammals to become more intelligent without adding to this massive neocortex. Using off-line time when the animal sleeps allows mammals to use the cortex more efficiently.

While we sleep, the mind is freed of monitoring and remembering new information; Winson proposed that the brain can then review and reorganize information it gained during the day in terms of what it already knows.<sup>xx</sup> Jouvett and Winson hypothesized that at night mammals “dream into memory” the lessons of the day and integrate the day’s learning with the species’ instinctual wisdom. A decade later, evidence from well-designed studies with both laboratory animals and humans confirms this hypothesis.

### **Sleep and Dreaming Aid Learning and Memory**

When you were learning a new skill like tennis, did you ever find you could play better the next day than when you had quit the night before? Or as a student, could you remember facts better the morning after studying? We attribute our improved performance after a night’s sleep to being “fresher” in the morning. But what exactly goes into this feeling? We imagine that the brain has rested, but, in fact, the dreaming brain has been *hyperactive*. Sophisticated neural mechanisms help us learn and process the day’s events while we sleep.

In the early 1970’s Vincent Bloch of the University of Paris showed that REM sleep in rats increased when the rats were being trained in a maze-learning task. Since then many other studies have reported that mammals apparently adjust REM homeostatically in response to memory consolidation demands, increasing the amount of time spent in REM as needed. For example, mice raised in an enriched environment have a higher proportion of REM sleep than mice raised under standard or impoverished conditions. REM increases in depression, bereavement, and war-related Post-Traumatic Stress Disorder. In humans, developmentally disabled children have less REM sleep, and gifted children have higher REM sleep rates than normal children.

Blocking REM can inhibit learning a new language and recognizing the faces of new people. This happens because during REM sleep recent memory traces may be reactivated, analyzed, and gradually incorporated into long-term memory. REM deprivation interferes with learning in many tasks, but only if the task involves a new behavioral strategy.<sup>xxi</sup>

As noted, several investigators have demonstrated that the pattern of neural activity during waking behavior is reactivated during sleep. When researchers implanted electrodes in individual nerve cells of a rat's brain, they found that neurons fired in the same order in dreaming as when the rat was running the maze. Furthermore performance in the maze improved throughout the night. They concluded that rats dream and practice the maze they had just run. Although researchers do not usually implant electrodes in people, fluctuation magnetic resonance imaging (fMRI) studies also show that human brain activity during sleep mirrors brain activity during training.<sup>xxii</sup>

A recent review by Robert Stickgold and Allan Hobson of Harvard concluded that SW and REM sleep facilitate different components of memory consolidation—depending on the nature of the task—in a two-step process. Initially, most memories rely on the hippocampus, located in the limbic system—the brain's long-term emotional memory center. Over time memories consolidate throughout the brain, where they can be retrieved from other areas of the cerebral cortex without using the hippocampus. During consolidation the hippocampal neurons fire and strengthen links between the neurons carrying different aspects of the memory in other cortical areas, thus binding parts of the memory together into a coherent whole for later retrieval by visual, olfactory, or auditory cues.

### **Psychological Insight and Growth**

From the studies described above it appears that dreaming contributes to the automatic processing systems in the brain that decide what we see, hear, and remember; the development of instinctive behaviors in utero; and memory consolidation throughout life. But what other jobs are getting done? Most dream research in adults has focused on memory rather than psychological insight and development because memory is more easily measured. But in clinical dream work, we focus on the role of dreams in helping individuals gain insight into their problems.

Dynamic brain imaging techniques such as positron emission tomography (PET) show how the brain shifts its activity from waking to dreaming. PET studies find that as the dreaming brain turns off the prefrontal cortex—the brain region responsible for judgment and reason—it also turns off the primary visual cortex so that visual input from the outside does not penetrate the brain. But the visual association cortex, which makes sense of visual signals, and the basal ganglia responsible for

voluntary movement, become very active. The mind interprets these internally generated signals as if they came from outside. To the hallucinating, dreaming brain we *are* seeing and moving.

At the same time the long-term emotional memory system is highly activated. In fact emotion-producing structures in the limbic and paralimbic areas, responsible for sensations of sorrow, love and longing, Aeschylus' "pain that does not forget," are even more active during REM sleep than during the awake state. To many researchers these patterns of activation suggest that dealing with emotional concerns is an important function of dreaming. A review in *Behavioral and Brain Sciences* concludes that the dreaming brain searches for emotionally salient memories to reprocess with input from all over the cortex. Researchers believe that the mind creates new understandings and ideas as it reactivates emotional concerns, including primitive fears, in combination with visual and auditory memories and sense-making higher brain.

These conclusions challenge the dominant view of dreaming as functionless, however, three independent groups came to the same conclusions from studies carried out simultaneously but with different methodologies, including PET, lesion, and fMRI studies.<sup>xxiii</sup> During REM, the hippocampus and other limbic system structures exchange information with higher level neocortical thinking structures, a process that consolidates memories and allows the creation of new associations within the cortex— novel insights and metaphors prompted by associations within the cortex and emotional memories.

We're aware of dreamed Nobel Prize-winning insights because they have historical interest, but most dream insights involve emotional or social concerns, not abstract math and science (although if math is your passion, apparently that is what you dream about). The creative dreaming of non-scientists may be equally stunning. The novel metaphors, which the dreaming brain offers without input from the rational prefrontal cortex (like the hypercritical member of a brainstorming team that squelches creativity), may be breathtakingly brilliant and startlingly vivid.

Psychologist Deirdre Barrett, in her book on dream creativity, *The Committee of Sleep*, details a number of composers who dreamed melodies, including Beethoven, Stravinsky, and Wagner.<sup>xxiv</sup> Paul McCartney dreamed he heard a classical string ensemble playing a beautiful melody. "I liked the melody a lot, but because I'd dreamed it, I couldn't believe I'd written it. I thought, 'No, I've never written anything like this before, but I had the tune, which was the most magic thing.'"<sup>xxv</sup> He named the song *Yesterday*, one of the most popular songs ever recorded.

Many people know that Mary Shelley dreamed the story of *Frankenstein*. But she is only one of dozens of authors who attributed crucial insights and creativity to their dreams. Barrett goes on to mention Goethe, Coleridge, Yeats, Blake, Poe,

Kafka, Charlotte Bronte, Voltaire, Stevenson, Graham Greene, Sir Walter Scott, William Styron, Frank McCourt, and Jack Kerouac.

E.B. White wrote to his agent, “I will have to break down and confess to you that Stuart Little appeared to me in a dream, all complete, with his hat, his cane, and his brisk manner.”<sup>xxvi</sup> Isabel Allende struggled with the conclusion to *House of Spirits* until she dreamed of her grandfather on his death bed and realized she had been telling the story to him all along. It may surprise no one that the lurid and prolific Stephen King relies heavily on his dreams.

The connection between poetry and dreaming is even more direct. Denise Levertov, Maxine Kumin, and Philip Levine are three of twenty-six contemporary poets who told Roderick Townley, author of *Writers Dreaming*, that they found the words and phrases they were looking for in dreams. Townley attributes, “the intimate relation between dreams and poetry to the fact that both rely on compression, juxtaposition, deep imagery, and ambiguity to create a charged atmosphere and unearth buried truths.”<sup>xxvii</sup>

The most dreamlike of all arts is film, and Orsen Wells, Ingmar Bergman, Luis Bunuel, Alfred Hitchcock, Cocteau, Fellini, Kurosawa, Altman, and John Sayles have all made powerful movies or scenes directly from their dreams. Fellini reproduced his childhood dream of a magician in *8 1/2*. Robert Altman says that in one night he dreamed the entire movie that became *Three Women*.<sup>xxviii</sup>

### **Our Suspicion of Non-rational Sources of Information**

While I was treating a college senior in psychotherapy, his dreams suddenly dried up. Previously, he had reported dreams every few weeks; we had worked on them together, and they yielded fruitful insights into his emotional concerns. Then for months there were none. Finally he brought in a compelling dream that haunted him, and he asked me doubtfully, “Do you really think that dreams mean anything?” I was puzzled by his question, given the vigor of our earlier work, until he explained that he was taking a neuropsychology class in which the professor said dreams result from the brain’s trying to make sense of nonsense. Embarrassed at holding supposedly unscientific ideas, he had simply stopped remembering his dreams.

His professor is not alone in this belief. Despite experimental evidence described above, most scientists continue to deny a functional significance to dreaming. Why the reluctance of modern scientists to believe that dreaming serves a function, that it is an evolutionary adaptation? I have described the collapse of Freudianism in American academic psychiatry departments

and the rise of a reductionistic biological psychiatry that has ignored evolutionary “ultimate” explanations in favor of intermediate “proximal” biochemical or neuroanatomical ones. However, perhaps something more stands in the way. I suspect that it is precisely the non-rational, metaphoric nature of dreams that evokes wariness and skepticism in many.

Dreams have been discounted—even by evolutionary psychologists—because they speak metaphorically and use systems of symbol formation and reasoning different from the rules of rational, wide-awake thought. Since the early Greek philosophers scientists and scholars have been suspicious of non-rational sources of information. Socrates, Plato, and Aristotle criticized the mythic stories and irrational passions that ruled their contemporaries’ lives. Instead of asking of nature *who?* and *why?* (*Who created the world?* and *Why?*), they asked *what?* and *how?* (*What is the world made of?* and *How do these components work?*). This pre-scientific revolution brought us enormous technological advances for over 2,500 years. However, the denial of non-rational sources of wisdom also led to a profound suspicion of the utility of myth and stories—a suspicion that persists to this day in Western science.

The advance of the rational has come at a cost. Susanne Langer, writing in *Philosophy in a New Key*, argues that the main way we develop new ideas is through the metaphoric process.<sup>xxix</sup> By defining something in terms of something else, metaphor allows us to see the thing differently. When we say, “Life is a journey,” or we dream, “*I am riding in a car, and my father is driving.*” we may come to understand aspects of our life in a fresh way. Although the mythic stories of how the earth came to be did not lead to the impressive scientific achievements that a rational approach did, singular wisdom was lost when the scientifically minded stopped paying attention to the metaphor of myths and dreams.

In his introduction to George Orwell’s *Animal Farm* literary critic C. M. Woodhouse describes the way fairy stories work. It is also the way dreams often work.

The fairy story that succeeds is in fact, not a work of fiction at all. . . it is a transcription of a view of life into terms of highly simplified symbols, and when it succeeds in its literary purpose, it leaves us with a deep and indefinable feeling of truth. . . . It uses for characters not rounded, three-dimensional human beings that develop psychologically through time, but fixed stereotypes, puppets, silhouettes—or animals. . . . Its message (which by no means is its moral) is that of all the great fairy stories: ‘Life is like that—take it or leave it.’ And because it is written by a poet our reaction is. . . . ‘I know. But I do not approve. And I am not resigned.’<sup>xxx</sup>

In the dream characters act out conflicts, urges, and dilemmas in dramatic terms. The dream—like the fable or fairy tale—personifies abstract concepts such as good and evil. Dreams may remind us of instinctual duties, and they may be accompanied by intense or holy feelings so that we will take notice of them. Such dreams may haunt the day.

As an example, a woman who was building the home she had always longed for brought this dream to therapy: *“I have an evil twin. She has supernatural powers. I realize I must kill her, but as hard as I try to slice through her sternum with a knife, I am unable to affect her.”* The dreamer woke shaken and wondering if there is an aspect of herself that is evil and cannot be stopped. As she struggled to grasp the dream’s allusions, I offered the idea that our capacity for evil often arises out of fear or humiliation. Her understanding and tears welled up simultaneously. The shame she felt about being poor as a child had led her to dip into her children’s college fund to build a showy house. Her husband had tried to restrain her spending, but she would not be deterred. She wept as she realized the extent of the shame and deprivation she had felt as a child, and the power it still held over her—leading her to irresponsible behavior toward her own children. Her dream-aided insight enabled her to curb her impulses to raid her children’s future.

This dream also illustrates the way dreaming can remind us of our biological obligations. When we get caught up in the conflicting demands of modern life, such a dream can startle us into reexamining our values. These dreams are messages from the adaptive unconscious; they bring our attention back to what is ultimately important in an evolutionary sense, like finding a mate or our children’s welfare.

Does this mean that dreams are *truer* than waking cognitions? It would still be a mistake to ascribe preternatural wisdom to dreams. As with waking cognition, they can be incomplete. In fact, as previously discussed, dream characters are often one-dimensional representations of an aspect of a multi-faceted person or relationship, and sometimes they address contradictory ideas one at a time. One woman in a loving marriage free of physical abuse dreamed her husband had left bruises on her legs. The dream alerted her to his passive-aggression that she had been ignoring; a few weeks later she dreamed she struck her husband, reminding her that her own behavior also hurt him.

Dreams do have an elegance, wit, and earthiness that repays analysis and enlarges our sense of ourselves. But they can also torment, haunt, and mislead. Hitler was emboldened to invade Poland because of a dream.

And, of course, dreams can also be very banal. Although psychotherapists know that patients have deep and profound dreams, when scientists collected dreams from research subjects by waking them each time a REM episode ended, they

amassed hundreds of prosaic and relatively uninteresting dreams. Perhaps much of dream mentation, like waking thought, is pretty mundane. We are likely to remember and talk with therapists or friends about psychological conflicts and insights, not about all that futzing the brain seems to do both sleeping or waking.

### **Practicing Social Relations**

We know that dreaming cats practice predatory behaviors; dreaming rats forage. If dreaming functions to help mammals practice the behavioral strategies essential for their success, what is the primary work of human dreams? For primates relationships are extremely important. Primatologists have found that skillful social behavior is crucial to reproductive success in chimpanzees.<sup>xxxii</sup> *Homo sapiens*—the most social primate of all—may be even more preoccupied by social relations. Our dreams frequently involve interactions with other people.<sup>xxxiii</sup>

Indeed, hominid's brainpower may have increased specifically to cope with their complex social world. As our ancestors moved onto the savannas, group size increased to protect the exposed apes from predators, but increasing group size meant more relationships to maintain. Primatologist Robin Dunbar argues that increasing group size led to selection for larger brains specifically for keeping track of those relationships.<sup>xxxiiii</sup> Thus, while cats dream of hunting, and rats dream of foraging, I suspect that our ancestors probably spent more time dreaming of social situations—trying out and experimenting with aggressive, protective, and affiliative behaviors.

### **From Cinderella to Dracula**

If a dream is about one's mother, why isn't she depicted as she is in real life? Dreams often split a complicated relationship with one person into a story with several people, each one representing an aspect of the person or the dreamer. Like the Cinderella story in which a girl's complex relationship with a mother figure depicts the mother as two people—a wicked stepmother and a generous fairy godmother, dreams creates just such metaphors for overlooked aspects of our intimate relationships.

Legends of monsters such as the werewolf and Dracula are perennially fascinating because they symbolize dangerous and ambiguous human relationships so eloquently. Ancient art and writing suggest that people have been attending to their dreams for a very long time. Human-animal hybrids, such as wolf men and lion-headed women, make up a common dream metaphor for complicated human relationships—and they are found inscribed on the world's oldest art. According to

Cambridge University researcher Christopher Chippindale, these bizarre images are the one common feature of ancient rock art sites in Europe, Africa, and Australia.

Another client's dream illustrates how dreams select and amplify an aspect of the nuanced and textured complexities of real life to show us something we have neglected. Sarah's husband, John, was struggling with his relationship with his glamorous parents, who, while publicly loving, had been controlling and demeaning to him as a child. He was often depressed, but he also idealized his parents. Depression led him to psychotherapy, and he began to realize the toxic effects he still carried that resulted from his parents' behavior toward him. In this process his wife affirmed his perceptions of their subtle denigrations and manipulations. On the night of Sarah's dream, John, Sarah, and John's parents had all been to a party, where a trusted friend had enthused about the parents to Sarah. "They're wonderful!" she had said, "Smart and fascinating to talk to. I see now why John is so neat!" Sarah went to bed thinking, "She's right, John's parents are wonderful. We haven't been giving them enough credit." That night she dreamed:

*I am a little boy. There is a toxic waste source. It is radioactive. The only way I can keep from being poisoned is to avoid exposure by running into a house and ducking under the windows. As long as something blocks the rays I am safe, but if I stand exposed in front of a window the toxic rays can hurt or even kill me.*

Sarah awoke thinking, "I need not to underestimate the toxicity of John's parents for him, especially when he was little."

People who work with their dreams discover that many contain multi-faceted, ambiguous, transcendent, and complicating information that can expand a waking attitude. They find that dream work provides insight into their relationships, furthers their psychological development, and helps them deal with emotional trauma. This sounds very like Aeschylus' insight from long ago: "In our sleep, pain that does not forget falls drop by drop upon the heart, and in our despair, against our will, comes wisdom to us."

### **Can Ordinary People Benefit from Dream Work?**

Unfortunately, most people in technologically advanced cultures are encouraged to ignore their dreams. Freudian psychiatrist Charles Rycroft assures us that ordinary people "have neither the capacity nor interest to do dream work."<sup>xxxiv</sup> He implies that people need a level of intellectual sophistication to interpret their dreams. This is elitist claptrap. Anyone open to their



dreams can render them meaningful with or without the help of a therapist. For example, Roy and Heather are two psychotherapy patients who were not unusually introspective, yet they had creative, profound dreams that they worked with deeply.

Roy was in therapy because his wife was concerned about his anger and occasional violence toward their young son. He uncritically identified with his own authoritarian father who had been remote, perfectionistic, and sometimes brutal. Although his childhood had been lonely and anxious, he had very little insight into his own or his father's impact on their young sons. One night he had the following dream:

*There is this white gorilla, full size, like a man. I feel there are more, a whole group. Me and someone else saw a whole bunch in the dark. They leave and we keep following them, almost harassing them, to a barn. We climbed up the stairs into the loft. My friend saw one and I sensed it right when getting to the upper level. He fell back down on me. I felt that he was afraid of the gorilla. Then the gorilla came back down to the dirt. The gorilla said, Boom! And swung his arms to scare us. But he just wanted to be left alone. Then he spoke and said he and his guys wanted to occupy the upstairs. We agreed to let them and said we would not bother them.*

When I asked Roy what gorillas meant to him and what a *white* gorilla might be, he said, "It's something wild and sacred." Then he began to cry as he said, "Why do we keep bothering them?" After a silence he surprised me with a new and profound insight, "I think it's the wild part of my son—maybe of myself too—that I keep riding so hard."

Heather was a nineteen-year-old college student who seemed younger and who peppered her speech with slangy locutions such as, "He's, like, totally awesome." She smiled continually throughout her first several sessions as she told me that her beloved father had just been diagnosed with lung cancer. She assured me that he was not worried. He was a highly successful and self-confident businessman, and his bravado convinced them both. Her belief in her father carried her through the first several months of his illness, but when she came to my office after a visit home she was shaken by the ravages of radiation and chemotherapy on her father. Yet, Heather still professed the conviction that her father would eventually recover because he continued to say, "Don't you worry, baby, your Dad's not going anywhere." At the same time, he also encouraged her to come home. Because her visit had been so painful she resisted returning. Then she had this dream:

*“I’m with my Mom and Dad, and we’re crossing this street. Then this woman appears, driving an awesome red convertible. She is dressed in black and has dark hair and is very beautiful. She stops the car in the crosswalk and starts flirting with my father, running her hand down his arm—and Dad likes it! My mom and I are totally freaked. The woman is so beautiful and Dad is, like, attracted to her. We try to get Dad to come with us—but he gets in the car with her!”*

By this time in the narration she was sobbing. I asked, “Who do you think she is?” Without hesitating Heather said, “She’s Death.”

However Heather ignored the insight of this dream. Confused by her parents’ mixed messages, she fled on a vacation with friends. She finally went home just four days before her father died.

### **Do Gorillas Dream in Fables?**

Most people assume that we learn to tell fables from our culture—that telling stories with a moral lesson is something culture invented and passed down to children. But dreams suggest that humans experienced metaphorical stories before books and perhaps before language. Using metaphor—comparing dissimilar things based on uniting underlying principles—is one of the primary ways we construct new reality.<sup>xxxv</sup>

Could the dreams of other primates be metaphorical also? We cannot ask them about their dreams, but an intriguing intimation comes from Koko, the famous gorilla trained in sign language. Trainer Penny Patterson taught Koko hundreds of signs for everyday things. When Koko was introduced to another gorilla who bullied her, she signed that he was a “shit.” This is a clear metaphorical construction. One wonders what Koko dreams.

Indeed, for humans, dreams about feces as metaphor are common. Our disinhibited dreaming mind is often graphic and earthy. One woman I worked with was having a dangerous affair; if she were found out it could destroy her marriage and her standing in the community. She dreamed she was standing knee deep in feces, and awoke thinking, “I *am* in deep shit.”

People might dream they have to defecate but all the toilets are overflowing. Perhaps there is no place for their shit—their anger, pain, and less desirable attributes—because people around them have so much of their own. A woman who had just told her husband of a past affair dreamed of leaving a big turd on a seat in a public place. A man dreams he is urinating, but as he does, the urine splashes back in his face. This man was afraid of his anger, afraid of being “pissed off.” A woman

dreams her toilet is plugged because her husband has not fixed the pipes. In reality, he had been refusing to go with her to marital therapy. Such explicit images may challenge the dreamer's prissy denial of the gritty reality of a life situation.

### **Why Do We Forget Most of Our Dreams?**

Dreams are ephemeral; we don't recall most of them. The difference between remembering and forgetting a dream after waking is a few seconds. The mind behaves as though it wants to pull the shade on its nocturnal work, and quickly. If dreaming is useful, why do we forget our dreams so efficiently every morning?

A possible explanation lies in the fact that dreams can be more vivid, creative, and interesting than waking life. If we remembered them all, perhaps we could not concentrate on the day. If you have ever worked intensively with your dreams or had a compelling dream that haunted your day, you may have experienced the confusing, foggy feeling of walking in two worlds. In Wim Wenders' futuristic film, *Until the End of the World*, a researcher develops a device to show waking people their dreams on a TV screen. We last see the characters consumed by their solipsistic worlds, their lovers and the external world forgotten. Robert Lewis Stevenson, who dreamed the story of *Dr. Jekyll and Mr. Hyde*, wrote that some of his dreams were tales "but so incredibly more vivid and moving than any printed book" that he had "ever since been malcontent with literature."

Further, the waking psyche may find many of the insights of dreams unacceptable, as Freud believed. Often we are not ready to see the ways in which we or others are shits, fools, or heroes.

I suspect that we do not need to remember dreams for them to do their work, any more than we need to be aware of our body cranking out extra white blood cells in response to an infection. Probably dreaming does its jobs of practicing and consolidating memories without the animal's waking conscious awareness. The twitching dog may not remember its dream of chasing a squirrel when it wakes. Perhaps we remember some of ours as an unintended side effect of having fuller consciousness than other mammals. If working with remembered fragments of dreams produces waking insight, it's a bonus, like knowing one's body well enough to sense when a cold threatens and being able to treat it early.

### **The Awful Grace of God**

People from all cultures, including many in the industrialized world, do believe that dreams have a divine source. Jung wrote, "A dream is a letter from God. It's up to you if you want to open it." Most books on dreaming on the Self-help or New Age shelves of the bookstore imply involvement of a Higher Power in dream insight.

Given such entrenched mysticism and theologizing about dreams, perhaps this is another reason that people who think of themselves as hard-nosed scientists still cling to Hobson's early statements that dreams are random noise—decades after Hobson amended them.

Why is the belief in a supernatural source of dreams so common and persistent? I think there are several reasons. First, we now know dreaming bypasses the prefrontal cortex, the part of the brain responsible for judgment and looking realistically to the future. The frontal lobes help us live planfully—if stolidly—and may make reality bearable by censoring things uncomplimentary to our self-image or simply too terrible to face. (*Maybe if I ignore my husband's affair it will end on its own. . .*) These frontal lobe functions are all great, but not so great for creativity, as anyone who has tried to brainstorm with a critical, unimaginative, and judgmental colleague can attest. So, the brain does not invite this cortical wet blanket to the dream meeting. And the other excitable, emotional, highly visual parts of the brain dream up amazingly ridiculous and sometimes brilliant ideas. The dreaming committee sees with clear eyes, like the naive child observing the emperor's nakedness. Such insights, uncensored by the prefrontal cortex, can seem preternatural. Dream books are full of accounts by people whose dreams told them something they did not consciously know at the time: *Your wife is having an affair. Your father is dying. You have cancer.*

Another reason people assign divine wisdom to dreams is that some dreams really do feel as if they are delivering a divine message. Brain stimulation studies have found an area of the brain that causes people to be flooded with a sense of divine presence. If this area is activated during dreaming, the dreamer will feel awe and wonder. Such powerful feelings do accompany some dreams. Jungians call them "Big Dreams," and they usually alert us to archetypal obligations. Experiences like these make people believers.

If we combine these ideas: (1) that in the absence of the defensive frontal lobes, dreams expose the emperor and produce creative combinations of metaphors never hinted at in waking cognition; and (2) that feelings of numinous sublimity accompany some dreams, then we begin to understand why dreams have so often been seen as coming from outside oneself, as a gift from a god.

In fact, every night we sleep with a genius, but most of us in the Western world have turned our back to this lover. Dream work is like lovemaking: a marriage can exist without sex, but a couple's relationship is ever so much sweeter and deeper if the partners cultivate this primary source of instinctual power. I've seen a therapy that was flat and dry become moist and

fecund when a patient brings in a dream. Dreams do their work of integrating, practicing, problem solving, and healing without our conscious awareness, but life feels deeper and more interesting when we also work consciously with our dreams. These dynamic processes arise from natural selection, just like any other biological feature of an organism.

Although my father was old and weary, I did not know that he would die six days later when I had this dream. *I am on the farm where I grew up, but the time is present day. I see sheep, cattle, and pigs grazing together in the pasture. Then I realize that one of the sows is pregnant. I need to separate her from the other animals because her babies could be stepped on. What I need is a farrowing crate. The old pig shed is still there, and I deftly herd the sow inside where I see that my father has left the structure for the farrowing crate. All I need to do is add some 2 x 4's to the sides, but the basic structure is already there.*

In the liminal state between dreaming and waking I realized, with stunned recognition, that this dream was telling me about the “structures” I had inherited from my father. I had never understood where my drive, ambition, and motivation had come from. I have worked hard in pursuit of my goals, and I have been competent, even deft. But I had never associated these traits with my father. It was my mother I adored. Dad was a rival who vied successfully for her attention and paid little attention to me. But Mom was not ambitious, Daddy was. He started with nothing during the Depression and had acquired two nice farms by the time his children went to college.

I had spent most of my life firmly identified with my mother and the feminine. Then came mid-life. As with many people at this time of life, I was buffeted by an endogenous upwelling of the disowned parts of myself. Jung believed people's task at mid-life is to correct the imbalances of the first part of life. For years I had struggled with this integration. That morning it all came together with this dream that ended a half-decade of great inner turmoil and freed me from searching for someone outside myself to provide masculine potency. And the dream came just in time: before my father died I told him that I was deeply grateful for who he was and what he had given me. Within weeks I began this book. I have called on feminine receptivity and nurturance as well as the masculine action and courage that I now realize are within me for an arduous task, to inseminate, gestate, nurture, and defend this work.

Dreams bring healing moisture to a desiccated soul. But you do not have to be initiated into esoteric mysteries to let your dreams water the day. Thinking metaphorically may be difficult when we are fully in the day, but it is surprisingly easy in the liminal state between sleeping and waking. Stay in the language of the dream. Embrace the image gently, and ask yourself “How am I, or how is my situation like the image in the dream?” Working with your dreams, you, like Saul at Damascus, may be stopped in your tracks. If you attend, you may find a gift of stunning creativity set into the everydayness of life—an unexpected and under-appreciated gift from your biological heritage.

## Endnotes

---

<sup>i</sup> *New York Review of Books* 9 Oct. 1997. Pinker, S.

<sup>ii</sup> Rechtschaffen, A., Gilliland, M.A., Bergmann, B.M., and Winter, J.B. 1983.

Physiological correlates of prolonged sleep deprivation in rats. *Science* 221:182–84.

<sup>iii</sup> Dave, A.S., Yu, A.C., Margoliash, D. 1998. Behavioral state modulation of auditory activity in a vocal motor system. *Science* 282:2250–54.

Dave, A.S. and Margoliash, D. 2000. Song replay during sleep and computational rules for sensorimotor vocal learning. *Science* 290:812–16.

<sup>iv</sup> Rechtschaffen, A., Gilliland, M.A., Bergmann, B.M., and Winter, J.B. 1983.

Physiological correlates of prolonged sleep deprivation in rats. *Science* 221:182–84.

<sup>v</sup> Strathern, P. 2000. *Mendeleev's Dream*. Thomas Dunne Books.

<sup>vi</sup> These anecdotes come from Van de Castle, R. 1994. *Our Dreaming Mind*. Ballentine Books.

<sup>vii</sup> Hobson, J., and McCarley, R. 1977. The brain as a dream-state generator: An activation-synthesis hypothesis of the dream process. *American Journal of Psychiatry* 134:1335–68.

<sup>viii</sup> Sherman, P. 1988. The levels of analysis. *Animal Behaviour* 36:616–19.

<sup>ix</sup> Hobson, J.A. 1988. *The Dreaming Brain*. Basic Books.

<sup>x</sup> Jouvet, M. 1975. The function of dreaming: A neurophysiologist's point of view. In *Handbook of Psychobiology* (ed. Gazzaniga, M.S. and Blakemore, C.) Academic Press.

<sup>xi</sup> *Ibid.*

<sup>xiii</sup> Spelke, E. 1995. Initial knowledge: Six suggestions. *Cognition* 50:433–74.

<sup>xiv</sup> Kavanau, J.L. 1997. Memory, sleep and the evolution of mechanisms of synaptic

---

efficacy maintenance. *Neuroscience* 79:7-44.

<sup>xv</sup> Gopnik, A., Melnick, A., and Kuhl, P. 1999. *Scientist in the Crib*. William Morrow.

<sup>xvi</sup> Ibid. See also Jouvet, M. 1975; Winson, J. 1985; and Hobson, J.A. 1988.

<sup>xvii</sup> Revonsuo, A. 2003. The reinterpretation of dreams: An evolutionary hypothesis of the function of dreaming. In *Sleep and Dreaming: Scientific Advances and Reconsiderations* (ed. Pace-Schott, E.F., Solms, M., Blagrove, M., and Harnad, S.) Cambridge University Press.

<sup>xviii</sup> Walker, M.P., Brakefield, T., Morgan, A., Hobson, J.A., and Stickgold, R. 2002.

Practice with sleep makes perfect. *Neuron* 35:205-211.

<sup>xx</sup> Winson, J. 1985. *Brain and Psyche*. Vintage Books.

<sup>xxi</sup> Maquet, P. 2001. The role of sleep in learning and memory. *Science* 294:1048-52.

<sup>xxii</sup> Hobson, J.A., Pace-Schott, E.F., and Stickgold, R. 2003. Dreaming and the brain: Toward a cognitive neuroscience of conscious states. In *Sleep and Dreaming: Scientific Advances and Reconsiderations* (ed. Pace-Schott, E.F., Solms, M., Blagrove, M., and Harnad, S.) Cambridge University Press.

<sup>xxiii</sup> Ibid.

<sup>xxiv</sup> Barrett, D. 2001. *The Committee of Sleep*. Crown Publishers.

<sup>xxv</sup> Miles, B. 1997. *Paul McCartney—Many Years from Now*. Henry Holt.

<sup>xxvi</sup> Barrett, D. 2001. *The Committee of Sleep*. Crown Publishers.

<sup>xxvii</sup> Townley, R. 1998. *Night Errands*. University of Pittsburg Press.

<sup>xxviii</sup> Barrett, D. 2001. *The Committee of Sleep*. Crown Publishers.

<sup>xxix</sup> Langer, S. 1942. *Philosophy in a New Key*. Harvard University Press.

<sup>xxx</sup> Woodhouse, C.M. Introduction to George Orwell's *Animal Farm*.



---

<sup>xxx</sup>Pusey, A., Williams, J., and Goodall, J. 1997. The influence of dominance rank on the reproductive success of female chimpanzees. *Science* 277:828–31.

<sup>xxxii</sup> Wax, M.L. 2004. Dream sharing as a social practice. *Dreaming* 14:83–93.

<sup>xxxiii</sup> Dunbar, R. 1996. *Gossip, Grooming, and the Evolution of Language*. Faber and Faber.

<sup>xxxiv</sup> Rycroft, C. The last wilderness. Review of A. Stevens' *Private Myths*. *New York Review of Books*. 29 May 1997.

<sup>xxxv</sup> Lakoff, G. and Johnson, M. 1999. *The Embodied Mind and Its Challenge to Western Thought*. Basic Books.