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BASICS

## In the Dreamscape of Nightmares, Clues to Why We Dream at All

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The patient was a 37-year-old man who had been physically abused as a boy by his schizophrenic mother, often while he lay in bed trying to fall asleep. Nevertheless, he had grown into a reasonably normal, gainfully employed adult, and he thought that the worst was behind him, until one night he awoke to find an intruder rummaging through his dresser drawers. After that, his nightmares began — terrifying, recurrent dreams in which the intruder was a middle-age woman and a knife dangled with Damoclesian contempt from the ceiling fan over his head.

“The old fear memories had not gone away,” said Dr. Ross Levin, a psychologist and sleep researcher at [Yeshiva University](#) in New York. They “were easily reactivated by the recent trauma,” and just as readily twisted into the basis of a repetitive nightmare. Dr. Levin urged the patient to reframe the dream and rehearse alternatives to swinging blades and frozen fear, until finally the nightmares abated and the man could regain his footing.

Few of us suffer from nightmares crippling and persistent enough to demand treatment. Yet we all know how bad a nightmare feels, how it surrounds you and surges up to drown you and makes your teeth fall out in chunks and gives you leukemia and look, your 6-year-old daughter is running back and forth through traffic, and oh no, this train is headed the wrong way and it’s past midnight, and there you are a cowardly third-grader back on Creston Avenue in the Bronx, no, please, not the Bronx! And you scream and you thrash and you want to wake up.

By all evidence, outrageously bad dreams are a universal human experience. Sometimes the dreams are scary enough to jolt the slumberer awake, in which case they meet the formal definition of nightmares — bad dreams that wake you up. At other times, they are even worse. The sleeper thinks the nightmare is over, only to step into Your Nested Nightmare, Chapter II. Whatever the particulars of the plot, researchers say, nightmares and dreadful dreams offer potentially telling clues into the larger mystery of why we dream in the first place, how our dreaming and waking lives may intersect and cross-infect each other, and, most baffling of all, how we manage to construct a virtual reality in our skull, a seemingly life-size, multidimensional, sensorily rich nocturnal roundhouse staffed with characters so persuasive you want to ... strangle them, before they can strangle you.

A big reason bad dreams offer insight into the architecture of dreams generally is that, as a host of studies have shown, most of our dreams are bad. Whether research subjects keep dream journals at home or sleep in research labs and are periodically awoken out of rapid eye movement, or REM, sleep — the stage most

often associated with dreaming — the results are the same: about three-quarters of the emotions described are negative.

Moreover, said Robert Stickgold, a sleep researcher at the Harvard Medical School, we are ridiculously industrious dreamers, spending 60 to 70 percent of somnolence dreaming or in a dreamlike state called sleep mentation, which works out to three hours nightly spent in a state of anxiety or frustration as we show up late for tests or walk barefoot over broken glass because our shoes have melted.

Even bona fide nightmares are more common than most of us realize. Ask people to recall spontaneously how many nightmares they had in the last year, and they might say one or two, said Mark Blagrove, a dream researcher at the University of Wales in Swansea. Ask them to keep a dream diary, and they will report nightmares once or twice a month.

Survey and diary studies have shown that nightmare frequency varies by age and sex. Preschoolers are relatively immune to the bogeyman fetish, but not so their elder siblings. Roughly 25 percent of children ages 5 to 12 report being awakened by bad dreams at least once a week.

Nightmare rates climb through adolescence, peak in young adulthood, and then, like so much else in life, begin to drop. The average 55-year-old has one-third the number of nightmares as the average 25-year-old. At nearly every age, girls and women report having significantly more nightmares than do boys and men, a fact that some researchers say may be related to women's comparatively higher rates of anxiety and mood disorders.

Nightmare content also shifts over time and across cultures. A young man in 21st-century America might not mind the occasional bawdy dream, but for St. Augustine, the fourth-century Christian philosopher, "sexual dreams were nightmares," said Kelly Bulkeley, a dream researcher and visiting scholar at the Graduate Theological Union in Berkeley, Calif. "He considered them threats to his faith."

Cultural specifics can also tweak universal themes. Dr. Bulkeley and his colleagues have found that nightmares about falling through the air are common among women in Arab nations, perhaps for metaphorical reasons. "There's such a premium in these countries on women remaining chaste, and the dangers of becoming a 'fallen woman' are so intense," he said, "that the naturally high baseline of falling dreams is amped up even more."

Using brain imaging devices that are noisy and uncomfortable and less than conducive to a good night's sleep, scientists have nonetheless begun identifying which regions of the brain are active during sleep and which are largely off-line. The brain proceeds through four stages of sleep at night, each characterized by its own pattern of brainwaves and neurochemical activity. REM sleep, when the eyes are flitting behind closed lids, is rightly renowned as the dreaming stage, with at least 90 percent of it spent dreaming. But dreams occur in parts of non-REM sleep, as well.

When slipping into REM sleep, Dr. Levin said, "the whole brain changes." "Neurochemically, it's like the Fourth of July," as cortical precincts shift colors in scanning images to indicate arousal or quiescence, he said, adding, "The limbic system becomes incredibly active, much more so than when you're awake, which is why you're emotionally on edge in dreams."

Blazing with particularly patriotic fervor in the limbic system are the amygdala and anterior cingulate cortex, constituting what Steven H. Woodward, a psychologist at the V.A. hospital in Menlo Park, Calif., terms the brain's "axis of fear." At the same time, the prefrontal cortex, seat of rational thought and critical reasoning, is on lunch break, Dr. Levin said, "which is why you can have a dream where something has 4 heads and 12 legs, and you think, 'No problem, what's next?'"

Also relatively tranquilized is the primary visual cortex, recipient of visual signals from the outside world. The secondary visual cortex, however, which helps process and interpret those signals, remains alert. It is here that the fabulous imagery of dreams probably arises, said Tore Nielsen of the University of Montreal, as the secondary visual cortex strives to decipher the signals ricocheting through it, many of them internally generated, and to splice them into some approximation of a coherent whole.

Other sensory and motor systems remain active in REM, including those that would normally control the arms and legs, which is why motion figures prominently in many dreams. But if you often feel frustrated, as though you can never get to where you're going, well, you can't.

As it happens, one vigilant player in dreaming is a small region of the brainstem that paralyzes most of the body, preventing you from physically acting out your dream. People with neurodegenerative diseases that disable this brainstem disabler can end up injuring themselves during extreme dream-driven actions. Most cases of sleepwalking occur in non-REM sleep, when the body is not paralyzed.

With so much of the sleeping body and brain apparently colluding to allow us to wander safely through an ominous dreamscape of extravagant characters, most sleep scientists are convinced that dreaming serves an essential, possibly evolutionarily adaptive, purpose.

In a recent paper in *Psychological Bulletin*, Dr. Nielsen and Dr. Levin proposed that dreaming served to create what they call "fear extinction memories," the brain's way of scrambling, detoxifying and finally discarding old fearful memories, the better to move on and make synaptic space for any novel threats that may show up at the door. "The brain learns quickly what to be afraid of," Dr. Nielsen said. "But if there isn't a check on the process, we'd fear things in adulthood we feared in childhood."

Ordinary bad dreams rarely recapitulate unpleasant events from real life but instead cannibalize them for props and spare parts, and through that reinvention, Dr. Nielsen explained, the fears are defanged. "A bad dream that doesn't lead to awakening is successful in dealing with intense emotion," he said. "It's disturbing, but there is some kind of resolution to the extent we don't wake up."

By this scenario, nightmares, in allowing you to escape prematurely, represent a failure of the "fear extinction" system. "Bad dreams are functional, nightmares dysfunctional," he said.

If you feel yourself falling, spread your arms out and learn how to fly.