

Peter Farb

The Levels of Sleep

An expert on American Indians and on insects, father of two Sons, and husband of a museum curator, Peter Farb was born in New York City in 1929. A graduate of Vanderbilt University, he attended graduate school at Columbia and has taught at Yale. Since 1953 he has been primarily a free-lance author of books on the science and natural history of North America. Among his many publications are Living Earth (1959); The Insects (1962); The Story of Life (1962); Face of North America (by President Kennedy to one hundred foreign heads of state); Man's Rise to Civilization (1968); and Word Play (1974). "The Levels of Sleep" (editor's title) is an excerpt from "The Intelligent Senses," a chapter in Farb's latest work, Humankind (1978). It classifies human sleep into periods and stages according to eye movements; and it explains, incidentally, why students who cram for tests should get at least some sleep before an exam.

The modern understanding of sleep began quite by accident in 19 when a graduate student was assigned to observe the eyelids of sleeping volunteers to see whether any movement occurred. He observed that at certain times during the night the eyeballs of sleepers darted about furiously beneath the closed lids. (Eye movements are very easy to detect, even when the lids are closed; ask someone to perform these movements and see for yourself.) Such activity was totally unexpected, since sleep had long been thought to be a time of quiescence, not one in which the brain was actively generating eye movements that were often faster than could be produced by a waking person. Since then, much more has been learned about rapid eye movement (technically known as "REM") during certain stages of sleep. REM sleep is always accompanied by very distinctive brain-wave patterns, a marked increase in blood flow and in the temperature of the brain, irregular breathing, convulsive twisting of the face and fingertips, and the erection of the penis and clitoris. REM sleep is active sleep, even though the large muscles of the body are completely relaxed. The other kind of sleep is known as "NREM" (that is, non-REM). During this state, breathing is regular, body movement is generally absent, and brain activity is low. Perception shuts down because the senses are no longer gathering information and communicating it to the brain. NREM sleep is sometimes called "quiet sleep" but in one respect that is not so; snoring occurs during this state.

A number of curious experiences occur at the onset of sleep. A person just about to go to sleep may experience an electric shock, a flash of light, or a crash of thunder—but the most common sensation is that of floating or falling, which is why "falling asleep" is a scientifically valid description. A nearly universal occurrence at the beginning of sleep (although not everyone recalls it) is a sudden, uncoordinated jerk of the head, the limbs, or even the entire body. Most people tend to think of going to sleep as a slow slip page into oblivion, but the onset of sleep is not gradual at all. It happens in an instant. One moment the individual is awake, the next moment not.

The first period of sleep is always NREM. It consists of four stages, during each of which the sleeper becomes more remote from the sensory environment. Children in particular are virtually unawakenable at the fourth stage. Even if they can finally be roused, it may be several minutes before they return to awareness. This deepest fourth stage is the period during which most of the talking in one's sleep, sleep-walking, night terrors, and bed-

wetting by children take place. After the fourth stage, the sleeper retraces all the stages back to lighter sleep. The downward progression into the first deep sleep is smooth, but the upward progression is marked by irregular jumps from one stage to the other. The first REM period begins about seventy or eighty minutes after a person has fallen asleep and usually lasts for only about ten minutes. The entire NREM—REM cycle averages about ninety minutes, but with some individuals it is as short as seventy minutes and with others as long as 1½. The two kinds of sleep—as different from each other as sleep is from wakefulness—continue to alternate throughout the night. With each cycle, the amount of REM sleep gradually increases, to the degree that it may become as long as sixty minutes just before awakening, whereas the amount of NREM sleep decreases markedly. An adult who sleeps seven and a half hours spends from one and a half to two hours of that period in REM sleep, mostly toward the end of the sleep period.

The new view of sleep that has emerged in the past few decades from numerous laboratories is not one of sleep as “death’s counterfeit,” as Shakespeare 1 put it. Sleep is not passive in the sense that it is the absence of something characteristic of wakefulness. Rather, it is an active state in which the brain is never at rest. One theory about human sleep assigns different functions to the two kinds of sleep. NREM sleep apparently does the things that have traditionally been assigned by common sense to all sleep: growth, repair to the body’s tissues, and the synthesis of proteins. NREM sleep is a biological necessity; without it, an individual eventually would collapse. When someone is deprived of sleep, NREM sleep is usually made up first. And until the deprivation is compensated for, that person feels lethargic and less able than usual to carry out physical tasks.

REM sleep, in contrast, apparently restores the neural processes underlying consciousness; it is mental rather than physical. People deprived of it are not physically lethargic but emotionally irritable; they usually perform poorly in concentration and learning tests. REM sleep appears to be essential to integrate recently learned material into long-term memory. Students who stay up all night cramming for an examination the next day usually do not do as well as those who have had some sleep. The explanation is that the students have momentarily learned a lot of new facts, but these facts cannot be remembered unless they have been processed during sleep for incorporation into the memory. REM sleep also seems to help people cope with day-to-day stress. Experiments have shown that volunteers who were exposed to stressful situations had a sharply increased need for REM sleep, during which time they apparently made peace with the traumatic experiences. Such experiments offer fresh evidence that sleep is one of the most active parts of a person’s day.

QUESTIONS

Understanding

1. ‘What are the respective functions of REM and NREM sleep, according to Farb?’
2. In the light of new research, why is sleep no longer to be regarded as “death’s counterfeit”?
3. Why do students who have crammed all night for an examination usually perform less well than those who have had some sleep?

4. When, toward morning, a person's REM sleep lasts for sixty minutes, approximately how long is the period of NREM sleep that follows it?

Strategies and Structure

1. Into what two categories does Farb CLASSIFY human sleep? What is the distinguishing feature of each class?
2. Into how many periods does he divide the human sleep-cycle? To which class does the sleep in each period belong?
3. Into how many stages does Farb divide the first period of human sleep? Why does he not divide the second period into stages?
4. What is the distinguishing feature of each stage of sleep in the first period? Its distance from what?
5. With some justification, Farb's essay could be placed in Chapter ;, among essays that define. Why? What is Farb defining? How do CLASSIFICATION and DEFINITION work together in his essay?
6. Farb is dividing sleep into periods and stages, but he is also analyzing the sleep cycle. (In the next chapter you will examine essays in PROCESS ANALYSIS.) How does the peculiar cyclical nature of his subject complicate the classifying operation? How does he solve these difficulties?
7. What is the ultimate purpose to be served by Farb's classification of human sleep?

Words and Figures of Speech

1. Why is the METAPHOR "falling asleep" scientifically accurate, according to Farb?
2. What is an "acronym"? What acronyms does Farb use here?
3. Look up any of the following words you do not know: quiescence (par. i), convulsive (i), oblivion (z), virtually (3), synthesis (4), proteins (4), deprivation (4), lethargic (5) neural (s).

Comparing

1. Compare Farb's division of a cyclical process with Walker's division of Penn-men-to-avoid in "For Women Mostly," the preceding essay. In what sense is Walker's method a "straight-line" method of division?
2. When you read Desmond Morris's "Barrier Signals" in Chapter ("Essays That Define"), analyze how Farb's classification with the aid of definition departs from Morris's definition with the aid of division.

Discussion and Writing Topics

1. All primates share the need for sleep and many other biological characteristics. Write a classification essay in which you explain why men and apes belong in the same kingdom (Animals), phylum (Chordates), class (Mammals), and order (Primates).
2. Farb points out that REM sleep is necessary "to integrate recently learned material into long-term memory" (par. 6). Write an essay in which you classify the operations of

human memory according to length of retention and in which you divide the process of remembering into stages.

3. Classify the basic functions of the human body according to whether they are voluntary or involuntary. (Digestion would be involuntary, for example; but eating is voluntary.)