

Sleep by Gay G. Luce and Julius Segal

People who generally sleep poorly have been shown to be psychologically, behaviorally, and physiologically different from those who sleep well. They are seen as generally more maladjusted, more unstable, more irritable, more easily upset. They have less sleep overall, as well as less REM sleep. Their pulse rate during sleep is faster than for good sleepers, 60.5 as compared to 56.5 average pulse rate. They also show higher temperature at the low temperature point for the night than do good sleepers, 97.6 compared to 97.2 for good sleepers. Temperature for poor sleepers is still on the decline shortly before arising, whereas for good sleepers it is beginning to rise. Patterns of sleep afford clues as to the kind of personality the individual is, his adjustment, both physiological and psychological, etc.

Research into sleep patterns may eventually be used in learning about a person's well-being, his mental state, his sensitivity to pain or stress, his daytime behavior, his capacity to perform certain kinds of jobs. One of the great potentials for sleep diagnosis, ~~which~~ for normal people, is its possible value in preventive medicine, e.g., would be able to judge from a child's sleep pattern whether he is especially over-reactive and vulnerable to the environment; ~~that~~ ~~the~~ the development of symptoms or delinquency can then be thwarted by preventive treatment.

Four stages to sleep. Stage 1, 2, 3, and 4, in order of depth of sleep. Person starts out in stage 1 proceeds on downward to stage 4 and then back upward to stage 1 again. At this particular time, the REM period begins. This lasts for several minutes before the ~~the~~ sleeper proceeds on downward again into the deeper sleep stages. From the time the individual falls asleep to the time he begins his first REM period is usually from about one hour to one-and-a-half hours. Time between REM periods is also approximately the same. Sleepwalking, interestingly enough, is not seen in REM sleep usually; more often it is a product of stage 3 and stage 4 sleep. Dreams always appear to be part of the REM phase of sleep, although dreaming does occur in other stages as well. More usually, though, stage 3 and stage 4 sleep is dreamless.

"The body of the dreamer" Ch. 9

Dreams (REM periods) occur regularly every 90 minutes, for a total of 1½ hours during the night. ~~A~~ this observation caused interest to shift somewhat from interest in dream content to biological aspects of the need to dream (or at least the observation that everyone normally goes through several of these REM periods each night in which there is dreaming). REM periods also seem in monkeys, chimps, dogs, rats, sheep, goat, mouse, and even a marsupial animal, the opossum. At first, it was thought that REM indicated the subject was scanning dream images, and there does seem to be some evidence indicating this is so. We cannot know directly whether REMs in ~~such~~ animals, other than man, indicate they are having dreams. One study trained monkeys to signal when they "saw things"; this was in relation to a sensory deprivation experiment. Monkeys were to press a bar when they saw images. In sensory deprivation experiment, the monkeys fell asleep; however, during sleep, they started signalling that they were seeing things (dreams?).

Newborn infants spend about half their sleeping time in REM sleep. REM sleep is seen in 90% of newborn kittens sleep. Visual dreams seem unlikely at this ~~stage~~ stage, since they can barely see at this early stage of infancy. REMs seem to be a more universal phenomenon than simply a physiological reaction to dreams. During the REM period, blood pressure shoots up above highest waking level, pulse becomes less uniform, breathing exhibits sudden heights or dips. These reactions seem to be like those of fright; yet awakened subjects report no obvious anxiety or fear dreams.

There is a high~~er~~ consumption of oxygen and much burning of energy during REM phase. Adrenal hormones become plentiful in the blood stream during REMs. Penile erection precedes the REM period and lasts throughout it, yet subjects do not necessarily report erotic dreams when awakened. Penile erection seen in newborn infants during REM phase as well. Everything about REM sleep does not indicate a passive, inactive type of sleep. The authors suggest that the REM phase which carries so many characteristics of the awakened conscious phase and yet which has some slight differences from that ~~stage~~ conscious stage suggests a third state of being---a condition of consciousness that is neither sleep nor waking---it resembles "a lost continent of the mind."

As stated above, eye movements in REM phase are seen, in part as a scanning of dream action, but this cannot be the sole cause of them. REMs occur in congenitally blind people, ^{NEs} some of the REMs are too uncontrolled and too gross and furious to be scanning anything. REMs occur during certain kinds of electrical discharges which suggest they may be initiated by the brain stem and that the dream images follow from the electric spasms that move the eyes, rather than that the electric spasms follow from the dream images.

The brain during the REM periods is like it is when awake in a high pitch of arousal and concentration. Difference is seen in that during REM period, the brain cells discharge more sporadically; whereas ~~in~~ waking, they discharge in a more even tempo.

Animal and human subjects both are very hard to awaken in REM sleep by loud noises, disruption, etc.; yet, like the mother attuned to her baby's cough, they awaken from this ~~stage~~ easily to some kind of individually meaningful stimulus.

At one time, say the authors, we might have inferred that in dreaming the body was reacting to the inward image of the mind (to the dream). Today, it is as possible to take the opposite view---that dreams are manufactured by certain physiological cycles that are independent of the individual's history, although in detail they are molded by personal experience, memories, personality, and "character of his brain." The brain stem seems of more importance in the occurrence of REMs, not the cortex. (Could this mean that the cortex imposes on the REM phase certain content of dreaming that does have a relationship to the individual's personal history?)

Dream deprivation: one experimenter woke up subjects during REMs. First results indicated dreams (or REMs at least) were essential to psychological health. There is much ~~activity~~ frantic neural activity and glandular out pourings during REMs...this is what may be essential to health, not the dream itself. When deprived of dreaming during REM phase, subjects would then be seen to ~~try~~ have an increase in the number of REM phases during the night. If they were not allowed these, then they would eventually begin to evidence certain regressive signs, such as anxiety, poor concentration, irritability. If kept from REMs over a period of a few weeks, some symptoms began to approach those of the psychotic...~~delusions~~ delusions. Ss went for 10 nights without being allowed REM sleep showed significant personality changes, weakening of impulse control, etc. When thereafter allowed to sleep without interruption, they appeared to have a large percentage of REM sleep and psychological symptoms disappeared upon awakening. (Subtle aftermath remained though in a few cases which eventually disappeared.) Cats were deprived of REM sleep for 30 to 70 days, they too showed peculiar changes in behavior, but less severe than expected. REM makeup after 70 days was no greater than after 30 days.

"Dream deprived animals exhibited undue brain excitement, making them abnormally susceptible to electro-shock, and the shock itself seemed to have accomplished some of the release usually performed by the REM phase of sleep...may inspire American scientists with a rationale for taking a new look at electrotherapies



used in England, Germany, and Russia" (p. 150). This implies that without REM dreaming, there is a mounting excitability of the CNS. [Electric shock seems then ~~to~~ a type of procedure which allows this accumulated excitation a way of discharge.] This suggests a reason for some of the bizarre consequences of sleep and REM deprivation.

Dreaming may prove to be an epiphenomenon of the REM period, not its goal.

"The Meaning of Dreams" Ch. 10

Dream reports obtained in lab experiments usually long and incoherent and less intense than highly organized dreams from home. People also seen as withholding certain kinds of dreams from the experimenter, which they might tell their analyst and vice versa. Dreams that are recalled in the morning represent only a small fraction of nightly dreams.

These studies are based on dream content of REM phase dreams, whereas it has been shown that there is, at least, some dreaming in other sleep stages. Dreams earlier in the night are harder to remember than those later at night. Early night dreams appear relatively colorless, mundane, and thoughtlike. The later night dreams are more vigorous and contain more imagery.

People usually remember and can report dreams when awakened in the REM phase. Memory for dreams drops off sharply when the REM phase concludes.

Lab studies show dream recallers to be physiologically different from nonrecallers. The dream nonrecallers show signs of dreaming in a deeper stage of sleep, they awaken very slowly, some would assert they were thinking, not dreaming, and it took a real blast in order to awaken them.

Studies also suggest that most dreams take place in "real time", as long as it would take the action to take place in reality, although there are instances of "flash dreams" as well, dreams that take place in a very short period of time, yet contain much content. Most people seem to dream in color, but apparently don't report it unless asked ~~at~~ specifically about color. About 25% of the dreams, can be affected, in REM periods, by some kind of external stimulus, such stimuli being ~~unaffected~~ in the other 75% of the time they are tried. suggests some kind of filtering and choosing. Lab reports of dreams also support Freud's hypothesis of day residue in dreams.

In one study, subjects after isolation by themselves for one day, showed 60% more time than usual in REM dreaming and their dreams were very sociable with many people in them. Showing films before sleep also had effect on dreams. Violent films made subjects take longer to fall asleep, they began to dream earlier in the night, they more frequently could not remember their dreams (repression?) than did comedy films.

Very depressed people who are entering suicidal stage report particular nightmares that are often empty of people and action; they dream of natural scenes, empty desolate beaches, etc.

When does dreaming begin? Questionable here to talk of dreaming, rather than REM phase, since the question would be what we mean by dreaming. In 10 week premature infants, REM phase occupies 80% of their sleep, 50% at about age 2, 20-24% for the next years, it declines somewhat about age 45, and in aged periods shows only about 13% of sleep. Dreams may start before speech or clear vision. In the womb and

early infancy, REM state appears to provide baby's most active exercise in what are to become the notions of survival---sucking, kicking, erections. REM state may here be a biological exercise. Memory of sensations may possibly occur during REM phase in infants, but this is hardly dreaming until outside influences come to bear upon the evolving personality. At some unspecified time in development, sensory perception becomes clear enough so that outside impressions begin to generate internal experiences. "The rudiments of diffuse dreaming, sensory change, may begin back in the dark water of the womb, but this is hardly what most of us call dreaming" (p. 178).

 Some other comments from the book.

Reports on a few cases where individuals went without sleep for 200 or more hours. No laboratory subjects ~~have~~ ever been put through this procedure since it causes definite changes in personality that may have some lasting effects. In one subject, a disk jockey, with a history of some slight mental disturbance, remaining without sleep for close to 200 hours caused a regression so severe that it necessitated hospitalization. Another disk jockey, although showing psychotic symptoms...hallucinations, delusions, etc...during the latter half of his 200 hour stay-awake marathon, recovered after a long night's sleep, although some subtle aftereffects were noted for a few weeks. A 17 year old boy is reported who went without sleep for 208 hours, which seems to be some kind of record. He too began to show severe symptoms, but after eleven days without sleep, he slept for 14 hours and ~~he~~ rebounded completely...again some subtle after-effects lingering for awhile. These are cases of sleep deprivation, not dream deprivation, although as noted above, dream deprivation...or at least REM ~~stage~~ stage deprivation has a number of untoward effects on the subject as well.

Unconscious learning or learning during sleep: Some subjects were actually taught how to control alpha brain wave rhythms. Initially, a bell rang while they were sleeping and they were asked to guess whether it rang for alpha waves or some other level of consciousness. The subjects became proficient in identifying which it was. Then, they were simply to say "yes" when they were in an alpha wave state. They came to master this. Then a bell rang when they went into an alpha wave state and they were asked to keep the bell from ringing, which again they came to do by controlling the appearance of their alpha waves. According to one study, Zen meditation and yoga meditation is marked by a sustained state of alpha rhythm... ..which seems to be a peculiar state of neither waking nor sleeping. In a few lab sessions, subjects had learned to identify and control a state that often takes years of training to develop according to the Zen Buddhists; the state being one of pleasurable vacant serenity.

One physicist rigged up his alpha waves which sounded a buzzer when they appeared. After awhile, he could turn them on and off at will and eventually was even able to send Morse code messages by turning them on and off. It was very slow, but accurate.

One study of REMs found bursts of alpha waves during the REM period.

Sleep learning is a clouded issue. Russian studies seem to indicate that sleep learning really works, but they present conclusions, not data. Seems to work better when person shows alpha rhythm, which is not a stage of deep sleep. Training and learning may be impossible during deep sleep stages, but feasible during drowsiness and other states of consciousness below optimal alertness.

In 1965, an experiment was reported that gives some evidence of learning during (alpha wave) sleep as opposed to simply applying in sleep what was learned when



awake. Subjects were taught to discriminate between two tones while asleep, one of which would be accompanied by a slight shock that did not awaken the subject. Later ~~awake~~ after awake, the subjects still maintained capacity to distinguish between the two tones.

Question as to what sleep is remains. Some scientists propose that man's circadian rhythm of sleep and waking may be a residue of certain lunar and solar cycles which regulated primitive life and that our timing is dictated by a kind of timer within the brain. Others suggest that we ourselves are the clocks and that the daily rhythms may be the result of innumerable subtle cycles in the body. Something like a 24 hour rhythm seems to abide in our own flesh.

Danger of deterioration apparent in sleep loss. Reduced sleep is not a miniature of the full sleep night and the quality of rest is thus different,

During REM periods, temperature rises in drive centers in the brain, there is a pronounced increase in cerebral blood flow, certain muscles grow flaccid, and unusual brain patterns emanate from within. Brain responds in the manner of a waking brain in intense concentration.

Barbiturates, alcohol, tranquilizers, etc. alter pattern of normal healthy sleep; generally, they reduce REM phase. Stimulants, likewise, do not compensate for sleep loss.

We do not know as yet how many special soporifics exist in the body, or how they put us to sleep. Perhaps they are intermediaries, working through master brain chemicals, which in turn trigger sleep-inducing cells in the brain.

