

Dreaming:

The year 1953 marked the beginning of a new era of scientific research on dreaming. Eugene Aserinsky, then a graduate student, and Nathaniel Kleitman, an international authority on sleep, both at the University of Chicago, published an article in Science reporting that distinct periods of brain waves called emergent stage 1, accompanied by binocularly synchronous rapid eye movements (REMS), occurred about every 90 minutes during normal sleep. If sleepers were awakened from these stage 1-REM periods, they reported that they had been dreaming about 80% of the time, but seldom reported dreaming when awakened from other stages (see article on Sleep) of sleep.

This discovery of an apparently objective indicator of the process of dreaming excited many scientists, and thousands of studies of sleep and dreaming have since been carried out using brain wave and REM monitoring of sleep. Even people who insisted that they never dreamed could usually recall some dreaming when awakened from stage 1-REM sleep. In the first few years a simple and clearcut picture emerged: the mental activity of dreaming occurred almost always if not exclusively in stage 1-REM periods, and the REMs were an actual scanning of the dream imagery: a dream that seemed to involve looking back and forth horizontally at some scene, e.g., would have predominantly horizontal REMs.

This simple picture was complicated by subsequent research findings that there is a great deal of mental activity in other stages of sleep than stage 1-REM: the earlier studies had not picked this up as they asked subjects "What were you dreaming?", a phrasing which inclined subjects to say, "Nothing." if they recalled some mental activity just before awakening but did not consider it enough like their personal concept of dreams to call it dreaming. The more neutral type of question, "What was going

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on in your mind just before you were awakened?" elicits many more reports of mental activity. The picture now generally accepted by sleep researchers is that the mental activity occurring in stage 1-REM periods is generally much more like our conventional notion of dreaming (vivid visual imagery, often bizarre happenings, etc.) than activity in other stages of sleep, but occasionally some very dreamlike events occur in these other stages. The long term classifications of sleep stages, such as stage 1-REM, which are called tonic classifications (the overall "tone") may be only crude indicators of mental activity, and research is starting to focus on more rapidly changing phasic events, such as individual REMs.

Psychologically and experientially, dreaming may be considered an altered state of consciousness (see Consciousness, States of entry). The relation of this altered state and specific events in it to physiological measures like brain waves or REMs is the psychophysiological study of dreaming. The discovery of such physiological correlates of the psychological event of dreaming has aided the purely psychological study of dreaming. For example, the clock time spent in a stage 1-REM period is usually very close to the estimated time that a dream seemed to last, so the popular idea that most dreams occur in only an instant is obviously false. As a second example, most dreams in normal men are accompanied by full or partial erections of the penis, but these erections seldom indicate that there is any obviously sexual content in the dream. Sleep erections probably arise from some more general physiological process than sexual excitement. Because many men awaken in the morning from the typically long stage 1-REM period that occurs around that time, this may be the cause of "morning erections," rather than a full bladder.

Given the great predominance of dreamlike mental activity in stage 1-REM periods, we can say that ordinary people spend about 20% of their

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sleep time each night dreaming. Stage 1-REM periods begin about 90 minutes after falling asleep and about every 90 minutes thereafter. While the first stage 1-REM period may be quite short, five minutes or so, they get progressively longer, so the last one may be 40 minutes or more.

If people are awakened in the laboratory as soon as they start a stage 1-REM period and then allowed to go back to sleep, so that they can sleep but get almost no sleep of this stage 1-REM type, they start having stage 1-REM periods more and more frequently. If they are allowed to sleep uninterruptedly after several nights of stage 1-REM deprivation, there is a temporary increase in time spent in stage 1-REM sleep that partially makes up the lost stage 1-REM time. Researchers initially interpreted this as showing a need for the psychological activity of dreaming, and thought that it produced mental aberrations during the day, but it is not clear that the effects during the day are really very strong, and the "need" seems to be more a physiological one for stage 1-REM sleep than for the psychological activity of dreaming. We do not know if there is any real need for dreaming, but its universality suggests it must play some important role.

There are a number of psychological theories about why we dream, but none of them has strong enough scientific support to be generally accepted as an adequate explanation. The most widely known theory is Sigmund Freud's. Freud felt that dreams are a sort of safety valve, a psychological compromise between our need to express socially unacceptable sexual and aggressive impulses on the one hand and to stay asleep and get needed rest by not arousing our superego (conscience) on the other hand. The sexual and aggressive content of the latent dream, the implicit content, is thus disguised by various unconscious dream work mechanisms, such as

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symbolization and displacement of emphasis to neutral content, before we experience it as the manifest dream. Carl Jung further developed Freud's dream theories to add dimensions that went beyond a particular dreamer's own life experiences, so universal or archetypal symbols could occur in dreams. These approaches and the many variants of them that have been developed can be useful in psychotherapy for helping people to understand themselves, but they are poor scientific theories, as they cannot be expressed precisely enough to be tested. More modern theories that have greater potential for scientific development are Montague Ullman's evolutionary vigilance theory, which proposes that dreams alert our brains periodically to keep us more vigilant about possible threats from the environment, and Edwin Dewan's metaprogramming theory, which compares the brain to a computer and sees dreaming as reflecting a high-level programming process designed to clear the brain of the previous day's activity and prepare it for more optimal response in the future.