Dreamers leave a wake-us-up call

☐ Tapping into the brain again occupies scientists and shows that the debate over dreams is far from over

By MARGIE PATLAK

New findings on the brain continue to fuel the debate over the stuff that dreams are made of.

Dreams have been seen as everything from oracles of the future or the "royal road" to unconscious drives and passions, to the mere patter of brain cells firing randomly. Dreams also may reflect the brain's daily reviewing, analyzing and storing of important information gathered while awake. Although the jury isn't in yet on the true meaning and purpose of dreams, researchers are shedding some fascinating light on this sleeper.

The Talmudic proverb, "An uninterpreted dream is like an unopened letter," reflects the commonly held belief in ancient times that dreams held important messages critical to survival. Freud personalized that notion in 1900 when he put forth his theory that dreams revealed, in a disguised manner, the seething impulses and desires of the unconscious mind.

When Freud developed his dream theory, there wasn't much known about the brain to substantiate it. But his theory became the mainstay of psychoanalysis, which relies heavily on dreams to understand an individual's problems.

Freud's theory came under fire in 1977, however, when Harvard psychiatrist J. Allan Hobson proposed that dreams were the brain's way of making sense out of random images sparked in rapid succession by its nerve cells known as neurons. Relying on neurophysiological evidence, Hobson suggests that there is no inherent meaning in the images generated in dreams, although the narrative tapestry the brain weaves from those images reflect the dreamer's current and past psychological concerns.

"I'm not a dream basher," Hobson said. "I think dreams are fascinating and I discuss them with my patients with great enthusiasm. But I don't sit there in hushed tones

Please turn to DREAMS, Page E3

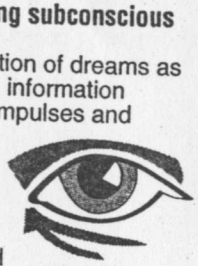
Margie Patlak is a free-lance science writer based in Elkins Park, Pa.

THE ELUSIVE DREAM

While dreams remain a subject of intense study, scientists are divided on their origin and meaning. A myriad of theories exist, and some have stood rock-solid since the turn of the century.

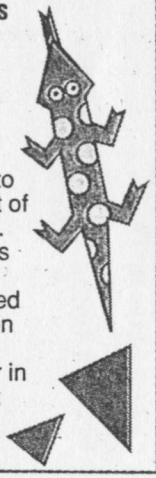
The seething subconscious

Freud's notion of dreams as packets of information about the impulses and desires of the subconscious has received widespread acceptance since 1900. Modern psychoanalysis draws from Freud's theories and relies partly on dreams to help unravel an individual's problems.



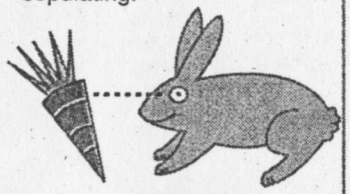
Random images

Harvard psychiatrist J. Allan Hobson proposes that dreams are the mind's attempt to make sense out of random images. Hobson believes images are randomly plucked from higher brain centers and spliced together in a way that most makes sense.



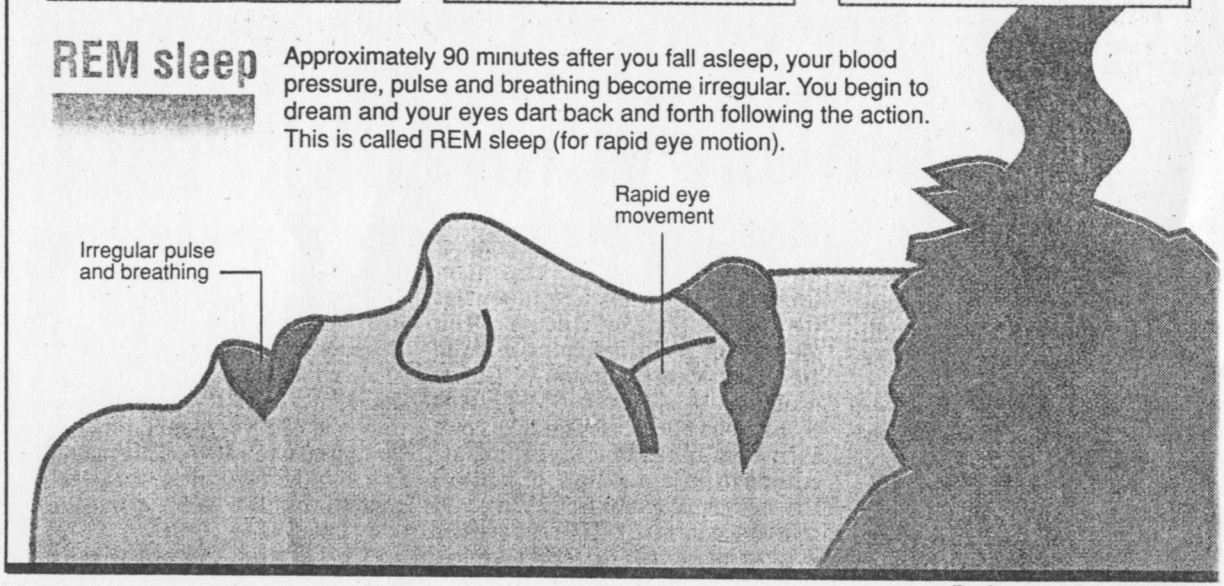
Nightly rehearsal

The rehearsal theory suggests that dreams reinforce genetic behavior patterns by providing a nightly opportunity for the brain to rehearse tasks necessary for survival of an organism, such as hunting, fighting, fleeing and copulating.



REM sleep

Approximately 90 minutes after you fall asleep, your blood pressure, pulse and breathing become irregular. You begin to dream and your eyes dart back and forth following the action. This is called REM sleep (for rapid eye motion).



The Oregonian/KEVIN HENDRICKSC

Dreams: Now showing — Theater of Our Mind follies

■ Continued from Page E1

waiting for the meaning of life to be revealed in them."

Hobson bases his theory on a number of cat studies which show that dreaming is tied to the rapid firing of neurons lodged in the brain stem, the base of the brain. These dream-provoking neurons release a compound called acetylcholine. Damage to only the brain stem portion of the brain hampers the rapid eye movements — REM — during sleep that signal a dream is in progress, and sleeping human volunteers given an acetylcholine-like chemical quickly engage in a long and intense phase of dreaming.

But the brain stem is incapable on its own of generating the vivid imagery seen in dreams. It stimulates other higher portions of the brain, however, which can provide the nightly theater of the mind.

Hobson assumes the images the brain stem plucks from higher brain centers are random, which helps explain the bizarre nature of dreams. An image from childhood can be followed by one seen the previous day, for example. The thinking portion of the brain, Hobson says, puts together these haphazard images in a way that most makes sense. The current concerns and past experiences a person has, Hobson contends, influences that story-making process.

As for the purpose of dreams, which take up about one-quarter of a person's sleep time, Hobson speculates dreams serve to give certain key neurons in the brain a vitally needed rest. These neurons, which release compounds crucial to attention, learning and memory, are strikingly quiet during dreams, Hobson's studies show. Their idleness may enable them to replenish their compounds, so that the brain can function properly when awakened.

The other brain neurons, Hobson speculates, aren't susceptible to fatigue and are turned on during dreams to allow them to practice their firing routines. These patterned routines enable complex activities such as swimming or playing tennis. "Maybe we remember how to play tennis after not playing it for 20 years because our brains' tennis motor programs are being run regularly during REM sleep," Hobson said.

This view of the purpose of dreams has been recently countered by neurobiologist Jonathan Winson of Rockefeller University, who contends "dreams are the means by which animals form strategies for survival." He believes dreams reflect the brain's sifting through and selectively storing important new information acquired during the day.

While dreaming, a rabbit, for example, may integrate and store new information learned during the day about a nearby fox so as to better avoid the predator the next day. Since human strategies for survival are primarily rooted in psychology, Winson adds, our dreams include such psychologically potent themes as fears, insecurities and desires.

Evidence for Winson's theory comes from studies on a unique brain wave, known as the theta rhythm. This wave is set in motion by brain-stem neurons, which indirectly spark the rhythmic firing of neurons further up in a brain region involved in memory.

Winson believes that in an awake animal, theta rhythm tags incoming information as vital and worthy of being reviewed and meshed into memory later while the animal dreams. He points out that theta waves show up in awake animals only when they are engaged in tactical maneuvers critical to their survival. Theta rhythm is turned on in cats, for example, when they're on the prowl. For a prey animal such as a rabbit, which has to be constantly on guard, theta rhythm appears "at the slightest sound or glint of light that signals a change in their environment," Winson said.

He discovered the same information gathered by an awake animal, while its theta rhythm is pulsing, is apparently reactivated at night while the animal dreams. Theta rhythm is always present while animals dream and absent during the rest of their sleep. Monitoring specific rat brain neurons, Winson showed that only those that fired vigorously during the day while the theta rhythm was in progress fired again during the animal's REM sleep.

"This experiment gives a pretty definite indication that the neurons are not firing randomly," Winson said. That suggests, he added, that the images in dreams these neurons spark also aren't random.

There's also evidence that these dream images are being incorporated into memory. The neurons that Winson monitored were located in the hippocampus region of the brain, where memories are thought to be made. Other studies have shown that the particular timing of the theta rhythm is necessary to release the compounds that inscribe permanent memories in the hippocampus. If the theta rhythm is surgically disrupted, in addition, rats are unable to remember the spatial clues necessary to make their way through a maze.

"Dreams reflect unconscious memory processing — the integration of experience into a strategy," Winson said.

There is some preliminary evidence that humans, like the lower animals Winson studied, also have theta rhythm. Because other known features of the dream state are shared nearly universally by the entire animal kingdom, Winson assumes the information processing he suggests happens in dreaming rats also occurs in the brains of humans while they dream. That processing would require meshing new information with older memories culled from storage — a situation that would explain the bizarre juxtapositions in time seen in dreams.

"Our current anxieties are related to our earlier anxieties and the dream puts them all together into a strategy for psychological survival," Winson said. Because many of our psychological strategies have their roots early in life, Winson added, our dreams are often speckled with images from childhood.

Although Winson feels that "whether or not you can consciously remember dreams is besides the point," he adds that dreams "are not trivial. They tell an important story that relates to what's happening to you."

Hobson finds Winson's findings "extremely promising" although he disagrees with his interpretation. Both Hobson and Winson admit that more research needs to be done to gain a clearer understanding of dreaming. Until the final word is in, one might want to take Hobson's advice in his book "The Dreaming Brain": "Dreams are truly marvelous. Why not simply enjoy them?"

Sleep on it.