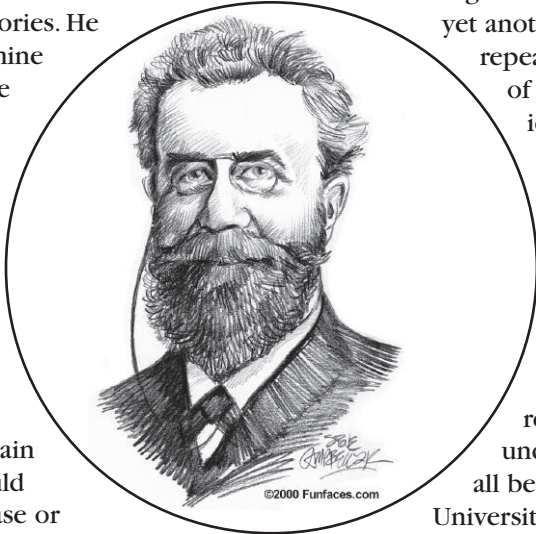




The History of Sleep and Memory

Back in 1885, a researcher named Ebbinghaus was interested in how long it takes the brain to consolidate memories. He wanted to determine the optimum time required in the consolidation of a memory, but he was concerned that if actual words were used, participants in the study may be more or less familiar with certain words which could then affect the ease or difficulty of learning them.



Because of this, he chose to use nonsense syllables which are simple one syllable sounds that have no actual meaning. He expected to find that the more recent the learning, the better the memory should be. This seemed to be the logical hypothesis, but what the results of the study actually demonstrated was puzzling to him. He discovered that the memory retention of the syllables was actually better in the period from eight to twenty four hours after learning, that is, at a time after which the subject slept, than during the initial post-training period from one to eight hours after learning.¹ This made little sense to him, and so he chalked it up to being an artifact of the study.

By 1914, another researcher also interested in memory reported that similar nonsense syllables learned just before going to bed were more likely to be remembered the following day

than when a similar time period of wakefulness occurred in between learning and recall.² In 1924 yet another study repeated this pattern of findings.³ Still, the idea of sleep having a beneficial effect on memory remained dormant for some time.

The real revolution in understanding sleep all began at the University of Chicago in the 1950s. Although dreaming remained a curiosity, sleep in general was largely thought to be a unified, restful period of brain quiescence. The discovery of REM sleep in 1953 changed everything. Sleep was no longer a homogeneous state of passive rest for the brain. Sleep, and especially REM sleep, was now understood to be a time of an active brain activity. In fact, the brainwaves of REM sleep were seen to be not all that different from those of waking brain activity. This completely flipped the table regarding the idea that sleep was a time when the brain was dormant. Four years later in 1957, it was discovered that waking a sleeper from REM sleep usually resulted in the report of vivid dream, whereas awakening from other states of sleep were much less likely to produce the same effect.⁴

Dream research ensued, but nothing addressing the possible association of REM sleep and memory. It wasn't until

the late 1980s and early 1990s that the interest in this field was reignited. Studies looking at the association of memory and REM sleep began to show the amazing and at that time surprising association. Things like trampolining,⁵ intensive learning of a foreign language,⁶ Morse code learning,⁷ visual field inversion⁸ and visual discrimination tasks⁹ all demonstrated increases in REM sleep following successful learning. Later, experiments using complex logic games also demonstrated this same increase in REM sleep with successful learning.¹⁰

Many research studies in this field have pointed towards REM sleep as being crucial in memory but the brainwaves of slow wave sleep have also piqued a little interest in the minds of a few scientists interested in memory consolidation.¹¹⁻¹² Much debate ensued in the scientific community. Which is more important? Usually when there are two sides to a story, the truth typically resides somewhere in the middle. The body of research as a whole is pointing towards the conclusion that both REM sleep and slow wave sleep are important in memory, for different but complimentary reasons.¹³

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