

Lucidity Research, Past And Future

By Stephen LaBerge, Ph.D

There is a state of consciousness in which any human being could experience anything imaginable. Each of us holds within us infinite possibilities. How many of us ever have the opportunity to taste even a hint of them? If we speak of our fantasies of wider vistas of life, we talk of our "dreams." In our dreams, we are free. A man in a dungeon can dream he is a king in a castle, and while he dreams, it is so.

People have long viewed dreams as blessings or curses beyond our control. However, according to Tibetan Buddhists, who for a thousand years have been practicing a form of dream yoga, similar to what in the west is called lucid dreaming, it is possible to gain complete mastery over dreaming. Recent scientific research at Stanford University has begun to provide objective evidence for that claim.

As is well known to NightLight readers, lucid dreaming means dreaming while knowing that you are dreaming. Everyone has, in theory, the capacity to learn to dream lucidly, because everyone dreams every night. Whenever we dream, we find ourselves in complete worlds, as richly detailed, moving and impressive as the world of waking life. This ability to create worlds is the natural endowment of the human mind. In dreams, this wondrous talent is fully demonstrated. The worlds we create in our minds are so convincingly real we cannot easily tell them from the "real" world of waking.

Lucid dreamers develop a frame of mind that allows them to recognize when they are dreaming. From that point, they are free to do as they choose. This freedom, hard to imagine in our highly constrained waking reality, is astonishing, exhilarating, and inspiring. The laws of physics and society are repealed. The limits are only those of the dreamer's imagination.

Who would not want such a genie at their command? Today, lucid dreaming is a reality, currently being enjoyed and explored by thousands of people. However, for it to achieve its potential of expanding the horizons of all humanity, research advances are necessary. Current training in lucid dreaming takes more time and effort than most people are able to commit. Technology exists to assist people in attaining the state, but although it can greatly enhance a person's chances of having a lucid dream, cannot yet guarantee it.

Research into the factors of brain and mind that underlie the lucid dream state could lead to breakthroughs allowing an individual to lucid dream at will, thereby having reliable access to any imaginable experience. This is much more than a remote possibility. Much is already known about REM sleep, the sleep state in which lucid dreaming occurs, and progress has been made in determining how brain activity changes when a person becomes lucid in a dream. Resources are needed for initiating intensive research into the precise nature of the lucid dream state, and the factors of brain, body and mind involved in achieving and sustaining it.

A convenient and reliable means of entering lucid dreams will open the door to a vast treasury of valuable applications. In worlds of unlimited possibility, creativity will become the rule, rather than the exception. People will be able to sample any way of being they wish, living out fantasies unavailable in waking life, or rehearsing for successful futures.

Experimentation in lucid dreaming is completely risk-free, so ideas in business, politics, ecology, athletics, or indeed, any endeavor can be tested in the model world of dreams. Practice in lucid dreams can improve performance, and prevent costly errors in waking reality. The potentials of mental imagery and hypnosis will also be accessible to everyone, because dreams are the most vivid of all images, available even to those who do not have the ability to create vivid mental imagery or to enter deep hypnotic states while they are

awake. This brings with it the possibility of enhanced healing capacities, hinted at in research on mental imagery. People may be able to use lucid dreaming to shorten the time it takes them to recover from illnesses or operations, and to stimulate the redevelopment of physical skills following injury.

All that is required to bring these possibilities to fruition is the devotion of research effort into the area of lucid dreaming. The more resources are supplied to this work, the more rapidly progress will occur, and the sooner this priceless tool will be available to help humanity overcome its present crises. It is abundantly clear that we are in need of quickly developing our capacities for understanding our role on Earth and creatively evolving to survive and grow into our true potential. Lucid dreaming offers great promise for helping us to achieve these goals.

With my colleagues (notably, Lynne Levitan and William Dement), I have been researching lucid dreaming at Stanford University for over a decade. I founded the Lucidity Institute to advance research on lucid dreaming and potentials of human consciousness, and to apply the results of this research to the enhancement of human health and well-being.

The Lucidity Institute has advanced towards the goal of making lucid dreaming universally accessible by developing commercially available lucid dream induction devices such as the DreamLight and DreamLink that help people have lucid dreams.

We are continuing research at Stanford aimed at enhancing the ability to have lucid dreams, and tapping the great potentials within them. Those wishing to contribute to the advancement of research on lucid dreaming please consider the following:

* A tax deductible donation to Stanford University, directed specifically "for research on lucid dreaming under Dr. Stephen LaBerge."

* A loan or investment in the Lucidity Institute, Inc. (Currently the Lucidity Institute Private Placement Memorandum is offering \$600,000 worth of stock. Approximately \$200,000 has been sold already, leaving \$400,000 available.) The Lucidity Institute will provide long-term research funding.

The general aim of our ongoing program of research is the investigation of consciousness and mind-body relationships during sleep. Our primary focus has been lucid dreaming, a state of consciousness with remarkable potential. During lucid dreams, people can reason and remember clearly, and act volitionally upon reflection, while remaining sound asleep and continuing to dream vividly (1).

Lucid dreaming makes possible a new paradigm for dream research. Because lucid dreamers can carry out specific dream experiments, control their dreams and communicate with the laboratory while still asleep (2), scientists can now study the dream state directly. We have pioneered the laboratory study of lucid dreaming (1,2,3) at the Stanford University Sleep Research Center, and thus are well positioned to employ lucid dreaming in the study of the nature of human consciousness and to explore the applications of lucid dreaming in health improvement.

INDUCTION OF LUCID DREAMS

Although we have shown that lucid dreaming is a learnable skill (8), currently available methods, involving mental concentration, require considerable investment of time and effort. Therefore, we have sought methods for helping dreamers to realize that they are dreaming by means of external cues applied during REM sleep that become incorporated into dreams and remind dreamers that they are dreaming. We have tested a variety of stimuli, including tape recordings of the phrase "This is a dream" (9), conditioned tactile stimuli (10), and light (11). Light appears to be an excellent stimulus. We have developed computerized lucid dreaming induction devices (the DreamLight, DreamLink, and most recently, the NovaDreamer) that have produced highly promising results. By further

developing and perfecting these and new devices and techniques, we hope to make lucid dreaming widely available.

Lucidity cue type and mental preparation: Preliminary studies on the DreamLight device have been promising: 55% of 44 subjects had at least one lucid dream during one study (11). Unpublished research indicates that combinations of the light cue with mental exercises specifically designed to increase one's awareness of the nature of dreaming tend to be more effective than using the cue alone. At this point we do not know what rate of flashing will be most effective. Therefore we plan to compare four different flash rates (1, 2, 4, and 8 flashes per sec) and three different kinds of mental preparation (MILD, discrimination training to recognize the light stimulus, and post-hypnotic suggestion) in a group of 40 subjects. We also are planning testing cues in other sensory modalities such as sound and vibration.

Physiological correlates of dream content and incorporation of stimuli: Four channels of EEG and four channels of autonomic physiology is being collected from each of 12 to 24 subjects as they are stimulated with flashes of light during REM sleep. Reports of incorporation of light as well as other dream content will then be correlated with the EEG and other physiological measures. Sometimes the subjects will see the light flash in their dreams, but sometimes they will not. Using a computer, we will analyze the EEG and autonomic physiology immediately prior to the time that the stimulus is triggered, looking for differences between the cases when the light is incorporated, and when it is not. By showing us which are the optimal times for applying cues to the dreamer, this research should teach us how to more effectively induce lucid dreams with light.

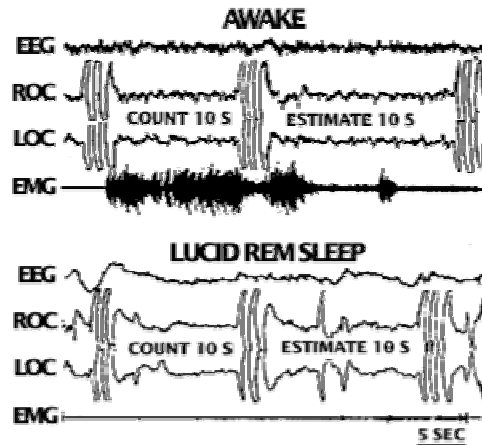
MIND-BODY RELATIONSHIPS DURING DREAMING

Our work with lucid dreams so far has led to new insights into the connection between mind and body. In a series of studies (summarized below) we have discovered that various dreamed experiences (including time estimation, breathing, singing, counting, and sexual activity) produce effects on the dreamer's brain (and to a lesser extent, body) remarkably similar to the physiological effects that are produced by actual experiences of the corresponding events while awake.

Correspondence between dreamed and actual eye movements We have found that there is a very high degree of correlation between the direction of gaze shift reported in lucid dreams and polygraphically recorded eye movements, a fact that we make routine use of by using eye movements as signals in all of our experiments (1,2).

Communication from lucid dreams We are also planning to improve the capacity of lucid dreamers to communicate with the waking world while dreaming. At this point, they do so by means of eye-movement signals, which are difficult to execute with any complexity. In past studies we have done some preliminary work with a glove containing computerized movement sensors allowing the recording of hand movements during dreaming. The devices were too crude at that point to permit us to see the fine detail needed for distinguishing various hand signals. Current devices are much more sophisticated. We hope to make it possible for lucid dreamers to communicate by means of hand gestures (e.g., American Sign Language) so that we can have on-the-scene reports from the dream world. A glove with movement sensors will be used to study communication from lucid dreams by means of hand gestures, using five expert subjects.

Dream time How long do dreams last? We have been able to receive a direct answer to this age-old question by asking lucid dreamers to estimate various intervals of time while dreaming. The dreamers marked the beginning and end of estimated dream time intervals with eye movement signals, allowing comparison of subjective "dream time" with objective time. In each case, the intervals of time estimated during the lucid dreams were very close in length to the actual elapsed time (1), as shown in the figure below.



Time estimates during waking and REM lucid dreaming. [EEG: electroencephalogram, ROC, LOC electro-oculogram from right and left eye; EMG chin electromyogram.] While awake (top panel), the subject signaled with eye movements, estimated 10 s by counting, signaled again, estimated 10 s without counting, and signaled a third time. The lower panel shows the subject carrying out the same task in lucid REM sleep. The time estimates are very similar in both states.

Control of respiration during lucid dreaming We recorded the physiology of three lucid dreamers who had been asked to either breathe rapidly or to hold their breath in their lucid dreams, marking the interval of altered respiration with eye movement signals. They reported successfully carrying out the agreed-upon tasks a total of nine times. In each case, a judge was able to correctly predict from the physiological records which of the two breathing patterns had been executed (4). We are currently collecting more data to further determine the precise nature of the dream respiration connection.

Brain function lateralization during lucid dreams Alpha activity was derived from right and left temporal EEG while four subjects sang and counted in their lucid dreams. The results indicated task dependent lateralization: the right hemisphere was more activated than the left during singing; during counting the reverse was true. These shifts were similar to those during waking singing and counting (5).

Physiological responses to sex in lucid dreams A pilot study with two lucid dreamers (one male and one female) who reported experiencing sexual arousal and orgasm in lucid dreams revealed patterns of physiological activity during dream sex closely resembling those accompanying corresponding experiences in the waking state (6).

These studies indicate that the effects of dream events on the brain and body are much more like the effects of real events than like those produced by waking imagery (1). Because dream activities produce real physiological effects, lucid dreaming may be useful for facilitating health and healing, as an extremely potent form of mental imagery. We plan to continue our explorations of awareness in dreams along these lines with the goal of producing a detailed map of mind-body interactions during dreaming sleep for all measurable physiological systems. Such a map could prove to be of inestimable value for experimental dream psychology, as well as for psychosomatic medicine.

EEG mapping of lucid dreaming In past studies, we have determined that lucid dreams are generally initiated during periods of high autonomic nervous system activity--decreased finger pulse amplitude, increased respiration rate and irregularity, and increased eye-movement activity relative to normal REM sleep (12). These factors indicated that dream lucidity occurs during periods of relatively high brain activation, suggesting that sufficient activation of the CNS is necessary before consciousness can be attained. However, we had little idea what was specifically happening in the brain, whether the activation was general, or localized in some particular areas.

In a pilot study we mapped the distribution of brainwave activity from twenty-eight electrode placements on the scalp, examining different frequency bands of EEG during periods pre and post-onset of lucidity in five lucid dreams from one subject. The most interesting findings in this preliminary analysis were in the alpha band (8-12 Hz), where decreases of alpha activity were seen in the posterior left hemisphere, in the first 30 seconds of lucidity. This finding is in keeping with an earlier analysis we performed on a few of our lucid dreams at Stanford of left/right ratios of alpha activity, finding the only difference at lucidity onset to be a decrease of alpha activity in the left parietal region. Decreased alpha activity is generally considered an indication of increased brain activation. Indeed, lucid dreaming ought to be associated with left hemisphere activation, (where language is localized), since to become lucid one must actually spell out to oneself, "This is a dream."

We plan to add to and check our findings by collecting more data from more subjects. This will give us a larger sample of non-lucid REM for comparison and show what EEG differences are consistent for all lucid dreams. Thus, we will gain a basis for the comparison of lucid dreaming with other states of consciousness. Twenty-eight channels of EEG will be collected, and maps of EEG activity will be computed, allowing the determination of which brain regions are involved in lucid dreaming (and perhaps reflective consciousness in general). Five expert lucid dreamers will be studied.

APPLICATIONS OF LUCID DREAMING

In addition to being a powerful research tool in scientific explorations of the dream state, lucid dreaming also offers considerable potential for a variety of practical applications, which include aiding personal- development, enhancing self-confidence, overcoming nightmares, improving mental (and perhaps, physical) health, facilitating creative problem solving, and more (1,7). There is a great deal of public interest in this area; we have received well over 10,000 letters from people around the world wishing to know more about lucid dreaming. For this reason, and because we believe lucid dreaming can benefit humanity, we feel that we have a service to perform in making the lucid dream state more readily accessible.

We would like to explore several potential applications of lucid dreaming. One is the use of lucid dreaming in overcoming nightmares. We have anecdotal evidence suggesting that lucid dreaming should be extremely beneficial to nightmare sufferers, giving them the means to overcome their own fears (1). Not only will they be able to alleviate their nightmare problems, but in so doing they will be able to increase their self-confidence and self-esteem. Lucid dreaming can be a very empowering experience, which is one of the reasons we would like to make it more readily available to people. An experimental self-help group for nightmare sufferers will be started and the efficacy of lucid dreaming to overcome nightmares will be studied and documented.

Lucid dreaming could provide the handicapped and other disadvantaged people with the nearest thing to fulfilling their impossible dreams: paralytics could walk again in their dreams, to say nothing of dancing and flying, and even experience emotionally satisfying erotic fantasies. Such sensorimotor practice could conceivably facilitate recovery from stroke.

Finally, lucid dreaming can function as a "world simulator." Just as a flight simulator allows people to learn to fly in a safe environment, lucid dreaming could allow people to learn to live in any imaginable world; to experience and better choose among various possible futures.

RESEARCH GOALS

Our goals are to further explore mind-body relationships and the expansion of consciousness during sleep through lucid dreaming. Specifically, we plan:

- A. To make lucid dreaming more accessible by further investigations with biofeedback devices like the DreamLight
- B. To study physiological correlates of dream content and of the incorporation of stimuli into dreams
- C. To map the EEG correlates associated with the emergence of consciousness during lucid dreaming
- D. To explore applications of lucid dreaming

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