

# Lucid Dreaming: Awake in Your Sleep?

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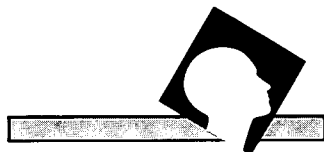
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What could it mean to be conscious in your dreams? For most of us, dreaming is something quite separate from normal life. When we wake up from being chased by a ferocious tiger, or seduced by a devastatingly good-looking Nobel Prize winner we realize with relief or disappointment that “it was only a dream.”

Yet there are some dreams that are not like that. Lucid dreams are dreams in which you know *at the time* that you are dreaming. That they are different from ordinary dreams is obvious as soon as you have one. The experience is something like waking up in your dreams. It is as though you “come to” and find you are dreaming.

Lucid dreams used to be a topic within psychical research and parapsychology. Perhaps their incomprehensibility made them good candidates for being thought paranormal. More recently, however, they have begun to appear in psychology journals and have dropped out of parapsychology—a good example of how the field of parapsychology shrinks when any of its subject matter is actually explained.

Lucidity has also become something of a New Age fad. There are machines and gadgets you can buy and special clubs you can join to learn how to induce lucid dreams. But this commercialization should not let us lose sight of the very real fascination of lucid dreaming. It forces us to ask questions about the nature of consciousness, deliberate control over our actions, and the nature of imaginary worlds.



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## *A Real Dream or Not?*

The term *lucid dreaming* was coined by the Dutch psychiatrist Frederik van Eeden in 1913. It is something of a misnomer since it means something quite different from just clear or vivid dreaming. Nevertheless we are certainly stuck with it. Van Eeden explained that in this sort of dream "the re-integration of the psychic functions is so complete that the sleeper reaches a state of perfect awareness and is able to direct his attention, and to attempt different acts of free volition. Yet the sleep, as I am able confidently to state, is undisturbed, deep, and refreshing."

This implied that there could be consciousness during sleep, a claim many psychologists denied for more than 50 years. Orthodox sleep researchers argued that lucid dreams could not possibly be real dreams. If the accounts were valid, then the experiences must have occurred during brief moments of wakefulness or in the transition between waking and sleeping, not in the kind of deep sleep in which rapid eye movements (REMs) and ordinary dreams usually occur. In other words, they could not really be dreams at all.

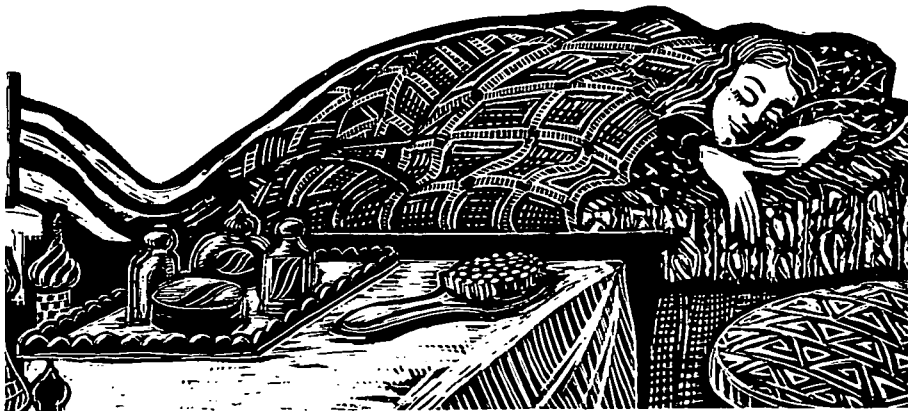
This presented a challenge to lucid dreamers who wanted to convince

people that they really were awake in their dreams. But of course when you are deep asleep and dreaming you cannot shout, "Hey! Listen to me. I'm dreaming right now." All the muscles of the body are paralyzed.

It was Keith Hearne (1978), of the University of Hull, who first exploited the fact that not all the muscles are paralyzed. In REM sleep the eyes move. So perhaps a lucid dreamer could signal by moving the eyes in a predetermined pattern. Just over ten years ago, lucid dreamer Alan Worsley first managed this in Hearne's laboratory. He decided to move his eyes left and right eight times in succession whenever he became lucid. Using a polygraph, Hearne could watch the eye movements for signs of the special signal. He found it in the midst of REM sleep. So lucid dreams are real dreams and do occur during REM sleep.

Further research showed that Worsley's lucid dreams most often occurred in the early morning, around 6:30 A.M., nearly half an hour into a REM period and toward the end of a burst of rapid eye movements. They usually lasted for two to five minutes. Later research showed that they occur at times of particularly high arousal during REM sleep (Hearne 1978).

It is sometimes said that discoveries in science happen when the time is



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right for them. It was one of those odd things that at just the same time, but unbeknown to Hearne, Stephen LaBerge, at Stanford University in California, was trying the same experiment. He too succeeded, but resistance to the idea was very strong. In 1980, both *Science* and *Nature* rejected his first paper on the discovery (LaBerge 1985). It was only later that it became clear what an important step this had been.

### *An Identifiable State?*

It would be especially interesting if lucid dreams were associated with a unique physiological state. In fact this has not been found, although this is not very surprising since the same is true of other altered states, such as out-of-body experiences and trances of various kinds. However, lucid dreams do tend to occur in periods of higher cortical arousal. Perhaps a certain threshold of arousal has to be reached before awareness can be sustained.

The beginning of lucidity (marked by eye signals, of course) is associated with pauses in breathing, brief changes in heart rate, and skin response changes, but there is no unique combination that allows the lucidity to be identified by an observer.

In terms of the dream itself, there are several features that seem to provoke lucidity. Sometimes height-

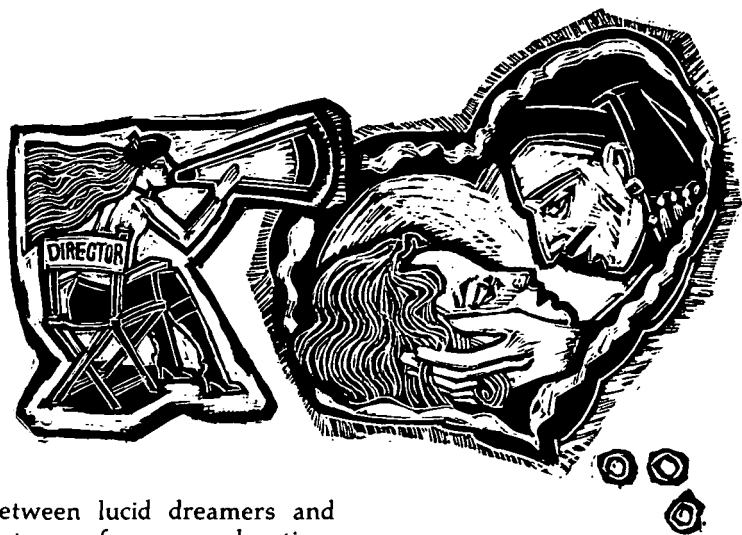
ened anxiety or stress precedes it. More often there is a kind of intellectual recognition that something "dreamlike" or incongruous is going on (Fox 1962; Green 1968; LaBerge 1985).

It is common to wake from an ordinary dream and wonder, "How on earth could I have been fooled into thinking that I was really doing push-ups on a blue beach?" A little more awareness is shown when we realize this in the dream. If you ask yourself, "Could this be a dream?" and answer "No" (or don't answer at all), this is called a pre-lucid dream. Finally, if you answer "Yes," it becomes a fully lucid dream.

It could be that once there is sufficient cortical arousal it is possible to apply a bit of critical thought; to remember enough about how the world ought to be to recognize the dream world as ridiculous, or perhaps to remember enough about oneself to know that these events can't be continuous with normal waking life. However, tempting as it is to conclude that the critical insight *produces* the lucidity, we have only an apparent correlation and cannot deduce cause and effect from it.

### *Becoming a Lucid Dreamer*

Surveys have shown that about 50 percent of people (and in some cases more) have had at least one lucid dream in their lives. (See, for example, Blackmore 1982; Gackenbach and LaBerge 1988; Green 1968.) Of course surveys are unreliable in that many people may not understand the question. In particular, if you have never had a lucid dream, it is easy to misunderstand what is meant by the term. So overestimates might be expected. Beyond this, it does not seem that surveys can find out much. There are no very consistent differ-



ences between lucid dreamers and others in terms of age, sex, education, and so on (Green 1968; Gackenbach and LaBerge 1988).

For many people, having lucid dreams is fun, and they want to learn how to have more or to induce them at will. One finding from early experimental work was that high levels of physical (and emotional) activity during the day tend to precede lucidity at night. Waking during the night and carrying out some kind of activity before falling asleep again can also encourage a lucid dream during the next REM period and is the basis of some induction techniques.

Many methods have been developed (Gackenbach and Bosveld 1989; Tart 1988; Price and Cohen 1988). They roughly fall into three categories.

One of the best known is LaBerge's MILD (Mnemonic Induction of Lucid Dreaming). This is done on waking in the early morning from a dream. You should wake up fully, engage in some activity like reading or walking about, and then lie down to go to sleep again. Then you must imagine yourself asleep and dreaming, rehearse the dream from which you woke, and remind yourself, "Next time I dream this I want to remember I'm dreaming."

A second approach involves con-

stantly reminding yourself to become lucid throughout the day rather than the night. This is based on the idea that we spend most of our time in a kind of waking daze. If we could be more lucid in waking life, perhaps we could be more lucid while dreaming. German psychologist Paul Tholey suggests asking yourself many times every day, "Am I dreaming or not?" This sounds easy but is not. It takes a lot of determination and persistence not to forget all about it. For those who do forget, French researcher Clerc suggests writing a large "C" on your hand (for "conscious") to remind you (Tholey 1983; Gackenbach and Bosveld 1989).

This kind of method is similar to the age-old technique for increasing awareness by meditation and mindfulness. Advanced practitioners of meditation claim to maintain awareness through a large proportion of their sleep. TM is often claimed to lead to sleep awareness. So perhaps it is not surprising that some recent research finds associations between meditation and increased lucidity (Gackenbach and Bosveld 1989).

The third and final approach requires a variety of gadgets. The idea is to use some sort of external signal

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to remind people, while they are actually in REM sleep, that they are dreaming. Hearne first tried spraying water onto sleepers' faces or hands but found it too unreliable. This sometimes caused them to incorporate water imagery into their dreams, but they rarely became lucid. He eventually decided to use a mild electric shock to the wrist. His "dream machine" detects changes in breathing rate (which accompany the onset of REM) and then automatically delivers a shock to the wrist (Hearne 1990).

Meanwhile, in California, LaBerge was rejecting taped voices and vibrations and working instead with flashing lights. The original version was laboratory based and used a personal computer to detect the eye movements of REM sleep and to turn on flashing lights whenever the REMs reached a certain level. Eventually, however, all the circuitry was incorporated into a pair of goggles. The idea is to put the goggles on at night, and the lights will flash only when you are asleep and dreaming. The user can even control the level of eye movements at which the lights begin to flash.

The newest version has a chip incorporated into the goggles. This will not only control the lights but will store data on eye-movement density during the night and when and for how long the lights were flashing, making fine tuning possible. At the

moment, the first users have to join in workshops at LaBerge's Lucidity Institute and learn how to adjust the settings, but within a few months he hopes the whole process will be fully automated. (See LaBerge's magazine, *DreamLight*.)

LaBerge tested the effectiveness of the Dream Light on 44 subjects who came into the laboratory, most for just one night. Fifty-five percent had at least one lucid dream and two had their first-ever lucid dream this way. The results suggested that this method is about as successful as MILD, but using the two together is the most effective (LaBerge 1985).

### *Lucid Dreams as an Experimental Tool*

There are a few people who can have lucid dreams at will. And the increase in induction techniques has provided many more subjects who have them frequently. This has opened the way to using lucid dreams to answer some of the most interesting questions about sleep and dreaming.

How long do dreams take? In the last century, Alfred Maury had a long and complicated dream that led to his being beheaded by a guillotine. He woke up terrified, and found that the headboard of his bed had fallen on his neck. From this, the story goes, he concluded that the whole dream had been created in the moment of awakening.

This idea seems to have got into popular folklore but was very hard to test. Researchers woke dreamers at various stages of their REM period and found that those who had been longer in REM claimed longer dreams. However, accurate timing became possible only when lucid dreamers could send "markers" from the dream state.

LaBerge asked his subjects to signal

when they became lucid and then count a ten-second period and signal again. Their average interval was 13 seconds, the same as they gave when awake. Lucid dreamers, like Alan Worsley, have also been able to give accurate estimates of the length of whole dreams or dream segments (Schatzman, Worsley, and Fenwick 1988).

### *Dream Actions*

As we watch sleeping animals it is often tempting to conclude that they are moving their eyes in response to watching a dream, or twitching their legs as they dream of chasing prey. But do physical movements actually relate to the dream events?

Early sleep researchers occasionally reported examples like a long series of left-right eye movements when a dreamer had been dreaming of watching a ping-pong game, but they could do no more than wait until the right sort of dream came along.

Lucid dreaming made proper experimentation possible, for the subjects could be asked to perform a whole range of tasks in their dreams. In one experiment with researchers Morton Schatzman and Peter Fenwick, in London, Worsley planned to draw large triangles and to signal with flicks of his eyes every time he did so. While he dreamed, the electromyogram, recording small muscle movements, showed not only the eye signals but spikes of electrical activity in the right forearm just afterward. This showed that the preplanned actions in the dream produced corresponding muscle movements (Schatzman, Worsley, and Fenwick 1988).

Further experiments, with Worsley kicking dream objects, writing with umbrellas, and snapping his fingers, all confirmed that the muscles of the body show small movements corres-

ponding to the body's actions in the dream. The question about eye movements was also answered. The eyes do track dream objects. Worsley could even produce slow scanning movements, which are very difficult to produce in the absence of a "real" stimulus (Schatzman, Worsley, and Fenwick 1988).

LaBerge was especially interested in breathing during dreams. This stemmed from his experiences at age five when he had dreamed of being an undersea pirate who could stay under water for very long periods without drowning. Thirty years later he wanted to find out whether dreamers holding their breath in dreams do so physically as well. The answer was yes. He and other lucid dreamers were able to signal from the dream and then hold their breath. They could also breathe rapidly in their dreams, as revealed on the monitors. Studying breathing during dreamed speech, he found that the person begins to breathe out at the start of an utterance just as in real speech (LaBerge and Dement 1982a).

### *Hemispheric Differences*

It is known that the left and right hemispheres are activated differently during different kinds of tasks. For example, singing uses the right hemisphere more, while counting and other, more analytical tasks use the left hemisphere more. By using lucid dreams, LaBerge was able to find out whether the same is true in dreaming.

In one dream he found himself flying over a field. (Flying is commonly associated with lucid dreaming.) He signaled with his eyes and began to sing "Row, row, row your boat. . . ." He then made another signal and counted slowly to ten before signaling again. The brainwave records showed just the same patterns of activation

that you would expect if he had done these tasks while awake (LaBerge and Dement 1982b).

### *Dream Sex*

Although it is not often asked experimentally, I am sure plenty of people have wondered what is happening in their bodies while they have their most erotic dreams.

LaBerge tested a woman who could dream lucidly at will and could direct her dreams to create the sexual experiences she wanted. (What a skill!) Using appropriate physiological recording, he was able to show that her dream orgasms were matched by true orgasms (LaBerge, Greenleaf, and Kedzierski 1983).

Experiments like these show that there is a close correspondence between actions of the dreamer and, if not real movements, at least electrical responses. This puts lucid dreaming somewhere between real actions, in which the muscles work to move the body, and waking imagery, in which they are rarely involved at all. So what exactly is the status of the dream world?

### *The Nature of the Dream World*

It is tempting to think that the real world and the world of dreams are totally separate. Some of the experiments already mentioned show that there is no absolute dividing line. There are also plenty of stories that show the penetrability of the boundary.

Alan Worsley describes one experiment in which his task was to give himself a prearranged number of small electric shocks by means of a machine measuring his eye movements. He went to sleep and began dreaming that it was raining and he was in a sleeping bag by a fence with

a gate in it. He began to wonder whether he was dreaming and thought it would be cheating to activate the shocks if he was awake. Then, while making the signals, he worried about the machine, for it was out there with him in the rain and might get wet (Schatzman, Worsley, and Fenwick 1988).

This kind of interference is amusing, but there are dreams of confusion that are not. The most common and distinct are called false awakenings. You dream of waking up but in fact, of course, are still asleep. Van Eeden (1913) called these "wrong waking up" and described them as "demoniacal, uncanny, and very vivid and bright, with . . . a strong diabolical light." The French zoologist Yves Delage, writing in 1919, described how he had heard a knock at his door and a friend calling for his help. He jumped out of bed, went to wash quickly with cold water, and when that woke him up he realized he had been dreaming. The sequence repeated four times before he finally actually woke up—still in bed.

A student of mine described her infuriating recurrent dream of getting up, cleaning her teeth, getting dressed, and then cycling all the way to the medical school at the top of a long hill, where she finally would realize that she had dreamed it all, was late for lectures, and would have to do it all over again for real.

The one positive benefit of false awakenings is that they can sometimes be used to induce out-of-body experiences (OBEs). Indeed, Oliver Fox (1962) recommends this as a method for achieving the OBE. For many people OBEs and lucid dreams are practically indistinguishable. If you dream of leaving your body, the experience is much the same. Also recent research suggests that the same people tend to have both lucid

dreams and OBEs (Blackmore 1988; Irwin 1988).

All of these experiences have something in common. In all of them the "real" world has been replaced by some kind of imaginary replica. Celia Green, of the Institute of Psychophysical Research at Oxford, refers to all such states as "metachoric experiences."

Jayne Gackenbach, a psychologist from the University of Alberta, Canada, relates these experiences to UFO-abduction stories and near-death experiences (NDEs). The UFO abductions are the most bizarre but are similar in that they too involve the replacement of the perceived world by a hallucinatory replica.

There is an important difference between lucid dreams and these other states. In the lucid dream one has insight into the state (in fact that defines it). In false awakening, one does not (again by definition). In typical OBEs, people think they have *really* left their bodies. In UFO "abductions" they believe the little green men are "really there"; and in NDEs, they are convinced they are rushing down a real tunnel toward a real light and into the next world. It is only in the lucid dream that one realizes it is a

dream.

I have often wondered whether insight into these other experiences is possible and what the consequences might be. So far I don't have any answers.

## Waking Up

The oddest thing about lucid dreams—and, to many people who have them, the most compelling—is how it feels when you wake up. Upon waking up from a normal dream, you usually think, "Oh, that was only a dream." Waking up from a lucid dream is more continuous. It feels more real, it feels as though *you* were conscious in the dream. Why is this? I think the reason can be found by looking at the mental models the brain constructs in waking, in ordinary dreaming, and in lucid dreams.

I have previously argued that what seems real is the most stable mental model in the system at any time. In waking life, this is almost always the input-driven model, the one that is built up from the sensory input. It is firmly linked to the body image to make a stable model of "me, here, now." It is easy to decide that this represents "reality" while all the other



models being used at the same time are "just imagination" (Blackmore 1988).

Now consider an ordinary dream. In that case there are lots of models being built but no input-driven model. In addition there is no adequate self-model or body image. There is just not enough access to memory to construct it. This means, if my hypothesis is right, that whatever model is most stable at any time will seem real. But there is no recognizable self to whom it seems real. There will just be a series of competing models coming and going. Is this what dreaming feels like?

Finally, we know from research that in the lucid dream there is higher arousal. Perhaps this is sufficient to construct a better model of self. It is one that includes such important facts as that you have gone to sleep, that you intended to signal with your eyes, and so on. It is also more similar to the normal waking self than those fleeting constructions of the ordinary dream. This, I suggest, is what makes the dream seem more real on waking up. Because the *you* who remembers the dream is more similar to the *you* in the dream. Indeed, because there was a better model of *you*, *you* were more conscious.

If this is right, it means that lucid dreams are potentially even more interesting than we thought. As well as providing insight into the nature of sleep and dreams, they may give clues to the nature of consciousness itself.

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