VARIETIES OF ANOMALOUS EXPERIENCE

Examining the Scientific Evidence

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LUCID DREAMING

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> I remember going to bed with mind peacefully composed and full of a quiet joy. The dream during the night that followed was at the beginning quite irrational, though perhaps more keenly followed than usual. I seemed to move smoothly through a region of space where, presently, a vivid sense of cold flowed in on me and held my attention with a strange interest.
>
> I believe that at that moment the dream became lucid. Then suddenly, . . . all that up to now had been wrapped in confusion instantly passed away, and a new space burst forth in vivid presence and utter reality, with perception free and pin-pointed as never before; the darkness itself seemed alive. The thought that was then borne in upon me with inescapable conviction was this: "I have never been awake before." (Whiteman, 1961, p. 57)

DEFINITION

We do not ordinarily think about being awake while we are (if we indeed are awake, an assumption the lucid dream above questions). Likewise, as a rule, we are not aware of the fact that we are dreaming while we are dreaming. We ordinarily experience our dreams as if they are phys-

ical reality and only recognize them as dreams after we awaken. However, there is a significant exception to this generalization: Sometimes, while dreaming, we are explicitly aware that we are dreaming. The experience of *lucid dreaming*, as this phenomenon is termed (Van Eeden, 1913), is clearly anomalous in comparison with the usual mildly delirious experience of nonlucid dreaming. The term *lucid* is used in the psychiatric sense, indicating a condition of clear insight and correct orientation to reality in opposition to the clouded insight and deluded disorientation of the delirious.

Just as there are degrees of delirium, there are degrees of lucidity (Barrett, 1992; Kahan & LaBerge, 1994; LaBerge, 1985). In the best of cases, lucid dreamers claim to be fully in possession of their cognitive faculties while dreaming: They report being able to reason clearly, to remember the conditions of waking life, and to act (or not act) voluntarily upon reflection or in accordance with plans decided on before sleep. At the same time, they remain soundly asleep, experiencing a dream world that can seem vividly real.

The usual definition of *lucid dreaming* is simply dreaming while knowing that one is dreaming (Green, 1968; LaBerge, 1985). Some researchers (e.g., Tart, 1988; Tholey, 1988) consider this minimal criterion too broad, and they argue that the term lucid dreaming should require, in addition, correct memory for the circumstances of waking life and a degree of control over the dream. However, there are compelling reasons for preferring the simpler, minimalist definition. For example, in laboratory studies of lucid dreaming, memory for the fact that one is sleeping in the laboratory is relevant and essential for the tasks involved (LaBerge, 1990), but in other contexts, remembering where one is sleeping may be entirely irrelevant. Moreover, although dream control and dream awareness are correlated, neither requires the other (Kahan & LaBerge, 1994); there is no requirement for a fully lucid dreamer to exercise control over the dream at all. One might, for instance, choose to lucidly observe the events of the dream without interference (LaBerge, 1985). This frame of mind is similar, but not identical to, dream "witnessing" (see below; also see Alexander, 1987; Alexander, Boyer, & Orme-Johnson, 1985).

LaBerge (1985) distinguished two contrasting perspectives from which people experience their dreams and other states of consciousness: actor or observer. The actor perspective is how a person ordinarily experiences his or her dreams (and waking life)—as an actively involved participant within the dream (or waking) scene. In contrast, when a person takes the observer perspective, he or she is reflective, disengaged and, in systems theory terms, "meta" to the scene. Lucid dreaming involves a balance between detachment and participation in which both actor and observer perspectives are present simultaneously (LaBerge, 1985; Rossi, 1972). In the typical nonlucid dream, a person is identified with the actor per-

spective. In witnessing, whether of dreaming or nondreaming sleep, the person is identified with the detached observer (Alexander, 1987; Gackenbach, 1991a).

There are several other types of anomalous experiences similar to lucid dreaming. Most closely related is the out-of-body experience (OBE), which in some cases can be almost identical phenomenologically to lucid dreaming. However, although people having OBEs are clearly reflectively conscious that something strange is happening, they believe that they are not dreaming, in contrast to lucid dreamers (Alvarado, this volume, chap. 6; Blackmore, 1988; Irwin, 1988; LaBerge & DeGracia, in press). Nonetheless, LaBerge and colleagues have shown psychophysiological evidence for the similarities between lucid dreaming and OBE (LaBerge, Levitan, Brylowski, & Dement, 1988; Levitan, LaBerge, DeGracia, & Zimbardo, 1999).

Other related anomalous experiences include some near-death-experiences (NDEs) (Greyson, this volume, chap. 10; LaBerge, 1985), some UFO abduction experiences (Gackenbach, 1991a; Appelle, Lynn, & Newman, this volume, chap. 8), some hallucinatory experiences (Bentall, this volume, chap. 3), and some mystical and meditative experiences (Gackenbach, 1991a; LaBerge, 1985; Wulff, this volume, chap. 12). Hunt (1995) argued for framing this whole set of related experiences as experiences of turning around on self or de-embedding of the self.

Under ordinary conditions, lucid dreaming is a rare experience. Although most people report having had a lucid dream at least once in their lives, only about 20% of the U.S. population reports having lucid dreams once a month or more (Snyder & Gackenbach, 1988).

As described below, lucid dreams typically occur late in the sleep cycle, nearly exclusively during REM sleep. This implies a relatively activated brain, and there is some evidence suggesting that high levels of presleep activity (Garfield, 1979) or emotional arousal (Sparrow, 1976) are associated with the occurrence of lucid dreams. Meditation (Gackenbach, 1991c; Hunt, 1989) and intensive psychotherapy (Rossi, 1972) may also be associated with increased rates of spontaneous lucid dreaming. Interruptions of the sleep cycle with 30–60 min of wakefulness strongly facilitates lucidity in subsequent sleep (LaBerge, Phillips, & Levitan, 1994).

Dreamers commonly become lucid when they puzzle over oddities in dream content and conclude that the explanation is that they are dreaming. Spontaneous lucidity is also frequently associated with anxiety dreams and the recognition of a dreamlike quality of the experience (Gackenbach 1988; Green, 1968). People are more likely to recognize an experience as dreamlike if they are familiar with what their dreams are like (LaBerge, 1985); this is one reason why lucid dreaming is more frequently reported by high dream recallers (Snyder & Gackenbach, 1988). Although lucid dreaming is a rare experience for most people, there is reason to believe

that it is a learnable skill (LaBerge, 1980a, 1980b), and there are a variety of techniques available for inducing lucid dreams that have been summarized or reviewed by LaBerge (1985; LaBerge & Rheingold, 1990), Price and Cohen (1988), and Gackenbach (1985–1986).

As Freud (1965) noted a century ago in *The Interpretation of Dreams*, it is possible to carry a specific mental set into sleep, such as the intention to wake up at a certain hour or if the baby cries or to remember dreams. Sleep is also compatible with the intention to have lucid dreams, and several effective methods for inducing lucid dreams have been developed on the basis of this approach. Diligent practice with some of these techniques has allowed highly motivated individuals with good dream recall to become lucid at will (LaBerge, 1980a, 1980b).

Another approach to lucid dream induction is related to biofeedback. In this approach, delicate sensory stimuli are applied during REM sleep which, if incorporated into dreams, can cue dreamers to remember that they are dreaming (Hearne, 1978; LaBerge, 1980a). Various stimuli to cue lucidity have been experimented with; the most promising results so far have been with flashes of light (LaBerge & Levitan, 1995).

PHENOMENOLOGY

The realization that one is dreaming can sometimes have an extremely powerful impact on the dreamer, as illustrated by the example with which we started this chapter. The following lucid dream is similar:

> I dreamed that I was standing on the pavement outside my home. . . . I was about to enter the house when, on glancing casually at [the pavement] stones, my attention became riveted by a passing strange phenomenon, so extraordinary that I could not believe my eyes—they had seemingly all changed their position in the night, and the long sides were now parallel to the curb! Then the solution flashed upon me: though this glorious summer morning seemed as real as real could be, I was *dreaming*! With the realization of this fact, the quality of the dream changed in a manner very difficult to convey to one who has not had this experience. Instantly, the vividness of life increased a hundred-fold. Never had sea and sky and trees shone with such glamorous beauty; even the commonplace houses seemed alive and mystically beautiful. Never had I felt so absolutely well, so clear-brained, so inexpressibly *free*! The sensation was exquisite beyond words; but it lasted only a few minutes and I awoke. (Fox, 1962, pp. 32–33)

In other cases, the initiation of lucidity takes on a much calmer emotional tone, as in the following case, which also illustrates the remarkable degree of logical reasoning sometimes present in dreams:

> From the top of a rather low and unfamiliar hill, I look out across a

> wide plain towards the horizon. It crosses my mind that I have no idea what time of year it is. I check the sun's position. It appears almost straight above me with its usual brightness. This is surprising, as it occurs to me that it is now autumn, and the sun was much lower only a short time ago. I think it over: the sun is now perpendicular to the equator, so here it has to appear at an angle of approximately 45 degrees. So if my shadow does not correspond to my own height, I must be dreaming. I examine it: it is about 30 centimeters long. It takes considerable effort for me to believe this almost blindingly bright landscape and all of its features to be only an illusion. (Moers-Messmer, 1938, p. 316)

Given the great variability in all types of dreams, this question can arise: On the average, how different are lucid and nonlucid dreams? Although descriptions of content differences between lucid and nonlucid dreams exist in the literature (e.g., Moers-Messmer, 1938), there are few systematic individual analyses (Gackenbach et al., 1992; Gillespie, 1988; LaBerge, 1980b). This type of content analysis gives us a detailed description of dream content but may, of course, prove uncharacteristic of the typical lucid dream (likewise, "the average lucid dream" may describe a nonexistent abstraction).

The major review of content differences between lucid and nonlucid dreams is Gackenbach's (1988), in which she evaluated the content of lucid and nonlucid dreams as measured by both self-evaluations and independent judges. The majority of data involved dreams collected either from dream diaries or from questionnaires filled out by the dreamers, with only a few content analyses on lucid dreams collected from sleep laboratories. Gackenbach concluded that, compared with nonlucid dreams, lucid dreams had, on the average, more auditory and kinesthetic sensations as well as more sense of control.

In the same review, Gackenbach (1988) reported on her study of content differences judged according to several bizarreness scales and scales based on the descriptive findings of dreamers' self-evaluations (e.g., palpable sensations, balance, and control) and also according to the Hall and Van de Castle (1966) system of content analysis. The judges' evaluations revealed few differences between lucid and nonlucid dreams. Consistent with the self-evaluations, Gackenbach found higher levels of auditory and kinesthetic dream sensations as well as dream control in lucid dreams than in nonlucid dreams. In addition, lucid dreams averaged fewer dream characters than nonlucid dreams. Gackenbach concluded that the major finding from both types of analyses was that in spite of several statistically significant content differences, lucid dreams are more similar than dissimilar to nonlucid dreams. This result should not be too surprising considering that lucid dreams and nonlucid dreams are both types of *dreams*.

Worsley (1988) pointed out that as useful as such content analyses

are from groups of individuals who spontaneously experience lucidity, they fail to appreciate the subtleties of the experience undergone by the more experienced and sophisticated lucid dreamer. There are a variety of ways that this problem has been approached. LaBerge and colleagues have examined the content of lucid dreams with a sample of members of the Lucidity Institute, who are motivated and experienced enough in dreaming lucidly to offer a more comprehensive view of possible content differences between lucid and nonlucid dreams. For example, Levitan and LaBerge (1993) analyzed self-rated content scales from 699 reports provided by 52 participants. Compared with nonlucid dreams, lucid dreams had significantly higher levels of control, more positive emotions, and higher levels of visual vividness, clarity of thinking, physical activity, and changes of scene. Given the possible role of selection bias in canvassing only members of the Lucidity Institute, it is important to replicate this study with other samples to evaluate the findings' generalizability.

As a result of learning and practice, experienced lucid dreamers are likely to have lucid (and perhaps nonlucid) dreams that differ widely from the typical lucid dreams of beginners. They are also more likely to use specialized techniques for lucid dream induction, control, and stabilization (LaBerge & Rheingold, 1990). For example, to prevent premature awakening, lucid dreamers may spin their bodies until the dream restabilizes (LaBerge, 1980a; 1995).

Gackenbach and colleagues asked a group of highly experienced meditators for examples of experiences of consciousness in sleep (reported in Alexander, 1987; Gackenbach, 1991a). Based on the conceptual work of Alexander and colleagues (Alexander, Boyar, & Alexander, 1987; Alexander et al., 1985), Gackenbach and colleagues described three types of consciousness in sleep: (a) *lucid dreaming*, or dreaming while actively thinking about the fact that one is dreaming; (b) *witnessing-dreaming*, or dreaming while experiencing a quiet, peaceful, inner awareness or "wakefulness" separate from the dream; and (c) *deep sleep witnessing*, described as dreamless sleep in which one experiences a quiet, peaceful, inner state of awareness or "wakefulness." In addition to distinguishing these three varieties of consciousness in samples provided by the participants, Gackenbach et al. also examined the content of the experiences of consciousness in sleep described by the meditators and found the expected differences in feelings of separateness and dream control.

AFTEREFFECTS

In general, the aftereffects of most dreams, lucid or otherwise, appear to be relatively subtle. However, some dreams, no doubt, have changed people's lives (De Becker, 1965), and the anomalous nature of lucid dreams may give them greater potential impact.

It has been argued (Hunt, 1989; Kuiken & Sikora, 1993) that lucid and other forms of intensified dreams are more likely to affect subsequent waking feelings, judgments, and action than ordinary dreams. Insofar as lucid dreams are experienced as interesting, exciting, and relatively pleasant, mood elevations would be expected to result upon awakening (LaBerge, 1985), as observed by Levitan and LaBerge (1993) and in most of the studies reviewed by Gackenbach (1988).

There has not yet been any research on long-term effects of lucid dreaming, but research by Alexander and colleagues (Alexander, Davies, et al., 1990; Alexander, Heaton, & Chandler, 1994) suggests potential beneficial effects of long-term witnessing of dreams and sleep. In their work, high-frequency witnessing in both meditators and nonmeditators was associated with lower scores in psychopathology and in psychological, biochemical, and health-related indicators of stress. Cognitively, these experiences were found to reflect high creative thinking, absorption, field independence, and nonpropositional information processing. Repeated experiences of this form of consciousness appeared to result in enduring positive psychophysiological changes, such as lower baseline levels of spontaneous skin resistance responses, respiration rate, heart rate, and plasma lactate. Prospective, long-term studies of the salutary effects of dreams in general, and lucid dreams in particular, are a research priority to establish the causal link between lucid dreaming and its seemingly beneficial effects.

Biological Markers

It is thanks to psychophysiological methodology that lucid dreaming is accepted today as a normal, if rare, phenomenon of REM sleep. Dreams had been characterized as essentially single-minded and nonreflective (Rechtschaffen, 1978); in this context, reports of lucid dreaming were viewed with not a little suspicion. The orthodox point of view about 20 years ago might be summarized thus: (a) Lucid dreams don't happen, and (b) even if they do, they can't happen during genuine sleep.

The concept of *conscious sleep* can seem so self-contradictory and paradoxical to certain ways of thinking that some theoreticians once considered lucid dreams impossible and even absurd. Probably the most extreme example of this point of view is provided by Malcolm (1959), who argued that given the premise that being asleep means experiencing nothing whatsoever, "dreams" are not experiences during sleep at all but only the reports people tell after awakening. This concept of sleep led Malcolm to conclude that the idea that someone might reason while asleep is "meaningless" and that, moreover, "If 'I am dreaming' could express a judgement it would imply the judgement 'I am asleep,' and therefore the absurdity of the latter proves the absurdity of the former." Thus "the supposed judgement that

one is dreaming" is "unintelligible" and "an inherently absurd form of words" (Malcolm, 1959, pp. 48–50).

This example shows the skeptical light in which accounts of lucid dreaming were viewed before physiological proof of the reality of lucid dreaming made philosophical arguments moot. The orthodox view in sleep and dream research assumed (until very recently) that anecdotal accounts of lucid dreams must be somehow spurious.

However, anomalous or not, people still reported experiences of lucid dreaming, thus the question Under what presumably abnormal physiological conditions do reports of "lucid" dreams occur? In the absence of empirical evidence bearing on the question, speculation largely favored two answers: either wakefulness or non-REM sleep. Most sleep researchers seemed inclined to accept Hartmann's (1975) impression that lucid dreams were "not typical parts of dreaming thought, but rather brief arousals" (p. 74; see also Berger, 1977). Schwartz and Lefebvre (1973) noted that frequent transitory arousals were common during REM sleep, and they proposed these "microawakenings" as the physiological basis for lucid dream reports. Although no one had offered any evidence for this mechanism, it seems to have been the orthodox opinion (e.g., Foulkes, 1974) up until the past few years. A similar view was expressed by Antrobus, Antrobus, and Fisher (1965), who predicted that recognition by the dreamer that he or she is dreaming would either immediately terminate the dream or continue in non-REM sleep. Likewise, Hall (1977) speculated that lucid dreams may represent "a transition from Stage-1 REM to Stage-4 mentation" (p. 312). Green (1968) seemed to have been alone in reasoning that because lucid dreams usually arise from nonlucid dreams, "we may tentatively expect to find lucid dreams occurring, as do other dreams, during the 'paradoxical' phase of sleep" (p. 128).

REM Research

Empirical evidence began to appear in the late 1970s supporting Green's (1968) speculation that lucid dreams sometimes occur during REM sleep. In a pioneering study, Ogilvie, Hunt, Sawicki, and McGowan (1978) recorded the sleep of two participants who reported lucid dreams after awakening from REM periods. However, no evidence was given that the reported lucid dreams had in fact occurred during the REM sleep immediately preceding the awakenings and reports. What was needed to unambiguously establish the physiological status of lucid dreams was some way to mark the exact time the lucid dream was taking place.

The required method was provided with a new technique involving eye movement signals, developed independently at Stanford University and Hull University. The technique was based on an earlier study (Roffwarg, Dement, Muzio, & Fischer, 1962) that found that the directions of eye

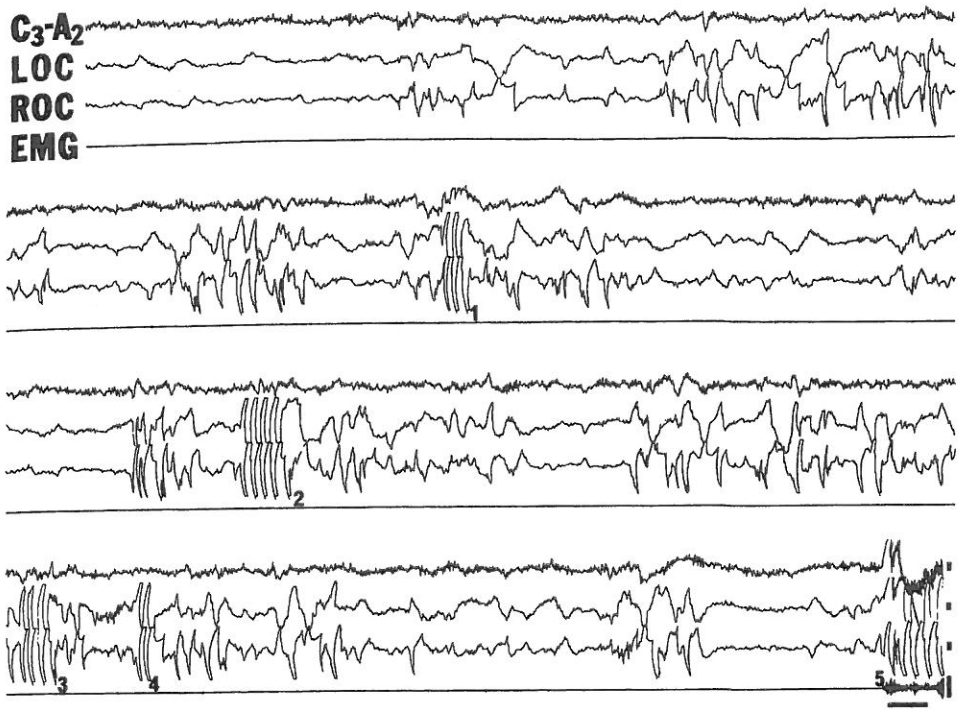


Figure 5.1. A typical dream-initiated lucid dream. Four channels of physiological data (central EEG [C_3-A_2], left (L) and right (R) eye movements [LOC and ROC], and chin muscle tone [EMG]) from the last 8 min of a 30-min REM period are shown. Upon awakening, the participant reported having made five eye movement signals (labeled 1–5 in figure). The first signal (1, LRLR) marked the onset of lucidity. Skin potential artifacts can be observed in the EEG at this point. During the following 90 s, the participant "flew about" exploring his dream world until he believed he had awakened, at which point he made the signal for awakening (2, LRLRLRLR). After another 90 s, the participant realized he was still dreaming and signaled (3) with three pairs of eye movements. Realizing that this was too many, he correctly signaled with two pairs (4). Finally, upon awakening 100 s later, he signaled appropriately (5, LRLRLRLR). (Calibrations are 50 μV and 5 s). Reprinted from "Lucid Dreaming: Psychophysiological Studies of Consciousness During REM Sleep" (p. 114), by S. LaBerge, 1990, in R. R. Bootzen, J. F. Kihlstrom, & D. L. Schacter, *Sleep and Cognition*. Washington, DC: American Psychological Association. Copyright 1990 by American Psychological Association. Reprinted with permission.

movements recorded during REM sleep sometimes exactly corresponded to the directions that participants reported they had been looking in their dreams. LaBerge (1980a) reasoned that if lucid dreamers can act volitionally, they should be able to prove it by making a prearranged eye movement signal marking the exact time they became lucid (see Figure 5.1). Using this approach, LaBerge and his colleagues at Stanford reported that claims of lucid dreams from 5 participants had been validated by eye movement

signals (LaBerge, 1980a; LaBerge, Nagel, Dement, & Zarcone, 1981). All of the signals, and therefore lucid dreams, had occurred during uninterrupted REM sleep. LaBerge (1985) noted that one of the original reviewers of this study recommended rejecting the paper because he found it impossibly "difficult to imagine subjects simultaneously dreaming their dreams and signalling them to others" (p. 72).

An almost identical eye movement signaling technique was independently developed by Hearne and Worsley in England, who also found lucid dreaming exclusively during REM (Hearne, 1978). Studies in several other sleep laboratories have obtained essentially the same results (Dane, 1984; Fenwick et al., 1984; Ogilvie, Hunt, Kushniruk, & Newman, 1983), making it clear that, although perhaps paradoxical, lucid dreaming is a proven phenomenon of sleep.

The studies cited above showed that lucid dreams typically occur in REM sleep. However, REM sleep is a heterogeneous state exhibiting great physiological variability. Two distinct phases are ordinarily distinguished: periods of eye movement activity and high cortical activation (phasic REM) versus periods with few eye movements and relatively low activation (tonic REM). Several studies have shown that lucid dreams are associated with phasic REM. LaBerge, Levitan, and Dement (1986) analyzed physiological data from 76 signal-verified lucid dreams (SVLDs) of 13 participants. Physiological comparison of eye movement activity, heart rate, respiration rate, and skin potential activity for lucid versus nonlucid segments revealed that the lucid segments of the SVLD REM periods showed significantly higher levels of physiological activation than the preceding segments of nonlucid REM from the same REM periods. The study also found that REM periods in which lucid dreams occurred were more activated than those in which they did not occur. In addition, H-reflex amplitude was lower during lucid REM (Brylowski, Levitan, & LaBerge, 1989), confirming that lucid REM is a paradoxically deepened state of REM, with increased phasic activation and suppression of spinal reflexes.

Given the strong findings of autonomic activation associated with lucid dreaming, one would expect that various electroencephalograph (EEG) measures of central nervous system activation would also show activation at that time. The few studies that have compared EEG from lucid and nonlucid dreams have focused on alpha activity from one or two sites (e.g., Ogilvie et al., 1983; Ogilvie, Hunt, Tyson, Lucescu, & Jeakins, 1982) and have reached contradictory conclusions (see LaBerge, 1988, for a review). A preliminary EEG brain-mapping study (Brylowski, LaBerge, & Levitan, 1989) found the onset of lucidity to be marked by left-parietal-temporal lobe EEG activation.

Lucid dreams have been reported to occur most commonly late in the sleep cycle (Green, 1968; Van Eeden, 1913). Indeed, LaBerge et al.

(1986) found that 11 of 12 participants had more lucid dreams in the second half of their REM time than in the first half.

As discussed above, lucid dreams are reported to start either from an ongoing dream or directly from a short awakening. Accordingly, LaBerge et al. (1986) dichotomously classified SVLDs as either a wake-initiated lucid dream (WILD) or a dream-initiated lucid dream (DILD), depending on whether the reports mentioned a transient awakening in which the participant consciously perceived the external environment before reentering the dream state. Fifty-five (72%) of the SVLDs were classified as DILDs and the remaining 21 (28%) as WILDs. For all 13 participants, DILDs were more common than WILDs. As expected, in contrast to DILDs, WILDs were almost always immediately preceded by physiological indications of awakening, establishing the validity of classifying lucid dreams in this manner. See Figures 5.1 and 5.2 for illustrations of these two types of lucid dream.

Psychophysiological Relationships During REM

Lucid dreaming makes it possible to answer empirically questions that could previously be asked only theoretically. For example, how long do dreams last? LaBerge (1980a, 1985) set lucid dreamers the task of estimating a 10-s interval 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.

The data reported by LaBerge, Nagel, Dement, and Zarcone (1981) and LaBerge, Nagel, Taylor, et al. (1981) indicate that there is a direct and reliable relationship between gaze shift reported in lucid dreams and the direction of polygraphically recorded eye movements. The results obtained for lucid dreams (see also Dane, 1984; Fenwick et al., 1984; Hearne, 1978; Ogilvie et al., 1982) are much stronger than the generally weak correlations obtained by previous investigators. In the previous studies, to test the hypothesis that the dreamer's eyes move during the hallucinated dream gaze (e.g., Roffwarg, Dement, Muzio, & Fisher, 1962), investigators had to rely on chance occurrence of a highly recognizable eye movement pattern that could be matched to the participants' reported dream activity.

In another study, LaBerge and Dement (1982b) demonstrated that participants could voluntarily control their respiration rate during lucid dreaming. Evidence of voluntary control of other muscle groups during REM has also been found (Fenwick et al., 1984; LaBerge et al., 1981a).

Following reports of cognitive-task dependency of EEG lateralization

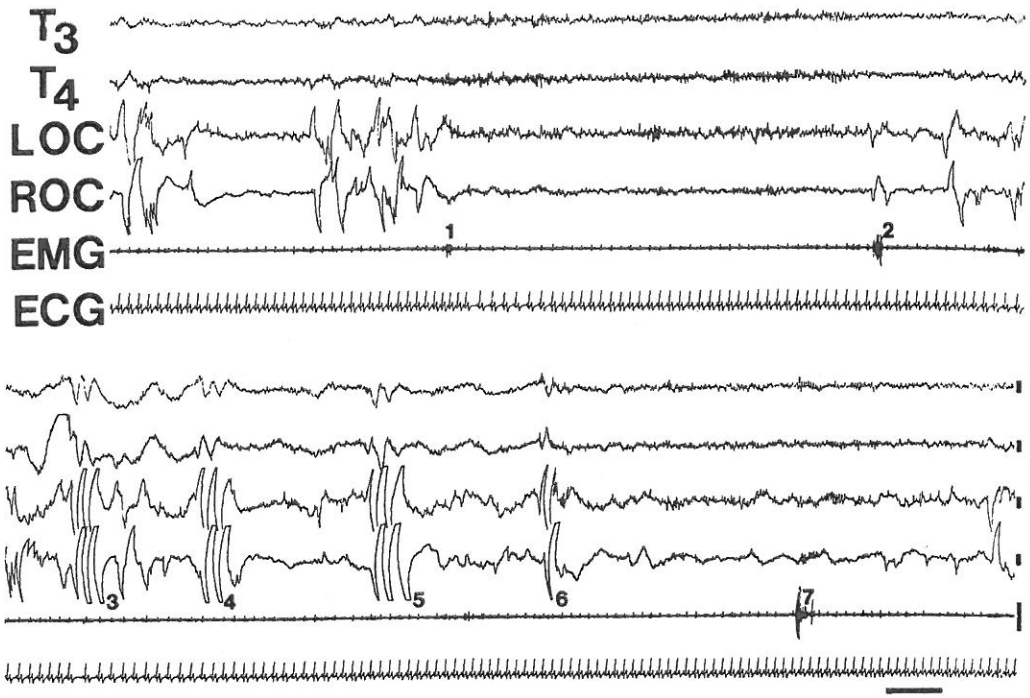
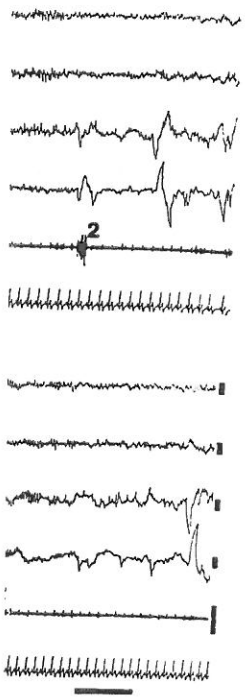


Figure 5.2. A typical lucid dream initiated from a transient awakening during REM. Six channels of physiological data (left- and right-temporal EEG [T_3 and T_4], left and right eye movements [LOC and ROC], chin muscle tone [EMG], and electrocardiogram [ECG]) from the last 3 min of a 14-min REM period are shown. The participant awoke at 1 and after 40 s returned to REM sleep at 2, and realized he was dreaming 15 s later and signaled at 3. Next he carried out the agreed-on experimental task in his lucid dream, singing between Signals 3 and 4, and counting between Signals 4 and 5. This allowed comparison of left- and right-hemisphere activation during the two tasks (LaBerge & Dement, 1982a). Note the heart rate acceleration–deceleration pattern at awakening (1) and at lucidity onset (3) and the skin potential artifacts in the EEG (particularly T_4) at lucidity onset (3). (Calibrations are 50 μV and 5 s). Reprinted from "Lucid Dreaming: Psychological Studies of Consciousness During REM Sleep" (p. 116), by S. LaBerge, 1990, in R. R. Bootzen, J. F. Kihlstrom, and D. L. Schacter, *Sleep and Cognition,* Washington, DC: American Psychological Association. Copyright 1990 by the American Psychological Association. Reprinted with permission.

in the waking state, LaBerge and Dement (1982a) recorded EEG from right and left temporal sites while participants sang and counted in their lucid dreams (see Figure 5.2). The results showed the same task-dependent lateralization in REM sleep as in the waking state: The right hemisphere was more activated than the left during singing; during counting, the reverse was true.

Sexual activity has been reported as a common theme of some lucid dreamers (Garfield, 1979; LaBerge, 1985), although content analyses of the



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lucid dreams of students do not seem to support the claim (Gackenbach, 1988). In a laboratory study, LaBerge, Greenleaf, and Kedzierski (1983) recorded two lucid dreamers who reported experiencing sexual arousal and orgasm in lucid dreams. The patterns of physiological activity during dream sex closely resembled those accompanying corresponding experiences in the waking state.

The psychophysiological studies summarized above all support the following view: During REM sleep, the events that we dream we experience result from patterns of brain activity that in turn produce effects on our peripheral nervous systems and bodies. These effects are to some extent modified by the specific conditions of REM sleep but are still closely similar to the effects that would occur if we were actually to experience the corresponding events while awake. This may explain in part why we are so inclined to mistake our dreams for reality: To the functional systems of neuronal activity that construct our experiential world (model), dreaming of perceiving or doing something is equivalent to actually perceiving or doing it.

INDIVIDUAL DIFFERENCES

The major review of research on individual differences related to lucid dreaming was done by Snyder and Gackenbach (1988). In it, they described and integrated the research about individuals who experience lucid dreams by presenting data derived from the study of four separable but related functional domains for which participant differences associated with lucid dreaming have been found. These functional domains are oculomotor/equilibratory, visual/imaginal, intellectual/creative, and personal/interpersonal. Snyder and Gackenbach ranked volunteers according to the prevalence and frequency of their lucidity. Such classification was accomplished through various self-report measures and is based on the assumption that lucidity ability can be measured in part by act frequency (or the number of times an activity, event, or feeling is performed or experienced), which may be related to a variety of individual differences.

Oculomotor/Equilibratory

Snyder and Gackenbach (1988) defined *oculomotor activities* as "a complex set of diverse movements subserved by cortical and subcortical structures involved in cognitive, sensoriperceptual, visuopractic, equilibratory, and affective functions" (p. 230). They observed that various aspects of balance, bodily orientation, and personal style can be said to fall in the oculomotor/equilibratory domain. Lucid dreaming ability has been experimentally related to the efficient use of one's own body as a referent during

changes in spatial orientation. This is most directly illustrated in the relationship of lucidity to field independence.

Two more recent studies have examined the relationship between field independence and lucidity in sleep. Gruber, Steffen, and Vonderhaar (1995) found a relationship in the same direction as Snyder and Gackenbach (1988; i.e., field independence associated with dreaming lucidly), whereas Blagrove and Tucker (1994) did not. Methodological differences, including controlling for gender of participant, between these studies may account for their differences. The relationship between lucidity and field independence seems clear for men in all the studies but less clear for women.

Evidence to date from studies of eye movements, kinesthesia, caloric stimulation of the vestibular apparatus, and field independence indicates a possible role for the vestibular system during lucid dreaming. This role would be consistent with the known relationships between sleeping, dreaming, eye movements, the vestibular apparatus and, possibly, the rotational movements reported for lucidity (LaBerge, 1980a). This relationship has been further investigated and partially supported in a recent sleep laboratory study (Leslie & Ogilvie, 1996).

Visual/Imaginal

The second functional domain discussed by Snyder and Gackenbach (1988) is the visual/imaginal domain. Included in this domain is spontaneous waking imagery, such as hallucinations, daydreams, hypnagogic imagery, and psychic phenomena, which is typically assessed with self-report questionnaires. Induced waking imagery, which is typically induced and evaluated within a laboratory setting, is most often assessed in terms of its vividness and controllability. Snyder and Gackenbach reached several tentative conclusions based on research in this domain. In terms of the spontaneous imaginal experiences, lucid dreaming frequency appears to be positively associated with the frequency with which sleep transition hallucinations, waking hallucinations, and daydreaming are experienced. Within the domain of experiences induced in the laboratory, an enhanced vividness of imagery across several sense modalities appears to be positively related to the experience of dream lucidity. They explained that "as the visualization tasks increase in spatial complexity and/or there is less need to rely on visual field referents for successful performance, lucid dreamers become distinguishable from persons who do not dream lucidly" (Snyder & Gackenback, 1988, pp. 243–244).

Snyder and Gackenbach (1988) distinguished between visual and nonvisual imagery ability, arguing that the former is unimportant, whereas the latter, in combination with internally oriented perspectives, is important to understanding lucidity, a point also made by Hunt (1989; 1995).

Several investigators have recently used measures that appear to fall into Snyder and Gackenbach's visual/imaginal domain. The often cited link between OBEs and lucidity was replicated by Glicksohn (1989; see Alvarado, this volume, chap. 6). Wolpin, Marston, Randolph, and Clothier (1992) reported an association between the vividness of waking imagery and the frequency of lucid dreams. Reported paranormal experiences (see Targ, Schlitz, & Irwin, this volume, chap. 7) and NDEs (Green, 1995; see Greyson, this volume, chap. 10) were found to be associated with lucid frequency by Usha and Pasricha (1989). Possibly facilitating the occurrence of these anomalous experiences is the ability for high absorption in imaginal events, which Spadafora and Hunt (1990) found to be associated with dream lucidity.

Intellectual/Creative

Considering the relationship of field independence to intelligence, a relationship between intelligence and lucidity ability might be expected. However, Snyder and Gackenbach's (1988) survey of the literature found the evidence inconclusive, partly because of poor experimental designs.

In subsequent research, Gruber et al. (1995) found no dreamer type differences in intelligence, as assessed by a subscale of the Cattell 16 Personality Factor (16PF) Questionnaire. However, Cranson (1989; Cranson et al., 1991) found a relationship between performance on a choice reaction time task, thought to measure a general form of intelligence, and witnessing dreams and sleep. Although content-specific measures of intelligence may not differentiate lucidity potential, a more global measure reflecting "refinement" of the nervous system might. In the same vein, Hunt (1995) viewed dream lucidity as one of several experiences that exemplify the "deep structure of a kind of intelligence that directly reuses and reorganizes the structures of perception" (p. 28). However, further inquiry is still required.

Creativity has been positively related to field independence and thus might be expected (or not, as above) to correlate with lucidity. Snyder and Gackenbach's (1988) review concluded that the creativity findings are consistent in indicating that female lucid dreamers differ from female nonlucid dreamers in terms of ability to solve certain types of nonverbal creative tasks. The results for male dreamers indicate no differential abilities. Recently, two investigations have been conducted on creativity and lucidity, with contradictory results. Although Blagrove and Tucker (1994) found no group differences on a self-report creativity measure, Brodsky, Esquerre, and Jackson (1990–1991) found that lucid dreamers performed better at a creative problem-solving task than nonlucid dreamers. As with the creativity data summarized by Snyder and Gackenbach, performance measures may

be more sensitive to group differences in lucid dreaming ability than self-report measures.

Personal/Interpersonal

If lucid dreaming ability involves multiple functional systems working in concert on an organismic level, more frequent lucid dreamers might be expected to differ from less frequent lucid dreamers along a range of personal and interpersonal dimensions. Snyder and Gackenbach (1988) found that the better-designed demographic studies have generally found no gender differences in lucid dreaming frequency, whereas studies that failed to control for dream recall found such a difference. However, gender does interact with a variety of individual difference variables, as indicated in the discussion regarding field independence.

Snyder and Gackenbach (1988) found an association of high anxiety and high lucid frequency in men, and the converse for women. However, Gruber et al. (1995) found no difference in anxiety as a function of lucid dreaming frequency for women and a significant difference for men in the opposite direction of that found by Snyder and Gackenbach. Further research is required to clarify these apparently contradictory results.

Snyder and Gackenbach also concluded that introversion was associated with lucidity ability. Gruber et al. (1995) found no difference in introversion–extroversion as measured by the 16PF second-order scales, whereas others have reported an association to introversion using the Keirsey Temperament Sorter. The latter scale conceptualizes introversion–extroversion differently than the 16PF, as a tendency to focus on the inner or outer world.

Summary

The results on individual differences are complex and often contradictory. At this point, the lack of effect sizes makes it difficult to evaluate the often conflicting results; a meta-analysis is clearly needed. Despite extensive research, it has not been possible to find individual-difference variables that predict lucid dreaming ability better than, for example, dream recall does. Most of the studies reviewed above treated dream recall merely as a confounding variable, a covariate to be removed. A question for future research is whether the proportion of lucid dreams recalled is constant for individuals low and high in dream recall. Moreover, understanding the relationship between dream recall and lucid dreaming ability is made especially difficult by the fact that lucid dreams appear to be more memorable than nonlucid dreams.

Another problem with this type of research is that lucidity frequency can vary widely within the same individual. For example, over the course

of 20 years, the frequency of lucid dreaming in one of the authors (LaBerge) has varied from several lucid dreams per night to less than one per month. Thus, the same person might fall into "frequent lucid dreamer" or "nonlucid dreamer" categories at different times because of factors such as motivation and energy.

PSYCHOPATHOLOGY

There is no indication from either the individual-differences literature or the clinical literature of any relationship between psychopathology and the ability to dream lucidly. In fact, where individual-difference correlations were significant, they tended to favor an association between lucidity and mental health (Snyder & Gackenbach, 1988). For instance, Gruber et al. (1995) concluded "that frequent lucid dreamers, characterized by the unusual degree of control they often exhibit within the dream state, are also better able to manage or control various aspects of cognitive, emotional, and social functioning while awake" (p. 7). Certainly, to the extent that lucid dreaming is an early manifestation of sleep witnessing, there is ample research to show its psychological benefits. Research to date on lucid dreaming that has focused on personality has not used many scales that measure psychopathology. In a subscale of the 16PF that measures neuroticism, no group differences were found between lucid and nonlucid individuals (see Snyder & Gackenbach, 1988). At present, there is little reason to believe that dreaming lucidly is more likely to cause psychopathology than dreaming nonlucidly.

CLINICAL ISSUES

We believe that lucid dreaming has considerable potential as a psychotherapeutic tool. Over a century ago, Hervey de Saint-Denys (1859/1982) used lucidity to cure himself of a terrifying recurrent nightmare:

> One night, ... when the dream returned for the fourth time, at the moment my persecutors were about to renew their pursuit, a feeling of the truth of the situation was suddenly awakened in my mind; and the desire to combat these illusions gave me the strength to overcome my instinctive terror. Instead of fleeing, ... I resolved to contemplate with the closest attention the phantoms that I had so far only glimpsed rather than seen. ... I fixed my eyes on my principal attacker, who somewhat resembled the grinning, bristling demons which are sculpted in cathedral porticos, and as the desire to observe gained the upper hand over my emotions, I saw the following: the fantastic monster had arrived within several feet of me, whistling and cavorting in a manner

> which, once it had ceased to frighten me, appeared comic. I noted the claws on one of its paws, of which there were seven, very clearly outlined. The hairs of its eyebrows, a wound it appeared to have on its shoulder and innumerable other details combined in a picture of the greatest precision. . . . The attention I had concentrated on this figure had caused its companions to disappear as if by magic. The figure itself seemed to slow down in its movements, lose its clarity and take on a woolly appearance, until it changed into a kind of floating bundle of rags . . . and then I awoke. [The nightmare did not recur thereafter.] (pp. 58–59)

Tholey (1988) also observed that when the dreamer courageously and openly looks at hostile dream figures, their appearance often becomes less threatening. Indeed, the great majority of people say that, more often than not, becoming lucid in a nightmare makes them feel better afterward. In a survey study of 698 college students, Levitan and LaBerge (1990) found that 81% of the 505 volunteers who reported having had both lucid dreams and nightmares claimed that becoming lucid in a nightmare usually improved the outcome. Lucidity was about seven times more likely to make nightmares better than worse.

Based on his work on lucid dreaming for personal integration, Tholey (1988) listed four advantages of lucid, as opposed to nonlucid, dreams:

1. Because of the lucidity, the dream ego is less afraid of threatening dream figures or situations. For this reason, there is less resistance to confrontation with these figures or situations.
2. Using appropriate techniques for manipulating lucid dreaming, the dream ego can get in touch with places, times, situations, or persons that are important to the dreamer.
3. Especially in dialogue with other dream figures, the dream ego is able to recognize the present personality dynamics and their etiology (diagnostic function).
4. Through appropriate activity of the dream ego, a change of personality structure is possible (therapeutic or creative function). (p. 267)

Dane (1984) described such lucid dream work as *intrapersonal* psychotherapy, in which one's own waking and dreaming consciousnesses are used therapeutically, and Sattler (personal communication, 1991) argued that this approach is in some ways preferable to traditional interpersonal psychotherapy.

Tholey (1988) researched the effect of various attitudes toward hostile dream characters, concluding that a conciliatory approach, involving engaging in dialogues with hostile dream characters, is most likely to result in a positive outcome. He found that when dreamers tried to reconcile with hostile figures, the figures often transformed from lower order into

higher order creatures, or from beasts or mythological beings into humans, and that these transformations frequently allowed the dreamers to immediately understand the meaning of their dreams. Furthermore, conciliatory behavior toward threatening figures generally causes the figures to look and act in a more friendly manner. For example, Tholey himself dreamed:

> I became lucid, while being chased by a tiger, and wanted to flee. I then pulled myself back together, stood my ground, and asked, "Who are you?" The tiger was taken aback but transformed into my father and answered, "I am your father and will now tell you what you are to do!" In contrast to my earlier dreams, I did not attempt to beat him but tried to get involved in a dialogue with him. I told him that he could not order me around. I rejected his threats and insults. On the other hand, I had to admit that some of my father's criticism was justified, and I decided to change my behavior accordingly. At that moment my father became friendly, and we shook hands. I asked him if he could help me, and he encouraged me to go my own way alone. My father then seemed to slip into my own body, and I remained alone in the dream. (Tholey, 1988, p. 265)

Several clinically oriented articles have appeared since Tholey's (1988) review. Hall and Brylowski (1991) compared lucid dreaming to the Jungian conception of active imagination. They pointed out that in lucid dreaming a symbolic statement is first produced, and then, when the dream ego takes a respectful attitude toward the symbol, a transformation can occur. They explained, "Both lucid dreaming and active imagination may be used to bypass personal resistances or defenses of rationalization. As a technique in psychotherapy, lucid dreaming may be particularly useful with borderline and with obsessive–compulsive patients" (p. 35). This interesting observation could be evaluated through controlled clinical outcome research with these types of patients.

Other therapeutic discussions include the integration of lucid dreaming and hypnotherapy (Klippstein, 1986) and a redefinition of psychoanalytic topographic theory of consciousness (Wolman, 1989). Most therapists have focused on the use of dream lucidity as a tool in nightmare management, understanding, and integration (Abramovitch, 1995; Brylowski, 1990; Evers & Van de Wetering, 1993; Galvin, 1993; Holzinger, 1995). Tholey (1988) also studied the use of lucid dreaming as a means of resolving unfinished business, such as in the case of the death of a loved one (see LaBerge & Rheingold, 1990, for examples).

Although there is no indication of a relationship between lucid dreaming and psychopathology, that does not mean that there may not be risks for unstable individuals in pursuing dream lucidity, just as there are risks for unstable individuals pursuing any activity, including nonlucid dreaming, and ordinary social life. Insofar as lucid dreaming is regarded as

a form of meditation (Hunt, 1995), the clinical concerns regarding the practice of meditation might be relevant to the practice of lucid dreaming.

It seems prudent that one should use the lucid dream to work through personal issues before seeking spiritual "transcendence," a point that has been repeatedly emphasized by LaBerge (1985; LaBerge & Rheingold, 1990). All too many lucid dreamers, from van Eeden (see LaBerge, 1985, p. 175) on, who have prematurely sought to transcend the self before accepting the "shadow" (i.e., the destructive or undesirable aspects of the person) have experienced demonic nightmares (see also Gackenbach et al., 1992, 1995; Kelzer, 1987). The solution we propose is to strive for self-integration before self-transcendence (LaBerge, 1985; LaBerge & Rheingold, 1990). Studies that examine the nature and sequence (e.g., self-integration before self-transcendence) of lucid dream work would help establish or disconfirm clinical observations and insights regarding the role of lucid dreaming in psychotherapy and personal growth.

THEORIES

The major psychological and psychophysiological frameworks that have emerged to explain dream lucidity are briefly delineated in this section. A more detailed review of some of these theoretical perspectives can be found in Gackenbach (1991b) and in two books by Hunt (1989, 1995).

Psychological approaches have been taken by LaBerge (1985; LaBerge & Rheingold, 1990), Blackmore (1988), and Tart (1988), all of whom viewed lucid dreaming in terms of information processing. LaBerge viewed lucidity in sleep as primarily a cognitive skill, whereas Blackmore and Tart put more emphasis on a model of self-awareness. The theoretical work of Tholey (1988, 1989), from the German Gestalt school of psychology, is conceptually similar to an information-processing view. Related to these approaches is the conceptual work of Kahan and LaBerge (1994), who treated dream lucidity as a form of metacognition.

The importance of self in conceptualizing lucid dreaming is central to the work of Moffitt and colleagues (e.g., Purcell, Moffitt, & Hoffmann, 1993). Hunt (1989) conceptualized lucidity in sleep as one form of intensified dreaming along a self-reflectiveness dimension. Gackenbach's (1991a) perspective is developmental, beginning where Purcell et al. end (i.e., lucid dreaming) and argues that lucidity is merely a bridge to post–formal operation functioning within dreaming sleep. LaBerge (1985), however, disagreed with Gackenbach's assumption that dream witnessing is necessarily a more adaptive state of consciousness than fully lucid dreaming. In his view, the ideal is not to completely detach from the dream, but to be "*in* the dream, but not *of* it" (p. 107).

Psychophysiological perspectives on lucid dreaming include the work of

oil on masonite. Courtesy of Walter Orthen.

LaBerge (1980a; 1990), who showed that lucidity requires a relatively highly activated brain in REM sleep. Two psychophysiological models have been proposed connecting EEG and lucidity based on the assumption of an association of lucidity to meditation. Hunt and Ogilvie (1988) and Ogilvie et al. (1982) examined the relationship of lucidity to alpha power, whereas Gackenbach (1992) emphasized EEG coherence. Travis (1994) used both indices in his "junction point" model. Snyder and Gackenbach (1988, 1991) viewed lucidity from the framework of spatial skills, especially as implicated in vestibular system functioning. Globus (1993) considered the phenomenon in terms of chaos theory and neural networks.

LaBerge and DeGracia (in press) identified three distinct factors involved in lucid dreams, OBEs, and other related states: (a) a *reference-to-state*, the metacognitive recognition that one's current state of consciousness is different from one's usual waking state; (b) a *semantic framework*, the belief system used by the individual to conceptualize the nature of the experience; and (c) a *goal-options context*, containing actions used to induce such experiences or actions exercised within such experiences. In these terms, OBEs and lucid dreams share a common reference-to-state but differ in semantic frameworks and goal-options context.

Transpersonal psychology has also incorporated dream lucidity into its theoretical perspective (Walsh & Vaughan, 1993), drawing on lucidity's historical connection to a variety of religious perspectives, especially in the Tibetan Buddhist literature (Norbu & Katz, 1992; Gyatrul, 1993). Most of the empirical work connecting consciousness in sleep to the transpersonal perspective was done by Alexander and colleagues (1987). A recent study by this group, demonstrated that in meditators who report witnessing sleep half the night or more, the EEG associated with relaxed waking could be seen superimposed on the more characteristic EEG of deep sleep (Mason, 1995; Mason, Alexander, Travis, Gackenbach, Orme-Johnson, 1995).

Many of the approaches described above have been integrated by Hunt (1995), who placed dream lucidity within a range of consciousness experiences. According to Hunt, lucid dreaming, along with a few other key experiences, bridges contemporary cognitive views of consciousness and the transpersonal perspective.

> The cross cultural commonalities in hallucinatory geometric designs (Jung's mandala images), synesthesias, out-of-body imaginal states and lucid dreaming, and the 'white light' experiences of shamans and meditators seem to indicate that such nonverbal states have a common underlying structure. (p. 28)

A key idea in Hunt's (1995) thesis is the notion of cross-modal synesthesias as presymbolic in the development of cognition and thus at the heart of the white-light–type experiences characteristic of some mystical experiences and, at times, lucidity in sleep. Hunt argued that such expe-

riences are neither regressions to infantile narcissism nor reducible to primitive cognitive mechanisms.

METHODOLOGICAL ISSUES

Developing an appropriate methodology for the study of such phenomena as mental imagery, hallucinations, dreaming, and conscious processes in general requires solving a number of significant problems. Although subjective reports provide the most direct accounts of the contents of consciousness, they are difficult to verify objectively, and introspection is far from an unbiased, direct, or error-free process of observation.

There are several strategies available to increase our confidence in the reliability of subjective reports of lucidity (see also Pekala & Cardeña, this volume, chap. 2). First, Snyder and Gackenbach (1988) emphasized the importance of verifying that participants understand the concept of lucidity by requiring the inclusion of a recognition phrase in a sample lucid dream report (i.e., " . . . and then I realized I was dreaming"). This procedure is especially important in large survey work, because in research up to 50% of volunteers have been discarded when this criterion has been used. Another empirical necessity in survey work comparing lucid to nonlucid dreamers or dreams is controlling for dream recall given the fact that high dream recall has been shown to be by far the strongest single predictor of lucid dreaming ability in untrained participants (Snyder & Gackenbach, 1988).

Another approach would be to use highly trained (and in the context of dream research, lucid) volunteers who are skillful and accurate observers of their consciousness. In addition, one can use psychophysiological methodology, because the convergent agreement of physiological measures and subjective reports provides a degree of validation to the latter (Stoyva & Kamiya, 1968).

As noted, psychophysiological methodology has been essential to the laboratory study of lucid dreaming. More broadly, the psychophysiological approach was also responsible for the explosion of dream research following the discovery of REM sleep (Aserinsky & Kleitman, 1953) and the subsequent association of REM with dreaming (Dement & Kleitman, 1957). Although the standard psychophysiological paradigm of dream research yielded fruitful results for many years (see Arkin, Antrobus, & Ellman, 1978), it possessed an important deficiency: There was no way of making certain that participants (assuming they were nonlucid) would actually dream about what the researchers were interested in studying. Presleep manipulations producing predictable and reliable effects on dream content have not been very effective (Tart, 1988). Thus, researchers could only wait and hope that eventually a dream report would turn up with what

one was looking for. This was really no better than a "shot-in-the-dark" approach; for this and other reasons, some dream researchers had advocated abandoning the psychophysiological method in favor of a purely psychological approach. For example, Foulkes (1980) claimed that "psychophysiological correlation research now appears to offer such a low rate of return for effort expended as not to be a wise place for dream psychology to continue to commit much of its limited resources" (p. 249). This conclusion may well be justified, but only insofar as it refers to the psychophysiological approach as traditionally practiced, using nonlucid participants. The use of lucid dreamers overcomes the basic difficulty of the old methodology and may revitalize the psychophysiological approach to dream research.

Although eye movement signaling clearly is an important and useful methodology, it is not without its problems. For example, moving one's gaze from side to side obviously affects what one sees in the dream, sometimes disrupting the visual imagery enough to cause an awakening. Moreover, eye movement signals of any complexity are not easily executed or reliably distinguished on the polygraph record.

Other types of signals, such as finger movements monitored by the "data-glove" technology used in virtual reality devices, might be less disruptive and also capable of transmitting information more rapidly and efficiently than more conventional modes of signaling. It might be possible for lucid dreamers to communicate by means of hand gestures similar to sign language, allowing "on-the-scene" reports from the dream world.

Several researchers have used qualitative methods to study lucidity (Gackenbach et al., 1992), generally single-case studies, although quantitative methods have been applied in case studies (Gackenbach et al., 1995; Gillespie, 1988). The advantage of the qualitative approach is that it allows "sensitizing" concepts (aspects of the narrative that seem best to characterize it) to emerge from the material somewhat independent of the expectations of the investigator.

Qualitative methods also allow more sensitivity to the context in which the experience occurs. In work on the central Alberta Cree Indians (Gackenbach, 1995; Gackenbach & Kuiken, 1995; Gackenbach & Prince, 1992), lucid dream content emerged in the diary and interview materials, but it was the context, as associated with other transpersonal dream themes, that was most important to understanding them. In one series of intensive interviews with a Cree dream counselor, it became clear to Gackenbach (1992–1993) that although nominal lucidity was common, it was also superfluous to the Cree understanding of the importance of dreams. This interpretation would not have emerged in a purely quantitative inquiry, in which only the counselor's remarkable high incidence would have been noted or, perhaps, completely missed, because it took many conver-

sations before the counselor even began to understand the language used to describe lucidity.

CONCLUSION

A parallel can be drawn (LaBerge, 1990) between the initially anomalous appearance of lucid dreaming and the state that has been called *paradoxical sleep* (i.e., REM sleep). The discovery of REM sleep, with its many anomalous characteristics (e.g., highly activated brain, autonomic nervous system variability, and muscle atonia) required the expansion of the concept of sleep. The evidence relating lucid dreaming to REM sleep reviewed above would seem to require a similar expansion of the concept of dreaming and a clarification of the concept of sleep: Lucid dreaming may well prove the most anomalous feature of paradoxical sleep.

Fenwick et al. (1984) showed that a participant was able to perceive and respond to environmental stimuli (electrical shocks) without awakening from his lucid dream. This result raises a theoretical issue: If we accept perception of the external world as the essential criterion for wakefulness (LaBerge, Nagel, Dement, & Zarcone, 1981), then we are forced to conclude that the volunteer must have been at least partially awake. On the other hand, when environmental stimuli are incorporated into dreams without producing any subjective or physiological indications of arousal, it appears reasonable to speak of the perception as having occurred during sleep.

Furthermore, it may be possible, as LaBerge (1980a) suggested, for one sense to remain functional and awake while others fall asleep. Similarly, Antrobus et al. (1965) argued that the simple question "asleep or awake?" may not have a simple answer:

> Not only do sleeping and waking shade gradually into one another but there is only limited agreement among the various physiological and subjective operations that discriminate between sleeping and waking. At any given moment, all systems of the organism are not necessarily equally asleep or awake. (pp. 398–399)

LaBerge (1990) summed up the situation as follows:

> As long as we continue to consider wakefulness and sleep as a simple dichotomy, we will lie in a Procrustean bed that is bound at times to be most uncomfortable. There must be degrees of being awake just as there are degrees of being asleep (i.e. the conventional sleep stages). Before finding our way out of this muddle, we will probably need to characterize a wider variety of states of consciousness than those few currently distinguished (e.g. "dreaming," "sleeping," "waking," and so on). (pp. 121–122)

In the context of the present chapter, the list must clearly include such

anomalies of sleep as lucid dreaming, witnessing dreaming, witnessing sleep, and OBEs.

Lucid dreaming is an experience ideally situated to cast light on a range of states of consciousness, both ordinary and anomalous. Further work needs to be done in a variety of areas, including developing techniques for having and optimally making use of lucid dreams, improving the understanding of the phenomenology and neuroscience underlying the experience, and elucidating the individual differences associated with the spontaneous emergence and talent for developing lucidity.

A relatively neglected area of great interest is the relationship between the body of knowledge surveyed in this chapter and the extensive Tibetan Buddhist experiences with lucid dream yoga (Gyatrul, 1993; Norbu & Katz, 1992). As has been seen above, Western scientists have been studying lucid dreaming for little more than 20 years. In contrast, the Tibetan Buddhists have practiced a form of lucid dreaming known as "the yoga of the dream state" for more than a thousand years. Thus, Western science could clearly benefit from a study of dream yoga.

The Tibetan Buddhists' point of view reverses the order of valuation of the waking and dreaming states. Whereas Westerners consider the waking state the only reality and dreams to be unreal and unimportant, Buddhists believe the dream state to have greater potential for understanding and spiritual progress than the so-called waking state, and both states to be equally real or unreal. In addition, according to Tibetan lore, the practice of yoga provides essential preparation for the dreamlike after-death state, allowing the yogi to become illuminated at the point of death or to choose a favorable rebirth (Gyatrul, 1993).

The Tibetan dream yoga consists of four stages (Evans-Wentz, 1958): (a) comprehending the nature of the dream (i.e., that it is a dream and thus, a construction of the mind); (b) practicing the transformation of dream content until one experientially understands that all of the contents of dreaming consciousness can be changed by will and that dreams are essentially unstable; (c) realizing that the sensory experiences of waking consciousness are just as illusory as dreams and that, in a sense, "it's all a dream"; and (d) meditating on the "thatness" of the dream state, which results in union with a "clear light."

The first three stages all find parallels in the experiences of Western lucid dreamers and current constructionist psychological theories of mind. It is not yet clear to what extent the fourth stage can be studied by current scientific methodology.

Tibetan Buddhists and a number of other specialists in "inner states" (e.g., Rudolf Steiner, Sri Aurobindo, Ibn El-Arabi, to name a few; see LaBerge, 1985, for details) regard achieving continuity of consciousness among waking, dreaming, and dreamless sleep as an essential step to higher

personal development. Studying conscious transitions among these three states seems an extremely promising area of investigation.

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