

Development and Evaluation of an Objective
Rating System and a Presleep Induction Procedure
for Lucid Dreams

by

Donald W. Stewart

A thesis
presented to the University of Manitoba
in partial fulfillment of the
requirements for the degree of
Master of Arts
in
Psychology

Winnipeg, Manitoba

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D.W. Stewart

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ABSTRACT

Lucid dream (LD) investigation is primarily made difficult for two reasons. First, the phenomenon lacks a reliable operational definition. Researchers typically describe lucid dreaming as an awareness of dreaming while the dream is in progress, but different researchers operationalize lucidity in different ways, making comparisons across studies impossible. To compound the problem, many studies have relied upon retrospective self-estimates of LD frequency as a means of subject selection and assignment to experimental conditions. A second problem with the investigation of LDs is their low frequency of spontaneous occurrence. Various researchers have sought to ameliorate this state of affairs by devising procedures for the voluntary induction of LDs, but these techniques have, for the most part, proven to be ineffective and/or difficult to implement. LaBerge has devised a technique for the mnemonic induction of lucid dreams (MILD) which shows promise, as it is suitable for at-home practice and seems effective, but it makes demands of the subject which throw into question the extent to which it may be useful for those who neither awaken regularly from their dreams nor desire to disrupt their sleep with a complicated practice regimen. The present study sought to address these

problems by conducting two investigations. The aim of the first investigation was to evaluate the efficacy of a Lucid Dream Rating System (LDRS) developed in an attempt to establish a reliable instrument for operationally defining degree of reported lucidity. Toward this end, 179 Introductory Psychology students were asked to describe one LD they had experienced, and these reports were then independently rated for lucidity by two trained judges. The inter-rater reliability for the LDRS was calculated using the Kappa statistic, and the results obtained indicated that the judges were using the system with a statistically significant degree of consistency. The aim of the second investigation was to evaluate the efficacy of an easier to follow and less disruptive version of the MILD technique. The "MILD-R" procedure was evaluated using an eight-week A-B-A withdrawal single-case experimental design with five subjects. Time-series analyses conducted across the blindly-rated daily LDRS scores for each subject indicated that MILD-R practice did exert a significant influence over the degree of lucidity reported by some subjects. These results are discussed within the general context of LD research, and implications for future research and clinical application are outlined.

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Chapter I

INTRODUCTION

Philosophers and literati have for thousands of years speculated on why we dream and on what dreams mean. Yet, throughout the ages, relatively little interest has been expressed in the intrinsically fascinating phenomenon of lucid dreams (LDs). Lucid dreams may be most simply defined as those dreams in which one realizes that one is dreaming. The term "lucid" seems an appropriate adjective because its connotations of clarity and rationality are among the hallmarks of the LD experience. An example may help to illustrate this point:

I dreamed that my wife and I awoke, got up, and dressed. On pulling up the blind, we made the amazing discovery that the row of houses opposite had vanished and in their place were bare fields. I said to my wife, 'This means I am dreaming, though everything seems so real and I feel perfectly awake. Those houses could not disappear in the night, and look at all that grass.' But though my wife was greatly puzzled, I could not convince her it was a dream. 'Well,' I continued, 'I am prepared to stand by my reason and put it to the test. I will jump out of the window, and I

shall take no harm.' Ruthlessly ignoring her pleading and objecting, I opened the window and climbed out onto the sill. I then jumped, and floated gently down into the street. When my feet touched the pavement, I awoke. My wife had no memory of dreaming. (Fox, 1962, quoted in Blackmore, 1982, p. 299)

Here the full range of the LD experience is evident. There is at first a questioning of the reality of the event, followed by an awareness that it is so incongruent with reality that it must be a dream. In this case, a feeling of control over the course of the dream then develops, followed by an active demonstration of that control. The importance of each of these events to the determination of the lucid state will be outlined in a later section.

Recognizing that you are dreaming is not a routine event, yet it is one with which many people are familiar. Blackmore (1982), for example, reports that 73% of her sample (192 male undergraduates) claimed to have had at least one LD, but that less than half of these subjects had over the course of their lives experienced more than five such events. On a more global level, Gackenbach (1984) estimated that 58% of the population has had at least one LD, but that only 21% have LDs once or more per month.

Given their relatively low frequency of occurrence, the laboratory investigation or clinical application of LDs does indeed seem, as LaBerge (1980a) has suggested, a "prohibitively improbable event" (p. 138). Although various researchers (e.g., Garfield, 1975a; Hearne, 1981; Tholey, 1983) have sought to ameliorate this state of affairs by devising techniques for the voluntary induction of LDs, their attempts have met with varying degrees of success. One of the more successful induction procedures is the mnemonic technique developed by LaBerge (1980a, 1980b, 1981), but it is limited in its applicability in that it requires special abilities on the part of the dreamer in terms of frequent spontaneous awakenings from dreams and a desire to disrupt sleep in order to practice it.

The present study sought to evaluate an easier to follow and less disruptive LD induction procedure (developed from the essence of LaBerge's mnemonic technique), and it also sought to undertake an assessment of the reliability of a system by which LDs could be objectively rated.

The LD rating system used in the present study was originally conceived for the limited purpose of quantitatively evaluating the effects of practicing the revised induction procedure. It became apparent, though, that the establishment of a reliable operational definition for LDs is at least as important as the development of an induction

procedure, and it is for this reason that the present study focuses as much on the former goal as it does on the latter.

Before describing the results of the present study, it is necessary to provide a more complete context for the research by outlining the lucid dream literature in some detail. This material is presented in several sections. The boundaries between the sections are not firm, and there is some overlap, but this is probably the most meaningful way of proceeding, and it also reflects the current state of lucid dream research.

Defining Lucid Dreams

Lucid dreams have no standard operational definition. There are likely several reasons for this state of affairs, but perhaps the most compelling one concerns the lack of an objective means of assessing dream content. (Here I am using the term "objective" to refer to a manner which does not ultimately depend upon the subject's waking report of the dream.) Because dreams are primarily a covert phenomenon, it is impossible to directly ascertain the veridicality of subjects' reports of their sleep mentation. In an effort to reduce this problem, some researchers have tried to increase the objectivity of LD measurement by training subjects to physically "signal" when they feel they are having a lucid dream, but self-report still plays an integral role in this approach.

In one series of studies using a physical indicant of lucidity (LaBerge, 1981; LaBerge, Nagel, Dement, & Zarcone, 1981a, 1981b), subjects were instructed to initiate a particular pattern of left-right fist clenches when they became lucid. The lack of muscle tonus during rapid eye movement (REM) sleep made actual fist clenches impossible, but changes in wrist electrical potential as a result of the attempted fist clenches could be measured. Wrist electromyogram (EMG) records obtained during REM periods were then used to corroborate the subjects' waking reports of lucidity. Similar work has also been conducted with respiration rate (LaBerge & Dement, 1982) and with eye movements (Hearne, 1981) as indices of the onset of lucidity.

While these approaches are of obvious utility in the laboratory, they are less useful in other settings. Techniques for home telemetry have been developed (e.g., Hearne, 1981), but these methods are also limited in their applicability in that they run the risk of turning the home into a "laboratory" of sorts, and this can have an impact on the content of subjects' dream reports in terms of sexual, aggressive, and other themes (Domhoff, 1969; Domhoff & Kamiya, 1964; Hall & Van de Castle, 1966a). This was probably not a concern for the researchers involved in the studies outlined above, as their aim was to demonstrate that LDs are appropriately defined as a REM phenomenon, but those who are interested in other aspects of lucidity should probably avoid

any procedure which has the potential to bias dream reports in a systematic manner.

For this reason, the present study used written home dream reports, rather than physiological or other measures, as the method for obtaining lucidity data from the training subjects. It can, of course, be argued that any method of recording dreams inevitably influences them to some degree (e.g., Grinstein, 1983), but home dream recording is perhaps the least disruptive means, and, as such, it seems among the most desirable ways of collecting information regarding the content of subjects' dreams.

Hempel (1966) has discussed the caution which must be exercised when using subjective measures (such as self-report) in scientific research, suggesting that these approaches might yield results which are not replicable. However, the subjectivity of self-report was tempered in the present study by the use of external ratings of lucidity. That is, rather than relying upon the subjects to simultaneously report the dream and to decide to what extent it was lucid, the subjects simply reported their dreams, and these reports were later rated by a reliable judge according to a standardized set of criteria. (The subjects also rated their own dreams in a post hoc fashion; this will be discussed in a later chapter.)

A subjective approach, then, may not be the most scientifically sound method of investigation, but, in the area of lucid dream research, it is, to some extent, unavoidable (although the present study took steps to objectify the assessment of lucidity). Indeed, it is probably as a result of the difficulties associated with defining LDs in other than a subjective manner that descriptions of the phenomenon evidence such a wide degree of variation.

Tart (1979), for example, describes LDs as those dreams in which the dreamer is aware of dreaming, can clearly recall waking life, and feels in full command of intellectual and motivational abilities. LaBerge (1980b) has described the experience in similar fashion, suggesting that lucid dreams are those in which the dreamer can reason clearly, remember freely, and act volitionally, all while continuing to dream vividly. At other times, though, LaBerge has simply described LDs as those dreams in which the dreamer knows that he or she is asleep (1980a), or as dreaming while being explicitly aware of dreaming (1979). Gackenbach, Sachau, and Rokes (1982) also defined lucidity as an awareness of dreaming while in the dream state, as did Hoffman and McCarley (1980), who described the experience as being "conscious" of dreaming while in a dream. Ogilvie, Hunt, Sawicki, and McGowan (1978) described lucid dreaming as being in a continuing dream and knowing it as such, although they (Ogilvie, Hunt, Tyson, Lucescu, & Jeakins, 1982a) later ap-

pended to this statement a clause indicating that the dreamer may also be able to control the dream content. Garfield (1975a) characterized LDs as those dreams in which she was aware of being in a dream state, could maintain it, and could change or control ongoing behaviors during the dream. And, finally, Hearne (1982a, 1982b) described lucid dreams as those in which the dreamer has the insight to realize at the time that the experience is a dream.

Each of these definitions of the lucid state seems to agree that the key determinant of lucidity is an awareness on the part of the dreamer that what he or she is experiencing is a dream. There is less convergence, though, on the point of how important control over the course and content of the dream is to determining lucidity.

A useful way of describing the range of the LD experience has been provided by Ogilvie et al. (1982b), who have proposed that lucidity may best be conceptualized as a continuum ranging from a prelucid state at one pole to a state of dream control at the other. By adopting such a perspective, it becomes possible to encompass a wide range of experiences under the label "lucid dream." These experiences differ mainly in the extent to which the dreamer is aware of the dream and of the potential control over it which he or she might choose to exercise. For example, a dream in which the dreamer is reportedly aware of dreaming, yet perceives

no control over the situation, would be deemed lucid, but to a degree lesser than that of a dream in which control was reportedly exercised. Similarly, a dream in which the dreamer reportedly questioned the reality of his or her experience would also be considered lucid, but it would fall more toward the prelucid end of the continuum. This conceptualization of lucidity seems to be of heuristic value, and it is for this reason that I adopted a similar perspective in an attempt to develop a reliable operational definition of LDs.

The need for a system by which lucid dreaming may be reliably operationalized is apparent from the disparate ways in which LDs are defined in the literature. At present, there is no way of knowing whether researchers are in fact referring to the same phenomenon when they speak of LDs. Some may mean only that the subject has become aware of dreaming, while others may mean that the subject has reported a volitional manipulation of the course of the dream. The development of a reliable lucid dream rating system would serve to advance research in the area by ensuring a greater degree of consistency in LD measurement across different researchers.

The basic premises underlying the operational definition of lucidity which was used in the present study (and is more fully described in Chapter II) are as follows:

1. In a lucid dream, the dreamer is to some extent aware that what he or she is experiencing is a form of ongoing sleep mentation (e.g., LaBerge, 1979, 1980a).

2. A frequent corollary of dream lucidity is a perception by the dreamer that he or she possesses the ability to exert some measure of control over the course and/or content of the dream (e.g., Garfield, 1975a; Hearne, 1981; LaBerge, 1980b, 1981).

3. The likelihood of the dreamer choosing to volitionally alter the dream increases more or less proportionately with the degree to which he or she is certain that what is presently being experienced is a dream (e.g., Green, 1968; Ogilvie et al., 1982b).

The issue of whether lucidity reflects a special class of nocturnal events, or is simply one element of dream content, will be elaborated upon in Chapter IV.

History of Lucid Dream Research

The Greek philosopher Aristotle (384 - 322 B.C.) was one of the earliest "Western" thinkers to take an interest in dreaming, and he was probably the first of these to note we sometimes dream while knowing that we are dreaming (LaBerge, 1981; LaBerge et al., 1981a, 1981b). According to Rampa (1969) and Anderson (1979), though, Aristotle's observations were predicated by the LD rituals of ancient Tibetan

Buddhists. Anderson describes how one of the practices of Tibetan Buddhists, past as well as present, is to cultivate an awareness of dreaming while the dream is in progress. The aim of this practice, Anderson states, is to allow one to transcend the physical body and to thereby experience something of the infinite. Ultimately, Anderson claims, one should strive to meditate in a lucid dream, for one might then gain insights into the universe not readily achieved in a waking state.

These pseudomystical attributes of lucid dreaming (cf. Gillespie, 1983) were also hinted at by Van Eeden (1913), the first to apply the term "lucid dream" to the phenomenon. Van Eeden had devised a system of classifying dreams into nine fairly distinct but somewhat overlapping categories. He described lucid dreams as being highly pleasant and as generally involving floating or flying sensations. He reports they usually occurred between 5:00 and 8:00 a.m., with the dreamer having a clear waking recollection of the event. Van Eeden further reported that these dreams were rather frequent, and their overall effect was seen as very beneficial and sometimes premonitory. He stated that, "In these dreams the reintegration of the psychic functions is so complete that the sleeper remembers day-life and his own condition, reaches a state of perfect awareness, and is able to direct his attention and to attempt different acts of free volition." He goes on to say that, "The sleep, as I am able

confidently to state, is undisturbed, deep and refreshing" (p. 446). In addition, Van Eeden reported he was deeply aware of both his physical body and of his "astral" or "dream" body while experiencing a lucid dream, but, upon awakening, these sensations merged and what we might today call his out-of-body experience ended.

Van Eeden's views on lucid dreaming did not meet with uncritical acceptance. In an article drawing heavily from Van Eeden, Brown (1936) argued against the unnamed critics who proposed that dream lucidity was an artifact of waking. Brown suggested that in a lucid dream, a dreamer might very well dream of waking up, and that this occurrence was best regarded as an illusory or "false" awakening. According to Brown, these false awakenings were being misinterpreted by the critics as "true" awakenings, leading to the erroneous conclusion that LDs were nothing more than day-dreams interspersed between "true" dreams. Brown offered no alternate explanation of the lucid state, but did insist that "to experience it is to recognize it as a special mental condition not to be confounded with the reverie state, the hypnagogic state, or any other familiar state unless it be a kind of auto-hypnosis" (p. 66).

Freud (1900) also discussed the unique aspects of the lucid state. He suggested that a momentary failure of the censor mechanism allowed some threatening content to emerge

into "conscious" awareness during sleep. At this point it is too late to suppress the content, so the sleep state is protected by spurring the dreamer into recognizing that he or she is dreaming. By developing an awareness of dreaming, the event becomes less threatening, and the individual can thereby avoid the defensive maneuver of awakening.

While Freud appears here to be limiting the lucid experience to anxiety-provoking sleep mentation, he also describes individuals who are "quite clearly aware during the night that they are asleep and dreaming and who thus seem to possess the faculty of consciously directing their dreams" (p. 611). Freud goes on to discuss how a dreamer "of this kind" may, if dissatisfied with its progress, alter the course of a dream without waking, much like a playwright might choose any ending desired for a play. He gives as an example the case of the Marquis d'Hervey de Saint-Denys, who apparently had the ability to accelerate the course of his dreams and to give them any direction he chose. Freud suggested that in the Marquis's case, the wish to sleep had given way to another wish -- namely, to observe his dreams and enjoy them. Freud concluded that such a process was completely compatible with sleep conservation and also facilitated the waking recollection of dreams.

In 1968, Green published a text on lucid dreams, and her work might arguably be credited with giving impetus to

the current interest in the phenomenon. While Green's approach was primarily descriptive, providing a wealth of case-study reports, her work served to organize the largely unscientific literature on LDs which had predominated to that point, and it also provided an arena for speculation on lucid dreaming and related phenomena (e.g., recurring dreams; false awakenings). Moreover, her work was of heuristic value, for it offered prospects for future research; much of which has subsequently been conducted by LaBerge and others.

It was not until the late 1970s that the predominantly nonexperimental literature on LDs became supplemented by experimental research. As a result, many of the questions raised by the earlier students of lucid dreaming are still under investigation. For example, the relationship between LDs and flying dreams (Blackmore, 1982), time of night (Ogilvie et al., 1978; Ogilvie et al., 1982a, 1982b), depth of sleep (Ogilvie, Hunt, Kushniruk, & Newman, 1983), parapsychological phenomena such as ESP (Hearne, 1982b, 1982c), and other altered states of consciousness (Hunt, 1982; Ogilvie et al., 1978; Ogilvie et al., 1982b) remains the subject of research today. In addition, other issues -- such as lucid dreamers' personality and perceptual characteristics (Gackenbach, 1981; Gackenbach et al., 1982; Gackenbach, Snyder, McKelvey, McWilliams, George, & Rodenelli, 1981; Snyder & Gackenbach, 1981) -- have arisen in the interim.

Because it is only in the last five years or so that the experimental investigation of LDs has begun in earnest, research concerning lucid dreaming is still in its infancy, and progress has been slow. It was my hope that the development of a relatively easy to follow LD induction technique would facilitate research in the area by potentially increasing the incidence of lucid dreams, while the development of a reliable operational definition for LDs would serve to systematize the research by contributing toward greater consistency in LD measurement.

Why Study Lucid Dreams?

The rationale for undertaking a study in a particular area is sometimes difficult to elaborate. It is often a combination of (or compromise between) personal interest and pragmatism. In the case of lucid dreaming, the phenomenon itself is so compelling that few who have experienced it have not spent some time contemplating its nature. There are, though, several other reasons for the exploration of lucid dreaming aside from its intrinsic appeal.

In a lucid dream, a sort of conscious insight seems to emerge, and this has been conceptualized as akin to "being awake within the dream" (Hearne, 1981, 1982a, 1982b). By "being awake" it is not meant that the dreamer is in other than a sleep state, for this is clearly not the case (LaBerge et al., 1981; Ogilvie et al., 1983; Ogilvie et al.,

1978; Ogilvie et al., 1982a, 1982b), but rather that he or she has available all the cognitive resources of wakefulness while remaining asleep. There is anecdotal evidence to suggest these resources include access to short- and long-term memories, as well as the capacity for critical thinking (Green, 1968; Hearne, 1981), but at this point there is no experimental support for these claims.

It has been suggested (Ogilvie et al., 1982b) that the lucid state involves a simultaneous capacity for detached observation and self-reflection along with continued dream involvement. If this is true, it suggests that lucid dreamers may be able to give an "insider's account" of their dreams (Hearne, 1982a, 1982b). By purportedly maintaining possession of their critical faculties during dreams, lucid dreamers may be able to provide a more accurate report of their sleep mentation than many non-lucid dreamers. This implies that LDs may provide an opportunity for the dreamer to accurately report the results of, say, attempts to voluntarily influence the dream's course and/or content (Garfield, 1975a; Green, 1968; Hearne, 1982a). Because their seemingly unique property of conscious involvement allows for a more rational approach toward dreaming, LDs may provide an intriguing new paradigm for the investigation of dreams.

Of course, whether these reports of the dream experience are in fact more accurate than reports of non-lucid dreams is open to question, as is the extent to which knowledge of LDs is generalizable to non-lucid dreams. In the absence of any completely objective means of assessing dream content (i.e., one not relying on self-report), it is, as suggested earlier, necessarily difficult to evaluate the extent to which any dream report reflects the "actual" content of the dream. But, even if there is no evidence that LDs are recalled more accurately than non-lucid dreams, there is some evidence (LaBerge, 1981; Van Eeden, 1913) that they may be recalled more frequently, and this leads to a second reason for the exploration of lucid dreams.

In a typical dream study, the subjects are awakened during REM periods because such awakenings are "very likely the necessary condition on which all dream recall is predicated" (Koulack & Goodenough, 1976, p. 982). However, repeated awakenings may result in an interrupted sleep cycle. Due to the association between dreaming and stage of sleep, it seems very likely that the usual method of investigating dreams may be influencing the very phenomenon it sets out to measure (Domhoff & Kamiya, 1964; Freedman, 1972; Hall & Van de Castle, 1966a; Sampson, 1965). As a result, many dream reports may be contaminated by the experimental procedure.

Domhoff (1969), for example, found that multiple experimental awakenings led to lengthy but prosaic dream reports. He concluded that, even though they are often more brief, home dreams are "better" in that they usually contain more of the content in which dream researchers are typically interested. Domhoff does concede, though, that, for some purposes, the detailed but mundane laboratory reports may be the data of choice, and for this reason he recommends that the decision of home versus laboratory dreams be made on the basis of the questions the researcher is interested in answering. Later research (Weisz & Foulkes, 1970) has suggested that the differences between home and laboratory dreams may not be as great as originally thought, but that some differences in content do indeed exist.

Given the potential, then, for multiple experimental awakenings to affect the content of the dream report, any movement toward the home study of dreams via morning recall would seem of value. Besides reducing the likelihood of the experimental procedure influencing the dream, such a move would serve to increase the extent to which the results are generalizable from the environmental conditions under which the study was conducted to other environmental conditions.

Since the majority of people who dream never see the inside of a sleep laboratory, relying solely upon laboratory data for the investigation of dreams may lead to findings

which are less than completely generalizable to "real life" conditions. Lucid dreams may be of service in a shift toward the home study of dreams, as they seem to be reliably and accurately recalled upon awakening in the morning, making awakenings during the night unnecessary for their study. There are, though, at least two areas of concern with regard to the role of LDs in home dream research:

1. It remains to be seen if home LDs are an acceptable analogue to home non-lucid dreams. If they are not, then the results of dream research using LDs would hardly seem any more generalizable to *in vivo* non-lucid dreams than would non-lucid dreams obtained in the laboratory.
2. Even though lucid dreamers typically do not doubt the accuracy of their dream reports (e.g., Green, 1968; LaBerge, 1981; Van Eeden, 1913), it is quite likely that these reports are subject to the same limitations of recall as any other event. If this is the case, it would suggest, at the very least, that the accuracy of the LD report may decrease as the length of time between the event and the report increases. Moreover, it is possible that LDs are prone to some of the same mechanisms of distortion (e.g., confabulation; interference; secondary revision) as are non-lucid dreams, and the extent to which the critical capacity of the lucid dreamer is able to overcome these impediments seems the primary determinant of whether the "insider's account"

of the dream is to be viewed as a more desirable approach toward dream reporting than the traditional methods.

A third reason for the study of lucid dreaming concerns the notion that such a state provides a new paradigm for research into the physiological correlates of dream actions (LaBerge, 1983; LaBerge et al., 1981a). Freemont (1972) outlined the debate over whether or not the eye movements of REM sleep correspond to changes in visual imagery during sleep mentation, and he concluded that while there is some evidence to support the view of such psychophysiologic parallelism, it is not compelling. Koulack (1972) reached a similar conclusion, stating that although eye movements and the visual imagery of dreams might from time to time be related, the notion of a constant isomorphic relationship between REMs and visual imagery seems untenable given the number of studies yielding less than consistent results.

Wolpert (1968) suggested that the problem of isomorphism is difficult to resolve because only a minority of experimental subjects have the combination of introspective and expressive abilities necessary to register their internal subjective experience and to communicate it adequately to the experimenter. Accurate communication of dream content is required of studies investigating psychophysiologic parallelism because the experimenter needs a detailed description of the imagery in order to relate expected eye

movements to obtained electro-oculogram (EOG) records. It seems that lucid dreamers possess the requisite "introspective and expressive abilities," as evidenced by their apparently facile and detailed recall (e.g., Green, 1968; LaBerge, 1981), and in addition are able to exert volitional control over their dreams to an extent sufficient to carry out pre-planned activities that the experimenter can examine for observable correlates (e.g., LaBerge, 1981, 1983; LaBerge & Dement, 1982; LaBerge et al., 1981a, 1981b). As such, it seems that LDs may provide a useful new approach toward the investigation of psychophysiologic parallelism in dreams, although lucid dreamers may not be representative of all dreamers.

Another potential difficulty is that any psychophysiologic parallelism found in lucid dreams may be different from any which is present in non-lucid dreams, especially if the correlations recorded in the former are the result of volitional dream manipulations. Because the lucid state implies a sort of conscious involvement in the dream, whereby the dreamer may be aware of both his or her physical body and of his or her "dream" body (cf. Van Eeden, 1913), as it were, activities carried out during a lucid dream may not be equivalent to activities which spontaneously occur in the course of a non-lucid dream, or to those which occur in a lucid dream where the activity is not pre-planned. Planned activities in a lucid dream may thus reflect a conscious in-

vovement not present in non-lucid dreams, and hence may demonstrate isomorphic relationships more akin to those of the waking state than to those of non-lucid dreams. In this respect, it may be misleading to extend the findings from LD investigations to all dreams, but this is a question for future research to resolve.

A fourth reason for the investigation of lucid dreams involves their capacity to illuminate aspects of the dreamer's personality. If, as seems likely from the literature, a lucid dreamer is indeed able to choose the dream events that he or she would like to experience, then the particular events he or she chooses might be interpretable in light of individual differences. For example, the decision by a lucid dreamer to fly away rather than to face an uncomfortable dream situation (e.g., LaBerge, 1981), or to stop running and to confront the monster that is chasing him or her (e.g., Garfield, 1975b; Stewart, 1954), might yield insights into the dreamer's habitual modes of coping with stress, quite apart from any "symbolic" significance one might wish to read into the report.

The lucid dreamer's ability to select the dream events to be experienced means that LDs might be viewed as a kind of projective device in that they meet the criterion of evoking from the individual "what is in various ways expressive of his private world and personality process" (Frank,

1948, p. 47, quoted in Rabin, 1981, p. 10). However, it appears there may be some limitations to the events a lucid dreamer can choose and still remain asleep. Hearne (1981, 1982a, 1983), for example, suggests there may be certain imagery constraints, such as level of imagery brightness, which cannot be violated by the dreamer without his or her awakening. These potential limitations to control notwithstanding, it is possible that presleep or environmental events may also influence the lucid dream experience.

In terms of environmental events, the only work done to date has been with the intent of using such stimulation in the induction of LDs. Hearne (1981) used electrical stimulation of the wrist as a cue to remind dreamers to consider whether or not they were dreaming, and he has obtained some promising results. LaBerge (1981) reports that having a tape recording of his voice (reciting "Stephen, you're dreaming") played during REM periods led to incorporation of the sentence into the dream and to subsequent lucidity, but he awoke almost immediately thereafter. There is no evidence, however, concerning the potential influences of spontaneous environmental events (such as temperature change, for example) on the LD process. This seems like an area which may be profitably explored, especially given the number of studies demonstrating some sort of incorporation of environmental stimuli into ongoing non-lucid dreams (e.g., Dement & Wolpert, 1958; Koulack, 1969).

The extent to which presleep or waking activity affects lucid dreaming has not been systematically investigated. Informal observation has indicated that, in at least one case, a day of "high level arousal" was a consistent precursor of lucid dreaming (Garfield, 1975a), but the extent to which this is a general phenomenon is unknown. However, based on the evidence that individuals under stress have more salient dreams (Cartwright, 1978), it would seem reasonable to suggest that lucidity may be more likely if an individual is under stress (cf. Moss, 1984). This hypothesis arises from the notion that salient dreams often tend to be bizarre, and bizarreness or incongruity seems to act as a "trigger" of sorts for lucidity in some persons (Hearne, 1981). Given the apparent potential, then, for presleep stress to have a lucidogenic effect, it seems that the area of waking activity and LDs may be an interesting one to explore, especially considering the evidence supporting a relationship between non-lucid dream content and waking activity (e.g., Breger, Hunter, & Lane, 1971).

Regardless of the extent to which these various internal and external factors affect the lucid dream experience, it still seems that the lucid dreamer has a great deal of potential control over the dream. Daily stress, environmental impingements, or personality style might all influence the stage upon which the lucid dream is acted out, but it seems the actual script to be followed remains largely in the hands of the dreamer.

The Phenomenology of Lucid Dreaming

Descriptions of the lucid dreaming experience are typically positive in nature (Brown, 1936; Green, 1968; Hearne, 1981; LaBerge, 1981; Ogilvie et al., 1982b; Van Eeden, 1913). Subjects report feelings of freedom and exhilaration, and also describe a feeling of self-insight akin to that experienced during the meditative state (Ogilvie et al., 1982b). Along with this, LaBerge et al. (1981) claim that the lucid dreamer possesses a consciousness fully comparable in coherence, clarity, and cognitive complexity to the waking state, even though dreaming vividly.

Hearne (1981) describes the phenomenological experience of lucid dreaming as "being in a totally artificial 'other' world, and at the same time knowing so" (p. 783). He draws a qualitative distinction between the end of an anxiety dream, where one often experiences a brief moment of lucidity (i.e., "It's only a dream"), and a true lucid dream, where there is no tension and the period of lucidity may extend to several minutes.

Another characteristic of the LD experience is the dreamer's perception that the content and course of action of the dream can be volitionally manipulated to some extent (Garfield, 1975a; Green, 1968; Hearne, 1981, 1982a, 1982b; LaBerge, 1981; Ogilvie et al., 1982a). This may give to the dreamer a sense of active control over the dream, which is

reportedly a pleasurable experience (e.g., LaBerge, 1981). In a factor analysis of dream content, Hauri, Sawyer, and Rechtschaffen (1967) found that perceptions of active control over the dream loaded highly on the Pleasantness factor, providing some empirical support for the view that the control aspect of lucid dreaming is in large part responsible for the subjectively pleasurable nature of the event. (The implications of dream control will be elaborated more fully in Chapter IV.)

However pleasant lucid dreams might be, though, there does appear to be a strong relationship between lucidity and bizarreness of dream content. Hoffman and McCarley (1980), for example, found there to be a significant association between lucidity and bizarreness in their sample. They described how, in a dream, there is a delusional acceptance of events as real which, were the individual awake and not psychotic, "would cause wonderment and consternation" (p. 134).

This sense of "wonderment and consternation" has been described as one of the characteristics of the prelucid state (Green, 1968; Ogilvie et al., 1982b), and the extent to which the dreamer is able to reject the dream events as "real" events seems one of the key determinants of lucidity onset.

The prelucid state involves a questioning on the part of the dreamer as to the reality of what he or she is ex-

periencing. Hearne (1981) has described how the dreamer's recognition of some glaring incongruity between reality and the dream imagery is likely the precipitating factor for lucidity. He goes on to describe how some habitual lucid dreamers tend to develop ways of testing their present state of consciousness, or, in other words, of resolving their prelucid questions, by attempting to levitate or fly. These activities are of course easily performed in the dream world, but are decidedly more difficult in reality! If the dreamer is successful at defying the laws of gravity, then, according to Hearne, he or she is most likely to correctly conclude that what is being experienced is indeed a dream. Once this realization is made, the dreamer seems to pass from the prelucid state into the lucid state, where the potential to control the dream may become apparent.

Ogilvie and his associates (1982b) have provided some support for Hearne's (1981) contention that dream bizarreness can act as a sort of "trigger" for lucidity. They found that reports of non-lucid dream content were relatively mundane and realistic, with reports of fully lucid dream content being only slightly more bizarre. The most bizarre content occurred in the prelucid descriptions, leading Ogilvie et al. to conclude that dreams transitional to lucidity, but stopping just short, are the most bizarre. Another way of stating this would be to say that those circumstances giving rise to prelucid questions which are not resolved in

favor of dreaming are, upon awakening, described by the dreamer as being highly bizarre. Conversely, those circumstances giving rise to prelucid questions which are resolved in favor of dreaming, and thereby lead to lucidity, tend to be described as less bizarre by the dreamer, suggesting the dreamer's perception that "this is a dream" may somehow help to make sense of the imagery, although there is no direct evidence for this.

If the above suppositions are true, then it may be that those who have never had a lucid dream may possess a greater tolerance for bizarreness than those experiencing lucidity. As a result, these individuals may never reach a state of prelucid questioning. Alternately, it may be that a state of prelucid questioning is never reached because the dream imagery is of a prosaic nature. This latter situation might be akin to that of individuals who report that they do not dream at all (e.g., Goodenough Shapiro, Holden, & Stein-schriber, 1959; Lewis, Goodenough, Shapiro, & Sleser, 1966). One possible reason for this failure to recall dreams is that the imagery may be so congruent with waking reality that these subjects are unable to differentiate their sleep mentation from their waking mentation. (Other reasons might include interference, lack of REM awakenings, or repression.)

If, as seems likely from the literature, lucid dreams somehow help the dreamer to accept bizarre (or affectively-charged) dream imagery, then they might serve the important function of sleep conservation in that they allow the dreamer to remain asleep in the presence of dream content which could otherwise threaten to waken him or her (cf. Freud, 1900).

The Physiology of Lucid Dreaming

The issue of whether lucid dreams are "true" dreams or are merely an artifact of arousal has been in contention since the times of Van Eeden (1913) and of Brown (1936). It was not until the discovery of REM in the 1950s, though, that certain questions regarding dreaming could be answered with confidence, and it was not until the 1970s that the methods of the sleep laboratory began to be applied to the area of lucid dreaming. A brief overview of some of the most important findings of the earliest laboratory investigations of REM dreaming will help to set the stage for the discussion which follows.

Aserinsky and Kleitman (1953, 1955) discovered that eye movements during sleep are reliably associated with reports of dreaming, and this finding, perhaps more than any other, served to revolutionize the study of dreams. Basically, these investigators found that in addition to slow, pendulous eye movements, subjects also showed rapid eye movements

(REMs) at periods throughout the night. It was also found that subjects awakened during these REM periods more frequently reported dreaming than did subjects awakened at other times. Dement and Kleitman (1957a, 1957b) later found that REMs occurred in conjunction with an electroencephalograph (EEG) pattern of fast, low voltage, random activity (Stage 1 sleep), and that they occurred throughout the night in approximately 90-minute cycles. More recent research has elaborated on the nature of the REM period, suggesting that it is marked by a whole constellation of events, including periodicity in respiration rate (Aserinsky, 1965) and level of autonomic activity (e.g., finger pulse rate is positively associated with length of REM burst) (Spreng, Johnson, & Lubin, 1968).

Given the abundance of data indicating that LDs indisputably occur during REM (e.g., Hearne, 1981; LaBerge, 1980b, 1981; LaBerge, Levitan, Gordon, & Dement, 1983; LaBerge et al., 1981a, 1981b; LaBerge, Nagel, Taylor, Dement, & Zarcone, 1981; Ogilvie et al., 1982a, 1982b), it seems reasonable to conclude that subjects are indeed asleep when they experience lucid dreams. However, the nature of the relationship between LDs and arousal is a complex one.

Schwartz and Lefebvre (1973) suggest that lucid dreams occur during momentary intrusions of wakefulness within REM sleep. LaBerge et al. (1981) take issue with this view, and

suggest instead that these "microawakenings" precede lucidity. LaBerge and his colleagues (1983) claim that LDs are dependent upon the relatively high level of cerebral activation attained in REM sleep, and occur only (a) within two minutes of the onset of a REM period, (b) after a microawakening during a REM period, or (c) in association with elevated REM activity. Microawakenings, then, are seen more as facilitative than as the sine qua non of lucidity. Garfield (1975a) has also argued against Schwartz and Lefebvre's position, suggesting the dreamer's ability to prolong or extend the dream at will contravenes a microawakening conceptualization of lucidity.

Other physiological conceptualizations of lucidity also rely upon an activation/arousal model. Hearne (1981), for example, suggests the spontaneous neural activity that causes REMs may also stimulate the cortex to a level whereby consciousness is reached within the dream. This "consciousness," though, is a tenuous one, for sustained arousal at such a level can lead to awakening (Hunt, 1982).

The level of arousal or awareness within REM is typically assessed through reference to the pattern of alpha activity produced by the dreamer. A person resting with eyes closed usually shows an alpha rhythm EEG of 8 - 12 Hz frequency and of moderate amplitude (Murray, 1965). (Alpha activity during REM is usually about one cycle per second

slower than the subject's waking alpha.) While high levels of alpha (in terms of the percentage of alpha waves per sleep epoch) are often regarded as an indication of wakefulness in many studies involving sleep-onset decisions (e.g., Is the subject awake or in Stage 1 sleep?), alpha activity during REM is not uncommon (Dement & Kleitman, 1957a, 1957b). Indeed, some (e.g., Ogilvie et al., 1982b) have suggested that the waxing and waning of alpha during REM represents fluctuations in degree of awareness within the REM period, with lucidity seen as most likely when alpha is at its peak.

The enhancement of alpha activity seems to be associated with the mental clarity and concentration reportedly characterizing the meditative state (Ogilvie et al., 1982b; Woolfolk, 1975). Such a state purportedly facilitates the wandering of attention, and both routine reactions and creative thought are possible (Murray, 1965). Ogilvie and his colleagues (1982b) have suggested that lucidity may be a "naturalistic" meditative state occurring during REM sleep. They see the lucid and meditative states as analogous because both are characterized by alpha rhythms. Their research evidence suggests that subjects awakened from REM periods with alpha activity have higher dream lucidity ratings than subjects awakened from non-alpha REM, but more recent work (Ogilvie, Hunt, Kushniruk, & Newman, 1983) has shown the amount of alpha during REM to be affected by the

subjects' rate of spontaneous lucid dreaming, with frequent lucid dreamers having less alpha during REM relative to infrequent lucid dreamers. These findings indicate that there is no simple relationship between alpha activity during REM and reports of lucid dreaming.

In addition to investigating the relationship between alpha activity and lucid dreams, researchers have looked for other physiological phenomena which might discriminate lucid dreamers from non-lucid dreamers. For example, Gackenbach et al. (1981) found that persons who differ in their frequency of LDs can be discriminated according to left-right differences on kinesthetic and visual-motor tasks. The differences were inconsistent, though, and replication seems necessary to attribute the findings to anything other than chance. A further concern is that there may have been some confounding of the results due to the handedness and to the gender of the subjects.

However, Snyder and Gackenbach (1981) took these latter two variables into account in a subsequent attempt to discover any physiological differences between frequent and infrequent lucid dreamers. The researchers tested subjects under a dual-task paradigm (Lomas & Kimura, 1976) used to infer the cerebral organization for speech in right-handers. Under this paradigm, subjects perform sequential arm-tapping while silent and then concurrent with speech. Any interfer-

ence in the pattern of tapping which arises as a function of speaking is thought to depend upon the subject's cerebral organization for speech and manual control, although there are other possible interpretations. Results indicated that "frequent" lucid dreamers, especially among right-handers, seem to have a unilateral organization for speech, whereas "infrequent" give evidence of a bilateral organization. These results, while suggestive, are inconclusive and need to be both replicated and supplemented by additional studies.

In a more recent attempt to identify any physiological differences between frequent and infrequent lucid dreamers, Gackenbach, Walling, and LaBerge (1984) looked at the relationship between lucidity and parasympathetic functioning. They found there to be a significant correlation (+ .26) between parasympathetic dominance (as measured by Plutchick and Conte's [1974] Sympathetic-Parasympathetic Test) and frequency of lucid dreaming for female subjects, but the magnitude of the correlation was small, and their measure of parasympathetic functioning was of the pencil-and-paper type. This leads one to once again call for more rigorous investigation of a suggestive finding.

Personality and Lucid Dreaming

In addition to the possibility of there being some neurophysiological basis for the differences in rate of spontaneous lucid dreaming, researchers have examined whether there might not be some differences in personality between those who frequently experience lucidity and those who infrequently or never experience it.

Belicki, Hunt, and Belicki (1978) compared a group of psychology students who reported frequent lucid dreaming with a second group who reportedly had never experienced the phenomenon. The subjects were asked to estimate their dream recall, the amount of attention they typically paid to their dreams, and the personal meaningfulness of their dreams. Subjects were also asked to record the last dream recalled of the night for a four-week period and to complete Crockett's Eight Role Category Questionnaire (a measure of cognitive complexity) and Leary's Typical, Ideal, and Private Self measures. The results showed no significant differences in estimated recall, attention paid to dreams, or personal meaningfulness. The personality measures also failed to show any differences between the groups. The dream reports were scored for two types of bizarre events -- hallucinations and confused thought -- but neither dimension discriminated between the two groups. The only significant difference between the two samples was in the number of dreams

reported over the course of the study. The lucid dreamers reported an average of about 15 dreams compared to about 11 for the non-lucid dreamers.

The absence of any personality differences between the frequent lucid dreamers and the non-lucid dreamers may have been a function of the instruments used and/or of the characteristics of the sample. However, Gackenbach (1981) obtained similar results using different instruments and a more diverse sample. She examined the scores of "adults" (mean age of 45 years) and of "students" (age unspecified) on the Sixteen Personality Factor Questionnaire, and related these to reported frequency of lucid dreaming. The results indicated student frequent lucid dreamers to be enthusiastic and practical, while adult frequent lucid dreamers were liberal and high in ego strength. When gender of the subject is included in the analysis, though, the results tend to become less clear. Gackenbach reported that both adult and student female lucid dreamers were practical and nonanxious, whereas their male counterparts were emotionally in control but low in intelligence. As Gackenbach concludes, this is indeed a "perplexing trait portrait" (p. 145), and it is not surprising that it failed to yield a pattern which strongly predicts lucidity.

The most recent evidence (Gackenbach, Curren, LaBerge, Davidson, & Maxwell, 1983) suggests that frequent lucid

dreamers are more intelligent and nonverbally creative than infrequent lucid dreamers on some measures (Comprehensive Abilities Battery; Torrance Test of Creative Thinking), but the characteristics of the sample (well-educated, white, middle-class adults) and the comprehensiveness of the instruments utilized should lead one to be judicious in generalizing these results.

Inducing Lucid Dreams

After a review of those studies which had addressed the prevalence of lucid dreaming, Gackenbach (1984) concluded that about 58% of the population has had at least one LD, with about 21% of the population experiencing the phenomenon one or more times per month. This relatively low frequency of occurrence has prompted much interest in developing means by which the incidence of lucid dreaming can be increased.

Several investigators have proposed methods for the induction of LDs, but it is not clear to what extent these voluntarily-induced lucid dreams are the same as "spontaneous" lucid dreams in terms of either process or origin, although they do seem to retain all of the characteristics which make LDs of interest to researchers. In addition, the volitional LD is considerably less difficult to research than the spontaneous LD, and the emergence of a reliable induction technique for the former could possibly result in a reduced reliance on studies of the latter (except perhaps in

those areas where the distinction between spontaneous and preplanned dream events may be important).

Tholey (1983) developed a technique for the induction of lucid dreams which is based upon the following assumption: If a subject while awake develops a critical-reflexive attitude toward his or her momentary state of consciousness by asking him- or herself if he or she is dreaming, it then becomes possible to transfer this attitude to the dream state. He further assumes that the unusual nature of dream experiences makes it possible for the subject to correctly recognize when he or she is dreaming.

Tholey's method appears to capitalize upon the prelucid questioning which often arises when bizarre dream content occurs, and in this respect it is congruent with Hearne's view of bizarreness serving as a key component in lucidity onset. It is difficult for me to more fully elaborate Tholey's "Klartraumtechnik," though, because the bulk of his work has not been translated from the original German, but it seems he is making some rather large assumptions.

Hearne (1981) has developed a lucid dream induction technique which is based upon the notion that external sensory stimulation might be able to "prompt" the dreamer into an awareness of the situation as a dream. The subject is instructed beforehand that the specific stimulation (wrist shocks, in this case) is intended to act as a "reminder" for

him or her to consider whether the imagery is that of a dream. More simply, the shocks serve as a cue for the dreamer to begin prelucid questioning. Subjects were given the shocks prior to sleep so that they were familiar with them, and they were then given presleep instructions to recognize the impulses and to consider if they were dreaming when they felt them. If they were dreaming, they were to indicate this by moving their eyes in a prescribed pattern (ocular signaling) that the experimenter could observe on EOG records. Hearne reports that 8 of 12 subjects became lucid after one night of this procedure.

Because of the difficulty in implementing this procedure outside the laboratory, Hearne (1981) devised a "portable dream machine" for the home study of lucid dreams. This machine detects REMs and then automatically delivers the electrical impulses to "trigger" lucidity. It then records any ocular signals the subject sends to indicate lucidity.

While a procedure such as Hearne's shows promise, there is some evidence to suggest that electrical stimulation during REM might lead to incorporation of the stimulus into the ongoing mentation (e.g., Koulack, 1969). Subsequently, the extent to which a given dreamer incorporates this stimulation into his or her dream may be inversely related to the efficacy of the procedure at inducing prelucid questioning. In other words, if the electrical stimulation is somehow

"made sense of" in the dream context, then the dreamer might not recognize this otherwise incongruent stimulus as his or her cue to begin questioning the reality of what is being experienced. Alternately, the shocks could lead to awakening for some subjects, but Hearne does not report any such occurrences. In addition, the number of people willing to wire themselves up as this protocol demands could be rather limited, and the cautions regarding the possible consequences of turning the home into a laboratory (e.g., disrupted sleep patterns; changes in reported dream content) should be heeded.

An approach similar to Hearne's has been taken by LaBerge, Owens, Nagel, and Dement (1981), but with less successful results. These researchers played a tape recording of the phrase "This is a dream" to subjects 5 - 10 minutes after the beginning of a REM period. Subjects were to use ocular signaling if they heard the tape or realized they were dreaming. For the most part, this approach served mainly to awaken the subjects. There was also a large amount of incorporation of the stimulation (e.g., subjects reporting that they dreamed someone was calling their name); some of which led to subsequent lucidity. LaBerge (1981) also reported the results of this technique with himself as subject. He stated that incorporation led in his case to lucidity, but he awoke almost immediately thereafter. There are a number of previous studies (e.g., De Koninck & Kou-

lack, 1975) demonstrating that auditory stimulation during REM can lead to incorporation of the stimulus into the dream.

Garfield (1974) described an autosuggestion method for inducing lucid dreams. Prior to sleep, she would simply tell herself, "Tonight I will have a lucid dream." She reported (1975a) that this presleep self-suggestion technique increased the frequency of LDs from a baseline of zero to an asymptote of three per week over an 18-month period. Garfield's technique is certainly the most simple approach toward LD induction, but her data suggest that the efficacy of autosuggestion is less than adequate, except perhaps for the most patient of subjects.

Using Garfield's technique as a starting point, LaBerge (1980a, 1980b, 1981) worked systematically to refine and elaborate a more efficacious procedure for the induction of lucid dreams. Two years of self-experimentation resulted in a technique for the mnemonic induction of lucid dreams (or "MILD"). The technique is based on the mnemonic device of visualizing oneself doing what it is that one intends to remember to do. In this case, the intent is to remember to become lucid when dreaming. The MILD procedure capitalizes upon one's ability to remember to perform future actions; a process facilitated by forming cognitive associations between what one wants to remember to do and the future cir-

cumstances under which one intends to act. The MILD procedure is as follows:

1. During early morning, the subject awakens spontaneously from a dream.

2. After rehearsing the dream, the subject engages in 10 to 15 minutes of reading or other activity demanding full wakefulness.

3. Then, while lying in bed and returning to sleep, the subject says to him- or herself, "Next time I'm dreaming, I want to remember I'm dreaming."

4. The subject visualizes his or her body lying asleep in bed with rapid eye movements indicating that he or she is dreaming. At the same time, the subject imagines him- or herself being in the dream just rehearsed (or in any other dream, in case none was recalled upon awakening) and realizing that he or she is dreaming.

5. The subject repeats steps 3 and 4 until he or she feels that his or her intention is clearly fixed. (LaBerge, 1980b, p. 1041)

LaBerge (1980b, 1981) provides some fairly impressive evidence for the effectiveness of MILD. Using himself as subject, he conducted a ten-month evaluation of the MILD procedure. He practiced the technique on a regular basis

(he does not define what is meant by "regular") for a four-month period, discontinued "regular" practice for a four-month period, and then once again began "regular" practice for an additional two-month period. When frequency data from the practice periods are combined, an average of 21 lucid dreams per month of practice is obtained, with reports of as many as four LDs in a single night (LaBerge, 1980a, 1980b, 1981).

While LaBerge's data are suggestive, and he presents the most complete evaluation of any technique described in the literature, there are several difficulties both with MILD and with the manner in which it has been evaluated:

1. The instructions are esoteric in nature. Such statements as "awaken spontaneously from a dream" and "visualize yourself lying in bed with REMs indicating that you are dreaming" seem to be both confusing and difficult to follow. Indeed, the probability of a subject misunderstanding or misinterpreting these instructions seems quite high, and this could lead to a lack of consistency of method of practice between subjects.
2. The time of practice is both inconvenient and restrictive. Asking subjects to practice MILD when they "spontaneously" awaken from a dream means that they must at least occasionally awaken at such a time and that they must be both willing and able to then practice the procedure.

Relying upon spontaneous awakenings may make daily practice of the procedure impossible for those people who do not regularly awaken during the night. And, even for those who do sometimes awaken from their dreams, practicing MILD may make the return to sleep difficult (because of the protracted interruption), not to mention that it might also disturb anyone with whom the subject is sleeping.

3. The generality of the results reported by LaBerge is unknown. It is possible that MILD is only of idiosyncratic effectiveness and will not work for others (given that they are able to understand and practice what they are being asked to do). Moreover, the difficult-to-follow procedure and restricted opportunities for practice mean that even if the procedure is effective, few could probably practice it on a "regular" basis as LaBerge did. LaBerge (1980b) states that three other "lucid dreamers" have successfully used the technique (the criterion for success is not reported), but he acknowledges that he "leaves for future research the question of its general usefulness" (p. 1042).

4. The assessment of lucidity is subjective in nature. Such a method is acceptable given the aims of LaBerge's case-study report, but relying upon this strategy in an evaluation of MILD with less-sophisticated subjects (i.e., those who have not made LDs an area of expertise) seems less

acceptable. While self-report ultimately cannot be avoided in dream-content research, any steps which can reduce the subjectivity of the evaluation of the dream reports (e.g., using judges' ratings of lucidity) seem well worth taking.

5. The latency of onset of lucidity as a function of MILD practice is unknown. LaBerge does not provide any data regarding how long it took for MILD to increase his frequency of LDs, although he (1980b) did state that clarifying the intention to remember to become lucid in his dreams resulted in an "immediate" increase in the monthly frequency of lucid dreams. However, he does not state whether the increase began after one night, after one week, or after the full month of practice.

6. The effects of discontinuing MILD practice are unknown. LaBerge (1980b, 1981) reports that there was a reduction in the frequency of lucid dreams during the four-month period in which he discontinued "regular" practice of the procedure, but the incidence of LDs during this withdrawal phase was still approximately three times that obtained during pre-MILD recording. LaBerge's claim of discontinuing "regular" practice begs the question of how often he was still practicing MILD on an "irregular" basis. The number of LDs obtained as a function of frequency of practice seems to be of considerable importance in evaluating MILD's efficacy. Also of importance is the length of time

it takes before the effects of practice begin to extinguish, and whether this is influenced by the frequency of practice.

Of the LD induction procedures reviewed here, MILD seems the most promising in that it is suitable for at-home practice and, in the case of at least one individual, appears to be highly effective. However, as indicated above, there are a number of difficulties with LaBerge's procedure. First, there is the question of how effective the technique is for those who only infrequently or never dream lucidly. Second, there is the question of how long one must practice the procedure before changes in lucidity are apparent. Third, there is the question of how long any changes in lucidity persist after discontinuing practice of the procedure. Of these unanswered questions, perhaps the most important one concerns the extent to which mnemonic LD induction is possible in the individual with no special sleep-related abilities other than dream recall. Unfortunately, the MILD procedure, by the nature of the demands it makes of the subject, is unable to address this fundamental question.

Rationale for the Present Study

This section will (a) outline the rationale for the present study, (b) identify the research questions, (c) state hypotheses, and (d) provide an overview of the experimental methodology and analyses. Details of the instruments

utilized and points of procedure are provided in Chapters II and III.

At present, the only way in which large-scale studies of lucid dreaming can be conducted is through the use of subjects reporting some degree of spontaneous lucidity. In a typical study, the subjects are brought into the sleep laboratory with the hope that they will have a lucid dream while there, or else the subjects' self-estimate of LD frequency is used to identify them as "frequently," "infrequently," or "never" lucid, with this designation serving as an independent variable. Difficulties with these approaches include a reliance upon propitious coincidence and an assumption that the retrospective self-estimation of LD frequency is a sufficiently reliable criterion for assessing lucidity.

If lucid dream research is to transcend its current status as a subjective, esoteric, and ill-defined field of investigation, it seems that it should direct its energies toward answering two interrelated questions:

1. Can the frequency of LDs be reliably increased in individuals possessing no special sleep-related abilities other than dream recall?
2. Can a reliable operational definition of LDs be developed which does not require sophisticated equipment and/or a laboratory setting?

The first question has ostensibly been addressed by a number of researchers (e.g., Garfield, 1974, 1975a; Hearne, 1981; Tholey, 1983). As indicated in the previous section, though, their induction techniques have for the most part proven to be ineffective and/or difficult to implement. LaBerge's MILD procedure shows promise, as it is suitable for at-home practice and seems effective, but it makes demands of the dreamer which throw into question the extent to which it may be useful for those who neither awaken regularly from their dreams nor desire to disrupt their return to sleep with a complicated practice regimen.

For this reason, I revised LaBerge's MILD technique to make it easier to follow and less disruptive of the subjects' daily routine. The present study sought to evaluate the efficacy of this revised version of MILD using an eight-week A-B-A withdrawal single-case experimental design with replications across subjects. It was hypothesized that the level of lucidity reported by the subjects would be significantly greater during the MILD-R practice period than during the baseline or withdrawal periods.

The LD induction procedure used in the present study had as its core the mnemonic technique upon which MILD was based and from which it presumably derived its effectiveness. There were, though, two features of the revised procedure -- a simplified set of instructions and a presleep

practice period -- designed to make the technique more amenable to the "typical" dreamer (i.e., the individual with no special sleep-related abilities apart from dream recall). These modifications afforded the possibility of daily practice and were intended to reduce intersubject variability in terms of both frequency of practice and interpretation of the instructions. Because these revisions constituted systematic changes in the MILD procedure, the present study did not represent an evaluation of MILD per se, but rather represented an evaluation of the mnemonic technique which is the essence of LaBerge's procedure.

The revised procedure for the mnemonic induction of lucid dreams (or "MILD-R") is as follows:

1. Before going to bed, think of a recent dream you have had, and go over it until it is clear in your mind.
2. After the dream is clear, go to bed, and then imagine that you are outside of yourself and can see your body lying asleep in bed and having this dream.
3. Then, imagine yourself being in your sleeping body and realizing that what is going through your mind is a dream.
4. Repeat the above steps until you understand that you are trying to visualize yourself becoming aware of dreaming while the dream is in progress.

5. Then, repeat over and over to yourself as you try to go to sleep, "When I dream, I want to remember that I'm dreaming," so that your intention stays clear throughout the night.

In order to provide a means by which the effects of MILD-R practice could be evaluated, it was necessary for the subjects to keep a record of their dreams as recalled each morning. There were several reasons underlying the decision to use morning recall of dreams: First, it seems that LDs are often recalled in the morning (Green, 1968; LaBerge, 1981). Second, morning recording of dreams seems less disruptive of the subjects' daily routine than recording during any nightly awakenings from dreams, although there may be some selectivity bias in terms of which dreams are recalled in the morning (Domhoff, 1969; Koulack & Goodenough, 1976). Third, after a review of the presleep suggestion literature, Walker and Johnson (1974) concluded that morning recall was an effective means of assessing the influences of presleep suggestion on dreams. Since MILD-R essentially consists of the subjects suggesting to themselves to remember to become lucid in their dreams, morning recording therefore seems an appropriate strategy. Finally, morning recording of dreams is possible in the home environment, and it thereby avoids both the costs and the possibly undesirable consequences of using a laboratory setting.

The subjects recorded their dreams on a form patterned after the model provided by Hall and Van de Castle (1966b) (see Appendix A), who suggested that the recording instructions should be structured enough to attain the information needed to score the report, but should also be sufficiently open-ended to provide the dreamer with the opportunity to organize and detail the report in whatever manner seems most appropriate to him or her. The report form used in this study also took into consideration Witkin's (1969) suggestion that subjects should be told they are to provide an account of their feelings during, and emotional reactions to, the dream. In particular, the report form emphasized the importance of relating any thoughts or self-statements the subject may have had or made during the dream, thereby maximizing the likelihood of including the information needed to make an assessment of lucidity.

Lucidity scores were assigned to the morning dream reports according to the criteria outlined in a Lucid Dream Rating System (LDRS) I developed in an attempt to establish a reliable instrument for operationally defining LDs (see Appendix B). The need for such an instrument is apparent from the lack of consensus regarding what comprises a lucid dream and how the phenomenon is to be measured. The LDRS was designed to be used by a trained rater who could objectively assess the subjects' dream reports for lucidity. By using external rather than self-ratings of lucidity, it was

possible to keep the rater blind to the phase of the study from which the reports came, allowing for a far less contaminated assessment of lucidity than would be possible using self-assessed lucidity. In addition, because a given dream report could be assessed by more than one rater, it was possible to calculate an inter-rater reliability coefficient for the LDRS and to thereby determine the extent to which it can be used reliably as a means of operationally defining degree of reported lucidity.

The reliability of the LDRS was calculated using a large pool of dream reports obtained from Introductory Psychology students. This approach was adopted in order to provide a source of LD reports which did not depend upon the efficacy of MILD-R practice. The students were given a handout and a presentation on LDs and were then asked to provide a detailed description of a lucid dream which they had experienced, or, if this was not possible, to provide a detailed description of the most memorable dream they could recall. These dream reports were then independently rated by two judges trained in the use of the LDRS, and the inter-rater reliability for their ratings was calculated using the Kappa statistic (Cohen, 1960, 1968). It was hypothesized that the rate of agreement between the judges would be significantly greater than that expected under conditions of random scoring.

The present study, then, sought to contribute to the lucid dream literature by evaluating newly-developed procedures for the induction and for the objective rating of LDs. In addition to this, the use in the present study of home dream reports obtained from subjects varying in their reported rate of spontaneous lucid dreaming arguably provided results which may be more generalizable to the "typical" dreamer than results obtained using a more restricted sample and/or a laboratory setting. Finally, due to the exploratory nature of the present study, an emphasis was maintained on gathering as much phenomenological data from the subjects as seemed relevant, thereby generating hypotheses which future research might test.

As indicated, the present study involved two separate investigations. The first of these was designed to assess the reliability of the LDRS as an instrument for operationally defining degree of reported lucidity. The second investigation was designed to determine the efficacy of MILD-R as an induction procedure. For the sake of clarity, each investigation will be described in turn. Following this, a general discussion of pertinent issues will be presented.

Chapter II

LUCID DREAM RATING SYSTEM RELIABILITY STUDY

Method

Subjects

One hundred and eighty-one Introductory Psychology student volunteers served as participants. All subjects were recruited through the University of Manitoba subject pool, and each received course credit for participation. Data from two subjects were discarded due to their unscorable nature. There were no restrictions regarding who might participate in the study, although all potential subjects were instructed at the time of recruitment that they would be required to provide a report of a dream at the experimental session. Of the final sample, 108 or 60% were female; seventy-one or 40% were male. Mean age of the participants was 21.6 years, with a range from age 17 to age 52.

Lucid Dream Rating System

Development of the LDRS. I developed the LDRS (see Appendix B) to reflect what seem from a review of the literature to be the operational characteristics of lucidity. For the most part, the LDRS represents an elaboration of the lu-

cidity rating system developed by Ogilvie et al. (1982b). Their system consisted of a single judge's evaluation of lucidity as indicated by subjects' verbal responses to queries administered during experimentally-induced awakenings from REM sleep. Ogilvie et al. analyzed their subjects' responses in terms of their correspondence to the criteria for prelucidity (i.e., the subjects were asked, "Was there any point when you wondered whether or not you might be dreaming?"), lucidity proper (i.e., "Was there any point at which you knew you were dreaming while that dream was going on?"), or dream control (i.e., "At any point in the dream were you deliberately able to control what was happening in the dream?"). The utility of their system is difficult to estimate, however, because of the manner in which it was implemented and evaluated.

Besides the fact that there was no estimate of the reliability of their ratings, the pointed nature of the questions used by Ogilvie et al. seems to arouse suspicion that they could be "leading the witness" (through the demand characteristics of the experimental situation), as it were. Moreover, these experimentally-induced awakenings disrupted the subjects' sleep cycle and, based upon the evidence that brief awakenings can facilitate subsequent lucidity (LaBerge et al., 1983), may have actually influenced the phenomenon the researchers set out to investigate. Given these factors, the approach used by Ogilvie and his colleagues seems

to represent some improvement over a completely subjective self-estimate of lucidity (as traditionally used in many LD investigations), but there is no way of directly assessing how great the improvement might have been.

My intent in developing the LDRS was to establish a system by which morning dream reports could be reliably rated for lucidity by persons other than the dreamer him- or herself. Such an approach is advantageous in that it reduces one of the most serious threats to the interpretability of LD investigations -- namely, the dubious assumption that self-ratings of lucidity are unbiased and reliable. (Interpretability refers here to the extent to which any changes in the dependent measure [i.e., LDRS scores] are attributable to the condition of the independent variable [i.e., practice or non-practice of MILD-R].)

Because it would be difficult to convincingly argue that the self-report of a subject who is fully aware of the aim of the MILD-R procedure is unbiased, an approach utilizing an instrument such as the LDRS seems dictated, for it allows the subject to report his or her dream without having to pass judgment on the extent to which it was perceived as lucid. By having the subjects simply report their dreams, the likelihood of their trying to provide the experimenter with the results they think are expected is reduced, and the potency of demand characteristics as a threat to interpretability is thereby lessened.

Another advantage of using externally- rather than self-rated lucidity concerns the increment in consistency of ratings that such an approach provides. When using self-assessed lucidity, the likelihood of subjects developing idiosyncratic "definitions" of lucidity seems high -- unless they are trained in the use of the LDRS, for example, but this would likely affect the way in which they reported their dreams -- so an external-rater strategy seems useful as a means of achieving some degree of consistency in LD ratings. Moreover, by using external ratings, judgments by more than one rater can be obtained. From these, an index of the interrater reliability of the LDRS can be calculated, providing a measure of the extent to which the system can be used reliably as an operational definition for lucidity.

Description of the LDRS. The LDRS is essentially a dichotomous-ordinal (DO) scale (Cicchetti, 1976; Cicchetti, Aivano, & Vitale, 1977; Cicchetti, Lee, Fontana, & Dowds, 1978), meaning that it contains a point of "absence" (i.e., a report of a non-lucid dream) as well as a series of points of "presence" with respect to lucidity. To illustrate this "absence" versus "presence" dichotomy, a report of a non-lucid dream earns a score of 1 on the LDRS; a report of a false awakening earns a 2; a prelucid dream earns a 3; a lucid dream earns a 4; a lucid dream in which control is perceived but not exercised earns a 5; and a lucid dream in which dream control is both perceived and exercised earns a

6. Scores on the LDRS can therefore range from 1 to 6, with reports of no dream recall earning a score of 0.

To facilitate scoring, each of the LDRS categories 2 through 6 contains examples of statements a dream report might include or imply which would earn that score. For example, the statement "I wondered if I might be dreaming all this" is provided as an example of prelucid questioning. Each dream report earns only one score; that being the one corresponding to the highest degree of lucidity reported. Thus, a description of a dream in which a false awakening led to prelucid questioning, but culminated in lucidity, would receive a score of 4, as this was the highest degree of lucidity reported.

Procedure

The subjects were run in six groups of approximately 30 participants. The subjects each received a handout (see Appendix C) containing: (a) a description of lucid dreaming, (b) an example of how an individual might feel in a lucid dream, (c) the rationale for the present study, and (d) a discussion of their role in this research. The handout also contained a dream report form and a background questionnaire (see Appendix C).

The experimenter read aloud the presentation on LDs, and asked that the subjects follow along on their copies.

The subjects were asked to read the presentation for a second time before proceeding. After becoming conversant with what a lucid dream comprised, the subjects were asked to describe a lucid dream according to a modified version of Hall and Van de Castle's (1966b) dream report form instructions (contained in Appendix C). If it was not possible for the subjects to describe a lucid dream, they were instructed to describe the most memorable dream they could recall. This procedure yielded a pool of dream reports varying in degree of lucidity.

Prior to independently rating these dream reports for lucidity, the judges underwent a pretraining procedure. I selected a series of 27 dream reports, varying in degree of lucidity, from Green's (1968) Lucid Dreams. These were used as "practice" reports by the author and the other judge, who independently rated them according to the LDRS criteria. Using Hersen and Barlow's (1976) agreements / agreements + disagreements measure, a figure of 85% agreement was achieved. As this value exceeded the preset minimum agreement level criterion of .75, the judges were permitted to begin rating the dream reports from the Introductory Psychology students.

The students' dream reports were rated in batches of about 60. After one judge had completed rating the entire batch, it was then turned over to the second judge for rat-

ing. Each judge kept score on a separate sheet, and no marks were made on the dream reports themselves. After each batch was rated, the judges would meet to compare their scores and to see if there was a need for further training prior to rating the next batch. The rates of agreement were seen in every case as being high enough to permit further rating without retraining or modification of the LDRS.

Once all the dream reports had been scored, a reliability coefficient was calculated for the judges' ratings. The interrater reliability of the LDRS was calculated using weighted Kappa (Cohen, 1968), an elaboration of the Kappa statistic originally developed by Cohen (1960) to provide an index of agreement or of simultaneous discrimination for nominal scales.

Basically, the Kappa statistic compares the proportion of obtained agreement with the proportion of expected agreement (as calculated from the frequency of usage of each scale category), yielding a value between 0 and 1.00. A K-score of 0 indicates that the judges are not agreeing in their ratings to an extent greater than that expected under conditions of chance or random scoring. A K-score of 1.00 indicates that the judges are in perfect agreement on every observation. Values between 0 and 1.00 indicate that the judges agree on more observations than expected on the basis of chance alone, but that they are in less than perfect

agreement on all observations. The obtained K value is referred to the normal distribution for significance testing.

Weighted Kappa (K_w) expands the range of scale types which might make use of the K statistic, yet it retains Kappa's characteristics of correction for chance agreement and amenability to significance testing (Spitzer, Cohen, Fleiss, & Endicott, 1967). The K_w formulae have been extended to cover dichotomous-ordinal scale data like those provided by the LDRS (Cicchetti, 1976; Cicchetti et al., 1977; Cicchetti et al., 1978). In addition, weighted Kappa allows a researcher to assign different weights to disagreements at different levels. This latter feature is important, for it allowed disagreements between absence or presence of lucidity to reduce the reliability coefficient of the LDRS to a greater extent than did disagreements between degree of lucidity present. This differential weighting procedure afforded a more precise estimate of the extent to which the two independent raters reliably used the LDRS to discriminate between lucid and non-lucid dream reports.

Results

The interrater reliability for the LDRS category "No Dream Report" was not calculated as it was assumed that the judges would agree if there was no report. Moreover, any attempt to calculate this value with respect to the other LDRS categories would have necessitated two points of "ab-

sence" on the scale, for which there is no provision. The "False Awakenings" category was not used by either judge, so it was not included in any of the calculations. All tests of significance were conducted using the variance computation described in Cohen (1968). This formula slightly overestimates the variance (Fleiss, Cohen, & Everitt, 1969), resulting in more conservative significance testing and confidence intervals.

The dichotomous-ordinal weighted Kappa value for the entire scale was .6094, $\chi^2 = 4.74$, $p < .001$. As Cohen (1960, 1968) notes, however, the fact that a statistically significant interrater reliability coefficient was achieved is not so important as the actual K_w value itself. For this reason, a 95% confidence interval was calculated for the obtained K_w value, indicating a .95 probability that the true population value of K_w lies between .5523 and .6665. This suggests that the LDRS possesses a moderately high degree of interrater reliability.

Besides the overall K_w , specific category rater agreement values were calculated according to the formulae provided in Cicchetti et al. (1978). Table 1 presents the matrix of obtained and expected proportions and the designated weights. The weights utilized were from the 6-point dichotomous-ordinal (DO) scale table of weights presented in Cicchetti (1976).

Table 1
Specific Category Rater Agreement Data for LDRS

		Judge 2					
Judge 1	Agreement	NLD*	PLD	LD	LD/NC	LD/C	Total
NLD	Weight	1.00	.67	.44	.22	0	
	Obtained	.772	-	-	-	-	.77
	Expected	.608	.015	.077	.023	.046	
PLD	Weight	.67	1.00	.89	.67	.44	
	Obtained	.006	.011	-	-	-	.02
	Expected	.016	.0004	.002	.001	.001	
LD	Weight	.44	.89	1.00	.89	.67	
	Obtained	.006	.006	.089	.011	.006	.12
	Expected	.095	.002	.012	.004	.007	
LD/NC	Weight	.22	.67	.89	1.00	.89	
	Obtained	.006	-	.006	.017	-	.03
	Expected	.024	.001	.003	.001	.0018	
LD/C	Weight	0	.44	.67	.89	1.00	
	Obtained	-	-	-	.006	.056	.06
	Expected	.045	.001	.006	.002	.0036	
Total		.79	.02	.10	.03	.06	1.00

*Note: NLD = non-lucid dream; PLD = prelucid dream; LD = lucid dream; LD/NC = lucid dream with control perceived but not exercised; LD/C = lucid dream with control both perceived and exercised.

Table 2 displays the average frequency of usage for each of the LDRS categories, as well as the obtained, expected, and chance-corrected indices of rater agreement. The range of specific category agreement was wide (from .28 to .99), as was the average frequency of usage for each category (range = .02 to .78).

Table 2
Specific Category Rater Agreement for LDRS

Category	Average Frequency	Index of Rater Agreement		
		Expected	Obtained	DO Kw
NLD	.78	.8483	.9949	.9664
PLD	.02	.6870	.7840	.3099
LD	.11	.5374	.9324	.8539
LD/NC	.03	.9030	.9298	.2768
LD/C	.06	.1692	.9882	.9857
Total	1.00	.7281	.8938	.6094

As can be seen, the Kw and frequency of usage figures for the "Prelucid Dream" and "Lucid Dream with Control Perceived but not Exercised" categories were quite low, indicating that these categories might benefit from reconceptualization. It should be noted, however, that the low frequency of usage of these categories, which in itself exerts a negative effect upon the reliability coefficients, might be a function of the sample and/or procedure used to generate the dream reports. Whether these categories are of utility for other samples or under other conditions is an empirical question. Therefore, any decision regarding the reconceptualization of the LDRS for use in future research will depend at least in part upon the extent to which these

categories (as well as the "False Awakenings" category) proved useful in rating the home dream reports obtained during the MILD-R training study.

Another factor which may have affected the Kw values concerns the possibility that the large number of non-lucid dream reports could be substantially influencing both the overall Kw and the Kw values for the individual LDRS categories. Therefore, a continuous-ordinal (CO) scale weighted Kappa coefficient was calculated for the "presence" categories 3 through 6. This reduced the sample to 37 from 179, but, for a 4-point scale, Cicchetti (1976) states that a minimum of 30 observations is sufficient to calculate a reliability coefficient. Table 3 presents the matrix of obtained and expected proportions and the designated weights for these categories. Table 4 presents the average frequency of usage for each lucidity category, as well as the obtained, expected, and chance-corrected indices of rater agreement. As can be seen, the overall Kw increased to .7495, $z = 4.486$, $p < .001$. Moreover, the new .95 confidence interval ranged from .5435 to .9645, suggesting that the judges can use the LDRS "lucidity" categories in a highly reliable manner, even if the LD reports are of relatively low frequency.

Table 3
Specific Category Rater Agreement Data
for Lucidity Categories

		Judge 2				
Judge 1	Agreement	PLD	LD	LD/NC	LD/C	Total
PLD	Weight	1.00	.67	.33	0	
	Obtained	.054	-	-	-	.05
	Expected	.004	.023	.008	.015	
LD	Weight	.67	1.00	.67	.33	
	Obtained	.027	.432	.054	.027	.54
	Expected	.043	.2484	.086	.162	
LD/NC	Weight	.33	.67	1.00	.67	
	Obtained	-	.027	.081	-	.11
	Expected	.088	.051	.018	.033	
LD/C	Weight	0	.33	.67	1.00	
	Obtained	-	-	.027	.27	.30
	Expected	.024	.138	.048	.09	
Total		.08	.46	.16	.30	1.00

Table 4
Specific Category Rater Agreement for Lucidity Categories

Category	Average Frequency	Index of Rater Agreement		
		Expected	Obtained	CO Kw
PLD	.065	.5320	.9699	.9357
LD	.500	.7319	.9452	.7958
LD/NC	.135	.6919	.8680	.5716
LD/C	.300	.5555	.9450	.8763
Total	1.00	.5068	.8867	.7495

Summary Discussion

The general question to which the LDRS reliability study addressed itself was as follows: Can a reliable operational definition of LDs be developed which does not require sophisticated equipment and/or a laboratory setting? Based on the results of the present investigation, the answer, for several reasons, clearly appears to be "yes." First, the LDRS proved to be quite reliable, regardless of whether the reliability assessment was made using a sample of both lucid and non-lucid dreams or a sample of lucid dreams only. Second, the only demand the LDRS makes of the subjects is that they record a report of their dreams. It does not require that they spend time in a laboratory or hook themselves up to home telemetric recording devices in order that lucidity might be assessed. Consequently, both financial and human resources may be conserved, and results obtained may be more generalizable to in vivo situations. Third, the LDRS does not require that subjects be awakened during the night to report any LDs. As a result, increased confidence can be placed in the interpretation that any success with an induction procedure is more a function of practice than of the lucidity assessment strategy (cf. LaBerge et al., 1983). (All of this assumes, of course, that LDs are recalled with at least as much frequency and accuracy as are non-lucid dreams, and that the disruption of a subject's sleep cycle through REM awakenings is seen as undesirable.)

Finally, the LDRS does not require that subjects assess their own dreams for lucidity at the time of reporting. This is an important consideration, for demand characteristics may come into play if the subjects are familiar with the rating criteria beforehand. By using the LDRS, the problems associated with self-rated lucidity are reduced, as the system enables "blind" external raters to objectively assess the degree of lucidity reported.

A potential problem with the use of external ratings is that the reports provided by the subjects may not contain the information needed to score the dream for lucidity. This problem becomes more serious when the goal is not simply to accumulate LD reports, but to assess the results of practicing an induction procedure (as discussed in Chapter III). In the latter case, a balance must be struck between keeping the subjects naive with regard to the rating criteria (to reduce demand characteristics) and providing them with enough information to make the reports meaningful in terms of lucidity.

The results of the present investigation suggest that if an individual recalls a lucid dream, he or she is, following the reporting instructions, usually able to describe it in a way which makes for relatively unambiguous assessment using the LDRS criteria. To convey a flavor of the sort of LD reports elicited by the reporting instructions, excerpts from various subjects' reports are presented below:

. . . I remember having feelings of anxiety in the dream -- worries that everyone was going to laugh at me for being naked -- but I kept reassuring myself in the dream that I knew I was only dreaming -- so not to worry. When I convinced myself that it was a dream -- I had an excellent time at the party!

. . . I could feel the knife severing my limbs and cutting me. At this point I woke myself up [as] I realized I was in a bad dream and have [sic] the capacity to wake myself.

. . . It was a tropical type setting . . . which I had never been exposed to before, and I guess this is why I knew in my dream that it could only be a dream. I was or shall I say I felt like I was right there, but yet I knew that this was only a dream [and] that I should just try to let it go on for as long as I could.

. . . I was with my friends from work atop the World Trade Centers just gazing down at the traffic when one of my friends brought up how "wild" it would be to jump off the building and live. I knew I was dreaming so I said to myself, well, why not? I was in a mood to show off . . . so, without any hesitation, I jumped . . . A few minutes had gone by so I said to myself, "OK; enough of

this falling, it's time to hit ground and prove them wrong." So, I landed smack on the pavement face up, looked at the guy I liked, got up and walked away with him.

As can be seen, the circumstances giving rise to lucidity varied tremendously -- from curiosity to anxiety to puzzlement to fear. But, in each case, there is something out of the ordinary which seems to "cue" the dreamers that their experience is a dream. Such an observation lends support to the view that prelucid questioning or "dream vigilance" (for events which could not occur in reality) may be of fundamental import to the lucid state. In addition, the response to the dream situation once lucidity has been achieved seems to vary with the nature of the dream. Lucidity arising in pleasant dreams led to the dreamer trying to prolong the experience, whereas lucidity in a more threatening dream led to the dreamer trying to escape the situation. If this is a general pattern, it would seem to have important implications for how lucid dreaming may be used in therapy. This will be discussed more fully in Chapter IV.

In sum, the present investigation established the LDRS as a reliable instrument for operationally defining degree of reported lucidity. Three of its initial five lucidity categories seemed of questionable utility for the present sample of dream reports (viz., the "False Awakenings," the

"Prelucid Dream," and the "Lucid Dream with Control Perceived but not Exercised" categories), but any decision to modify the system will require evidence that these categories are unnecessary under a broader range of conditions than were sampled in the present study. This is an important consideration, for it may be a mistake to undertake revisions on the basis of dream reports obtained in an experimental setting where the subjects were given instructions regarding the type of experience they should describe. Even though it seems unlikely that these subjects were fabricating their lucid dream reports, it is possible that the methodology utilized in the present investigation led to LD reports which were not necessarily reflective of the full spectrum of lucidity encountered *in vivo* and recounted in the literature. It may be the case that home dream reports contain significant numbers of false awakenings, for example, and thus the inclusion of a separate category for these experiences may prove necessary. Since this is an empirical question which the MILD-R training study provided an opportunity to address, the original version of the LDRS was used in the rating of dream reports obtained in the training study. Although they lacked uniformly high reliability coefficients, the reliability of the original LDRS categories was sufficient to enable one to place confidence in the belief that the system was providing a meaningful operational definition of lucidity.

If further research supports the notion that the categories in question are indeed superfluous, then it would seem expedient to eliminate or collapse the categories in order to maximize the reliability of the instrument. If, however, the categories prove to be of value, in the sense that they are used with some degree of frequency, then it would seem unwise to delete these categories merely to increase the reliability coefficients. In any event, a decision regarding the modification of the LDRS would best seem reserved until a broader sample of dream reports has been collected and scored according to its initial criteria.

Chapter III

MILD-R TRAINING STUDY

Method

Subjects

Because of the demanding nature of participation in this study (i.e., morning dream recording for eight weeks; MILD-R practice nightly for four weeks), subject recruitment was difficult. As a result, this research was forced to proceed using a heterogeneous sample of five individuals who were (a) interested in learning to increase their dream control, and (b) willing to participate for the full length of the study. Thus, a pre-experimental interview and administration of background and sleep patterns questionnaires (see Appendix D), originally intended as a means of "screening" subjects to increase the homogeneity of the sample, became instead a means of describing the individual participants. The small, heterogeneous sample limits the generalizability of the results.

Subject 1 was a 26 year-old male student. He reported no problems with nightmares, but sleep-onset insomnia occurred weekly. Subject 1 was not troubled by early morning awakenings or by dream-related awakenings during the course

of the night. He reported he was in good health and was not taking any medication. Typical morning dream recall was estimated to be one or two dreams per week. Subject 1 indicated that his dreams were not "important" to him, although they were sufficiently interesting for him to think of them frequently upon awakening. The subject estimated he had experienced one or two lucid dreams in his life, occurring many years previously, and usually arising in the course of a "quasi-nightmare." Experiences of dream control were, in his words, "rare and unpredictable." Subject 1 chose to participate out of an interest in the possibility of dream control and of relating sleep experiences to waking experiences through lucid dreaming.

Subject 2 was a 26 year-old female student. She reported that nightmares occurred on a monthly basis, and sleep-onset insomnia occurred three to four times per week. Early morning awakenings occurred weekly, as did awakenings from dreams during the course of the night. Subject 2 reported that she was in good health. The subject was taking oral contraceptives, and her physician had prescribed Flurazepam HCl (30 mg.), a hypnotic agent, to be taken when the subject had difficulty falling asleep. Estimated morning dream recall was three dreams per week. To her recollection, the subject had never experienced a lucid dream. She reported that dreams which were unusually pleasant or unpleasant were important to her, and that she would think

about them for a few days afterward in order to try to understand them. Subject 2 chose to participate because the project sounded interesting and the notion of dream control seemed attractive.

Subject 3 was a 31 year-old female office worker, referred to the Psychological Service Centre at the University of Manitoba for treatment for nightmares. The subject was experiencing nightmares three to four times per week, and reported that she was afraid to go to sleep at night for fear of them. The subject had a lengthy history of nightmares, and her complaint was that they had recently increased in frequency. The nightmares in question began shortly after the recent death of her father, and they contained themes of death and aggression. These dreams were probably associated with the loss of her father, and were likely exacerbated by the recent witnessing of separate incidents involving a stabbing and the death by suicide of a close friend's fiance. While the subject was frequently awakened during the night by her dreams, she reported that she was usually able to return to sleep without difficulty. Anxiety surrounding her nightmares led to sleep-onset insomnia. The subject was asthmatic, and took Ventolin for her attacks. Although about 20 kg. overweight for her frame, the subject was otherwise healthy. The subject's physician had prescribed Elavil (amitriptyline), a tricyclic anti-depressant, to ameliorate the subject's depression, but the

subject did not like taking the medication because, in her words, it left her feeling "zonked." The subject ceased taking the medication approximately three weeks before the study began. The subject estimated that she recalled about 14 dreams per week, but was uncertain if she had ever had a lucid dream. The subject felt that her dreams were extremely important, and reported that she thought about them every day. Subject 3 chose to participate because of a desire to reduce the unpleasant nature of her dreams.

Subject 4 was a 24 year-old female student. She reported no problems with nightmares or with falling asleep. Early morning awakenings occurred monthly, but the subject was rarely awakened during the course of the night by her dreams. Subject 4 was in good health and was not taking any medication. She estimated her morning recall of dreams to be on the order of three or four per week. The subject reported that she has experienced many lucid dreams, which, according to her estimate, occur on a monthly basis. The subject indicated that she usually becomes lucid when a dream makes her "uncomfortable" or "scared," and that she can change or end a dream by squeezing her eyes closed in the dream. Subject 4 chose to participate because she finds dreams intriguing and enjoys the control she sometimes exerts over them.

Subject 5 was a 26 year-old male employed by the federal government. He reported that nightmares occurred several times per month and that he was likewise awakened from his dreams more than once a month. The subject had no difficulty in falling asleep, nor was he troubled by early morning awakenings. Subject 5 was in good health and was not taking any medication. The subject indicated that he recalls about four dreams per week, and estimated that he had experienced two lucid dreams in his lifetime. The subject reported that he can occasionally wake himself from an unpleasant dream, and stated that he finds his dreams interesting. At the age of 20, the subject consulted a physician regarding his disturbing nightmares. A brain scan and EEG turned up negative results. Subject 5 chose to participate out of an interest in dreams and in enhancing the potential to control those which are unpleasant. (It should be noted that the subject unexpectedly began working out of province shortly after the study began. As a result, the project was conducted through the mail, with occasional telephone contact.)

Procedure

Each subject met with the experimenter for an orientation session prior to beginning the study. (This and all subsequent meetings were conducted on an individual basis.) At this initial meeting, the subjects received a standardized presentation apprising them in detail of what the

project required. It also emphasized that the data would be reported anonymously and that participation was strictly voluntary and could be terminated by the subject at any time. (See Appendix E for a copy of the handout the experimenter went over with the subjects.) The experimenter then answered any questions raised by the subjects, and arranged for a second meeting two weeks later. At the end of the meeting, the subjects were given a supply of dream report forms, patterned after the model provided by Hall and Van de Castle (1966b) (see Appendix A), and were also given a background and a sleep patterns questionnaire to complete (see Appendix D).

At the second meeting, any questions or concerns were addressed by the experimenter, and training with the MILD-R procedure began. The subjects were given a handout containing the MILD-R procedure and related explanatory material (see Appendix F). This handout was designed to facilitate the subjects' understanding of what comprises a lucid dream, of why LDs are being studied, and of their own role in the research. In addition, the handout explained the rationale for the MILD-R procedure and provided an example of how its mnemonic technique facilitates the recall of intended activities. The handout also contained a sheet on which the subjects were to record the dates of MILD-R practice and non-practice. After the subjects had read the handout, the experimenter answered any questions that arose. In order to

provide some means of ensuring that the subjects understood the procedure and how it is intended to facilitate lucidity, they were asked to explain the procedure to the experimenter. Any misperceptions or inaccuracies were corrected by the experimenter, and the subjects were asked to explain the procedure a second time if they had done so incorrectly on the first attempt. The intent of this exercise was to help maximize the likelihood that all subjects would be practicing MILD-R in similar fashion.

The subjects were then asked to practice MILD-R at least five times a week for a two-week initial practice phase. This allowed the subjects some flexibility in their bedtime schedules, and acknowledged that circumstances could arise which would make MILD-R practice impossible. After these two weeks of practice, each subject met again with the experimenter to discuss his or her experiences with MILD-R to date. After addressing any questions, the experimenter asked the subjects to explain the MILD-R procedure to him again as a means of ensuring that they had been following it correctly. Any improprieties in practice were identified and rectified prior to the subjects' embarkation on a second two-week MILD-R practice phase (again with a minimum of five practice sessions per week).

After the second two-week practice phase, the subjects each met with the experimenter for a fourth time. They were

asked to describe their experiences with MILD-R practice thus far, and the experimenter addressed any questions raised. The subjects were then told that, for the next two weeks, they should completely discontinue MILD-R practice but should continue to record their dreams as recalled each morning. A final meeting was arranged at which the subjects would turn in their dream reports and provide any additional comments regarding their participation in the study.

After the training study had been completed, the subjects were asked to rate their own dreams for lucidity according to the LDRS criteria, which the experimenter went over with them. Pearson product-moment correlation coefficients between the self- and expert-ratings were calculated, yielding an index of the extent to which the "subjective" and the "objective" ratings corresponded with each other, and suggesting how easily and accurately the subjects could learn to use the LDRS to rate their own dreams.

Finally, informal follow-up contact was made with each subject to assess whether participation in the study had any continuing (10 - 12 weeks) effects on their sleep patterns or dreams.

Once all the dream reports had been collected, they were assessed by the external raters in two lots. The first lot consisted of 56 reports from each of three subjects. The second lot consisted of 56 reports from each of the two

remaining subjects. The reports were randomized first within each subject, then between subjects, so that there was no way to identify from which phase of the study a given report came. The date and codename portions of each report were covered with a sticker containing the report's randomized identification number.

Using the LDRS, the dream reports were rated for lucidity by a trained judge who had no contact with any of the subjects, and who was therefore blind both to the identity of the subjects and to the phase of the study from which their reports came. These ratings were subjected to the time-series analysis procedure described below.

Because the experimenter had contact with the subjects and discussed some of their dreams with them, he was not completely blind to either the identity of the reporters or to the phase of origin of their reports. For this reason, his ratings of the reports would be biased, and his LDRS ratings could not be used to assess the efficacy of MILD-R practice. However, the degree of correspondence between the blind judge's and the experimenter's ratings was calculated using a Pearson product-moment correlation coefficient. This value provided a means of assessing the degree to which the blind judge, whose ratings of lucidity were the unit of time-series analysis, continued to use the LDRS in a manner highly consistent with that of the experimenter. This pro-

vided some means of ensuring that the high degree of concordance in external ratings obtained during the reliability study was maintained during the training study.

The efficacy of MILD-R practice was assessed by conducting individual time-series analyses across the blind judge's LDRS scores for each subject's morning dream reports. Time-series analysis has been described as "perhaps the most suitable statistical procedure for analyzing individual subject data" (Hartmann, Gottman, Jones, Gardner, Kazdin, & Vaught, 1980, p. 543). Cook and Campbell (1979) indicate that a time series is involved whenever there are multiple observations over time, and that treatment interventions are most commonly evaluated by post-treatment changes in level and/or slope of the time-series data. In other words, a treatment effect is inferred when there is a statistically significant interruption in the time-series data corresponding to the implementation or withdrawal of an intervention. In the case of the present study, a change in level of lucidity (as assessed by blindly-rated LDRS scores for each dream report) around the time when MILD-R practice was begun or discontinued would serve as evidence that the procedure was exerting an effect on the subjects' degree of reported lucidity.

Tryon (1982) has presented what he describes as a "simple, yet elegant" method of time-series analysis (p. 423).

The logic underlying his approach is the same as the logic underlying visual analysis of graphic data -- namely, that variability in successive data points is evaluated relative to changes in slope from one phase of the experiment to another. His method involves the calculation of the Mean Squared Successive Difference (MSSD) statistic, which represents one estimate of the variance of a time series. This value, as its name implies, is obtained by calculating the consecutive differences among data points, squaring these values, and then averaging them. The resulting statistic is independent of changes in the mean value of the time series. The ratio of the MSSD statistic to a second estimate of the variance of the series is then calculated, yielding a value known as the C statistic. The ratio of the C statistic to its standard error is referred to the normal distribution for significance testing. Significant z scores indicate that the observed changes in slope between experimental phases have a very low probability of occurring strictly on the basis of chance or random fluctuation. Tryon's procedure may also be used within experimental phases to test for stability of baseline or absence of slope within a given treatment phase.

Results

Descriptive Data

Each of the five subjects completed 56 morning dream report forms. The number of dreams reported per subject ranged from 16 to 41, with a mean of 32.6 dreams reported (see Table 5). A Pearson r conducted between the subjects' estimated weekly dream recall and the number of dreams reported during baseline yielded a negative correlation of .515, indicating that the subjects' a priori self estimates of dream recall were not very reliable.

Table 5
Number of Dreams Reported per Experimental Phase

Subject	Phase*				Total Dreams per Subject
	I	II	III	IV	
1	11	11	7	6	35
2	5	6	3	2	16
3	6	11	11	13	41
4	10	9	11	8	38
5	9	10	5	9	33
Total	41	47	37	38	163

*Note: Phase I = baseline; Phase II = first MILD-R practice phase; Phase III = second MILD-R practice phase; Phase IV = withdrawal of MILD-R/return to baseline phase.

The total number of lucid dreams reported per subject was obtained by counting the number of dream reports earning a blind rating of 2 or more on the LDRS during each phase of the study, and then summing these values. The number of LDs reported per subject varied from 1 to 13, with a mean of 6 LDs (see Table 6).

Table 6

Number of Lucid Dreams Reported
per Experimental Phase

Subject	Phase				Total Lucid Dreams per Subject
	I	II	III	IV	
1	1	1	3	0	5
2	0	1	0	0	1
3	2	1	5	1	9
4	1	3	4	5	13
5	0	1	1	0	2
Total	4	7	13	6	30

Figure 1 provides a graphic presentation of the number of LDs reported per experimental phase. As hypothesized, lucid dreams were reported with the greatest frequency during the MILD-R practice phases. Unfortunately, the small sample size and noncomparability of subjects precluded the use of statistical procedures utilizing the averaging of group data (e.g., analysis of variance) to assess the significance of this variability across practice phases.

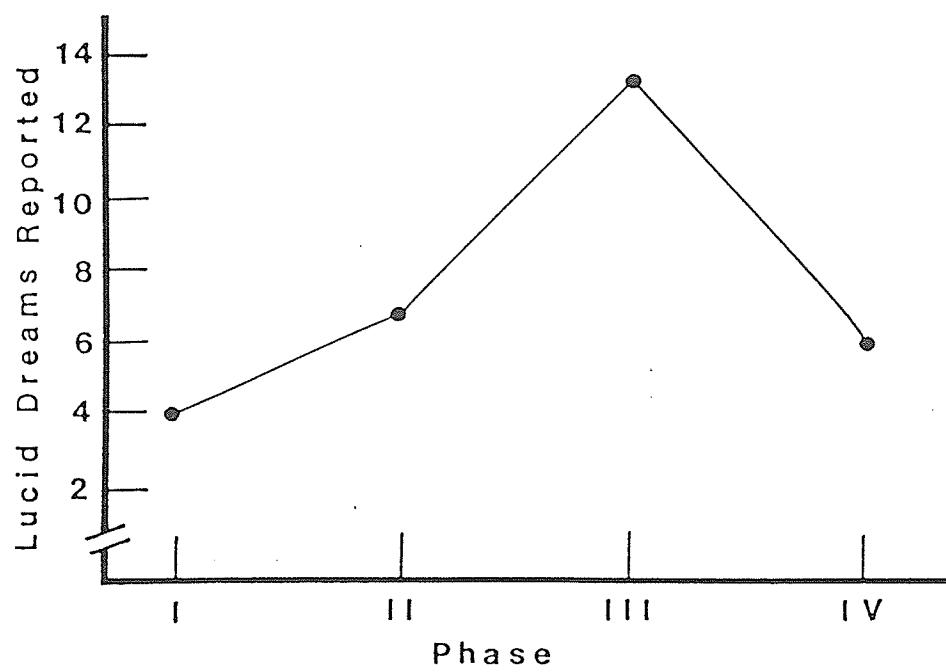


Figure 1. Total number of lucid dreams reported per experimental phase. Phase I = baseline; Phase II = first MILD-R practice phase; Phase III = second MILD-R practice phase; Phase IV = withdrawal of MILD-R/return to baseline phase.

Table 7 provides a description of the percentage of dreams judged lucid by the external rater. As can be seen, the highest percentage of dreams judged lucid occurred during the second MILD-R practice phase. Even though fewer dreams in total were reported during the second MILD-R practice phase (see Table 5), those which were reported during this phase were more likely to be judged lucid (see Table 6) than those reported during the other experimental phases. This pattern suggests that any lucidogenic effects attributable to the MILD-R procedure do not occur immediately upon initiation of practice.

Table 7
Percentage of Dreams Judged Lucid
Per Experimental Phase

Subject	Phase				Average % Lucid
	I	II	III	IV	
1	.09	.09	.43	0	.15
2	0	.17	0	0	.04
3	.33	.09	.45	.08	.24
4	.10	.33	.36	.63	.36
5	0	.10	.20	0	.08
All Subjects	.098	.149	.35	.158	.19

Table 8 presents the Pearson r correlations between the blind judge's LDRS scores and the scores provided by the

experimenter and by the subjects themselves. As might be expected, given the significant level of interrater reliability in the use of the LDRS, there was a high degree of correspondence between the two external raters. A more unexpected finding was the high degree of correspondence between the blind judge's "objective" ratings and the subjective self-ratings. These results suggest that the LDRS may be easily learned and implemented in an apparently reliable manner with very little pretraining or sophistication on the part of the subjects.

Table 8

Correlations Between Blind LDRS Ratings and Ratings
by Experimenter and by Individual Subjects

		LDRS Ratings			
		Subject			
Experimenter		1	2	3	5
Blind Rating		.91	.921	.720	.903
					.989

Individual Data

Subject 1. There was no significant trend within the baseline period, nor were there significant differences in reported level of lucidity between baseline and the first MILD-R practice phase, or between the two practice phases. However, there was a significant decrease in reported level

of lucidity between the second MILD-R practice phase and the withdrawal of treatment phase, $z = 1.71$, $p < .05$. (See Figure 2.)

The lower-than-baseline level of lucidity observed in the final phase of the study may have reflected a post-MILD-R practice suppression of lucidity, or, as seems more likely, it may have resulted from a decrease in the subject's ability and/or motivation to report his dreams.

Upon follow-up, the subject reported no lasting changes in his dreams or sleep patterns as a consequence of participation, although he noted that his recall has decreased since daily dream recording was discontinued. The subject reported no difficulty in understanding or in practicing the MILD-R technique.

Subject 2. Although the subject reported a lucid dream in the first MILD-R practice phase, this single episode was not sufficient to cause a significant difference in level of lucidity across the time series. Statistically, the plot for Subject 2 represents a horizontal line (see Figure 3).

The subject found MILD-R to be difficult to practice, but seemed to follow the procedure correctly. The subject was disappointed that she could not gain control over any dreams, but she was excited that she might be approaching this goal when, in one dream, she recognized that she was dreaming and that she should therefore be able to effect

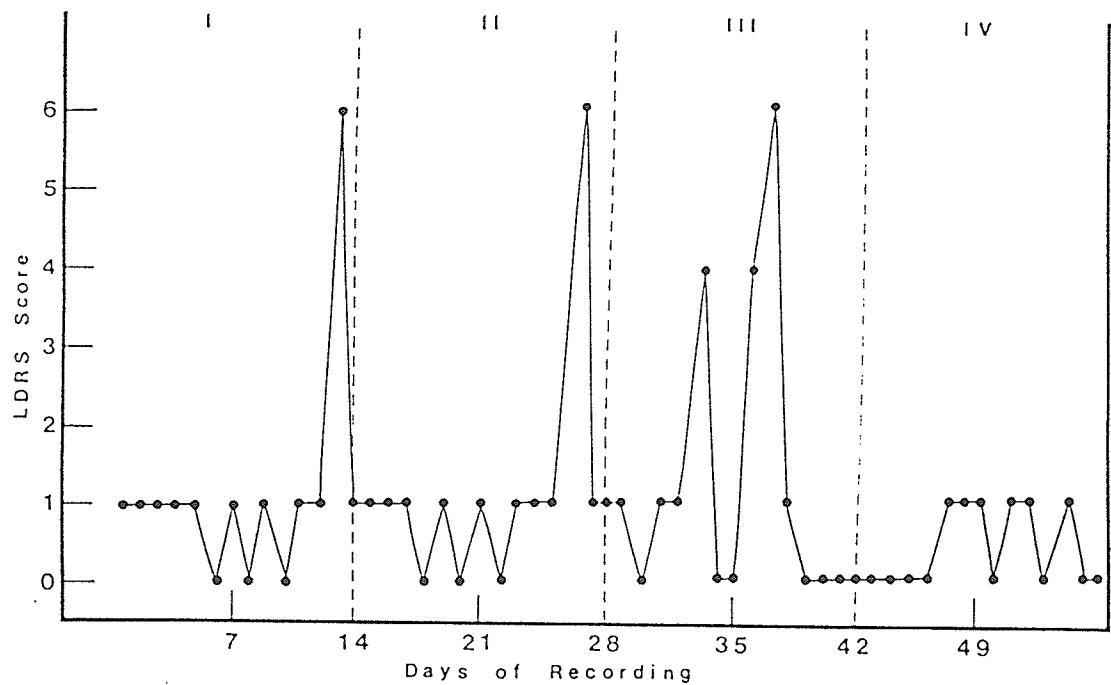


Figure 2. Daily LDRS scores as a function of MILD-R practice for Subject 1. Phase I = baseline; Phase II = first MILD-R practice phase; Phase III = second MILD-R practice phase; Phase IV = withdrawal of MILD-R/return to baseline phase.

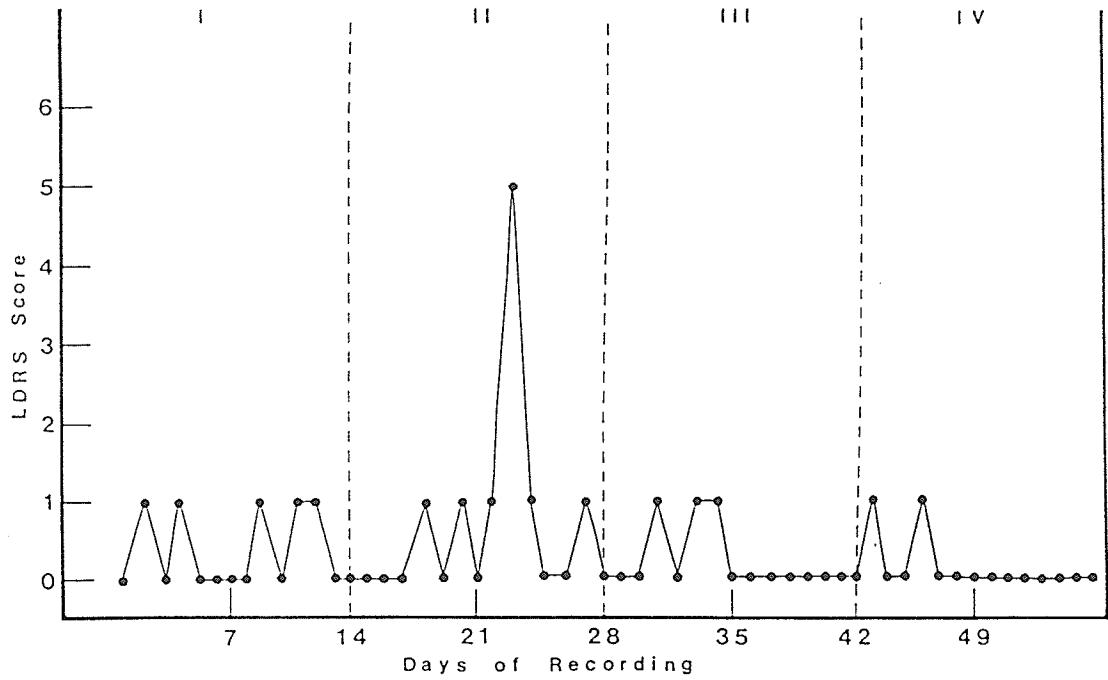


Figure 3. Daily LDRS scores as a function of MILD-R practice for Subject 2. Phase I = baseline; Phase II = first MILD-R practice phase; Phase III = second MILD-R practice phase; Phase IV = withdrawal of MILD-R/return to baseline phase.

changes (although no changes were reported). The subject noticed no lasting changes in her dreams or sleep patterns as a result of participation in the study.

Subject 3. A significant baseline trend existed for Subject 3, $\bar{z} = 1.998$, $p < .05$, indicating that her rate of spontaneous lucid dreaming may have been higher than she estimated, or that baseline recording in itself may have had some lucidogenic effect.

Even with the trend in baseline, however, the initiation of MILD-R practice did result in a significant upward shift in reported level of lucidity, $\bar{z} = 2.30$, $p < .01$. There was also a significant upward shift in reported level of lucidity between the first and the second practice phases, $\bar{z} = 1.90$, $p < .05$, as well as a significant downward shift between the second practice phase and withdrawal, $\bar{z} = 1.71$, $p < .05$. Given the increased frequency of LDs during the second practice phase, it seems reasonable to conclude that the significant shifts in level across the time series (see Figure 4) were a function of the MILD-R procedure and not merely spontaneous events.

The subject found the MILD-R procedure to be difficult to follow, and, at the time of the third meeting with the experimenter, it was discovered that she had not been including the third step of the technique (i.e., "Imagine yourself being in your sleeping body and realizing that what

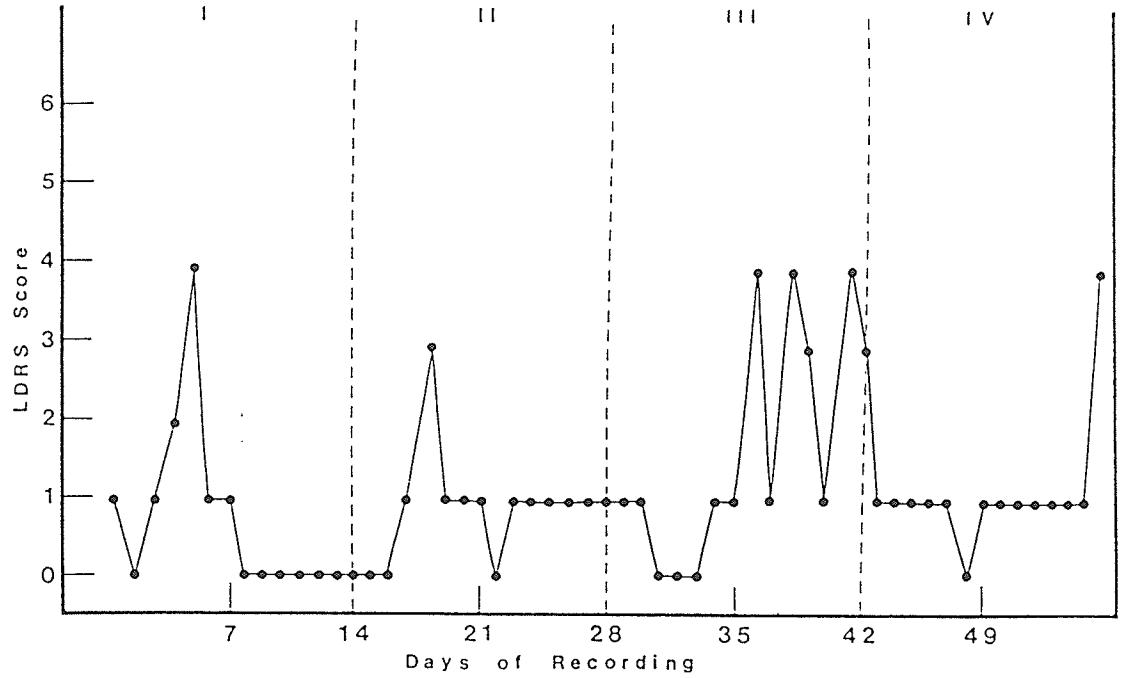


Figure 4. Daily LDRS scores as a function of MILD-R practice for Subject 3. Phase I = baseline; Phase II = first MILD-R practice phase; Phase III = second MILD-R practice phase; Phase IV = withdrawal of MILD-R/return to baseline phase.

is going through your mind is a dream") in her regimen because she found it "too hard." Some time was spent in aiding her to imagine this event, and the situation was rectified prior to her embarkation on the second MILD-R practice phase, where, perhaps not coincidentally, her lucidity increased significantly.

The subject's frightening dreams decreased shortly after MILD-R practice began, at which point, however, she began to note an increase in "weird" dreams. This heightened bizarreness may have been a function of MILD-R practice, for the procedure could have led to an increased recognition on the subject's part of the improbability of some of her dream experiences, without necessarily leading to lucidity (at least so far as it was defined by the LDRS). The dream bizarreness did not trouble the subject, although she reported that she sometimes wondered why she would "dream something so weird."

An unexpected positive benefit of practicing the MILD-R procedure was the palliative effect it exerted over the subject's sleep-onset insomnia. It seems the procedure was of such a cognitively-demanding nature that, when coupled with the subject's motivation to improve, it led to a successful refocusing of the subject's attention away from her negative thoughts surrounding sleep. This resulted in a reported decrease in sleep-onset latency. The decrease in frightening

dreams around this time may have also had an effect upon the bedtime anxiety, as might have other, unidentified factors, but cause and effect are not clearly delineated in this instance.

Subject 4. The subject's claim of monthly spontaneous occurrences of lucid dreaming was supported by the baseline data, although the single LD which occurred there was not sufficient to cause a statistically significant trend within the baseline period. The subject reported a number of LDs throughout the practice phases, but the rapidly alternating "peaks and valleys" form of the time series (see Figure 5) did not lead to the establishment of any significant trend across the first three phases. However, the gradual decrease in level of lucidity apparent during the withdrawal phase did represent a significant departure from the trend established in the previous phases, $z = 2.69$, $p < .01$.

The subject reported that the technique, although difficult to practice, did seem to increase her frequency of LDs. The subject also reported that her dreams tended to be bizarre for a number of weeks after she completed participation in the study. As of this writing, however, the subject's dreams were reportedly back to their pre-experimental pattern of content. The bizarreness may have reflected a sort of post-experimental dream vigilance, whereby the content was noted as strange, but not sufficiently so for lucidity to arise.

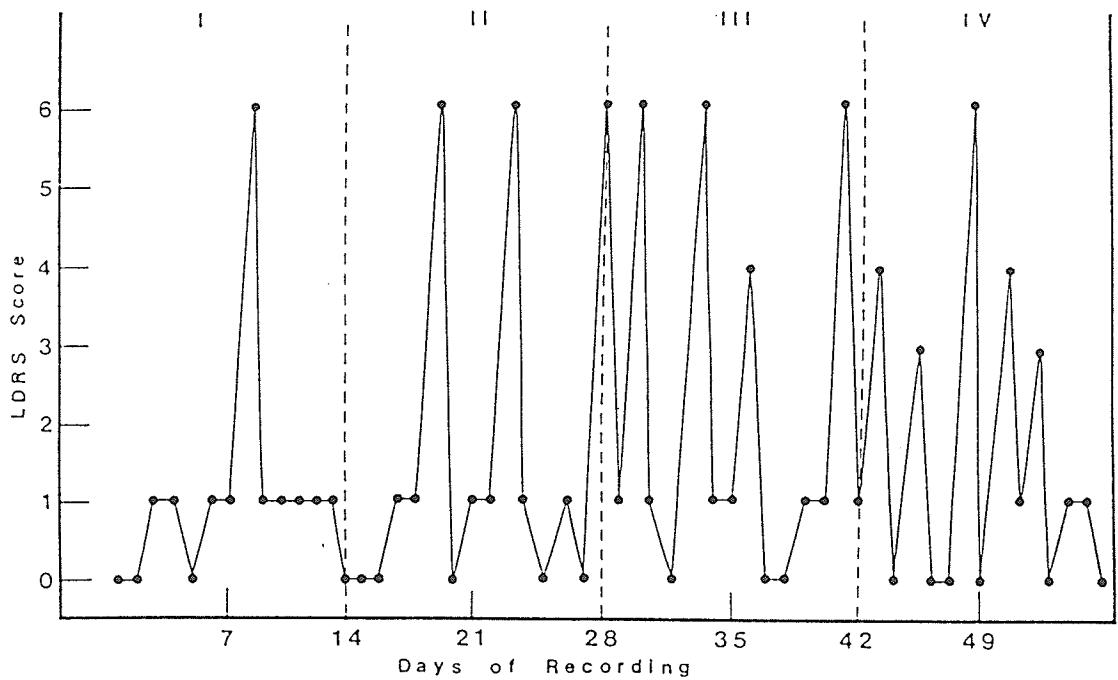


Figure 5. Daily LDRS scores as a function of MILD-R practice for Subject 4. Phase I = baseline; Phase II = first MILD-R practice phase; Phase III = second MILD-R practice phase; Phase IV = withdrawal of MILD-R/return to baseline phase.

Subject 5. Although the subject reported a lucid dream midway through the first MILD-R practice phase, and experienced a false awakening during the second practice phase, these events were not sufficient to cause a significant difference in level of lucidity across the time series. As with Subject 2, the plot represents a horizontal line (see Figure 6).

The subject reported that he found the procedure to be difficult to practice unless especially motivated for some reason. The subject reported that he did not notice any change in his dreams as a result of participation, although he did note that recording his dreams did seem to improve his recall of them.

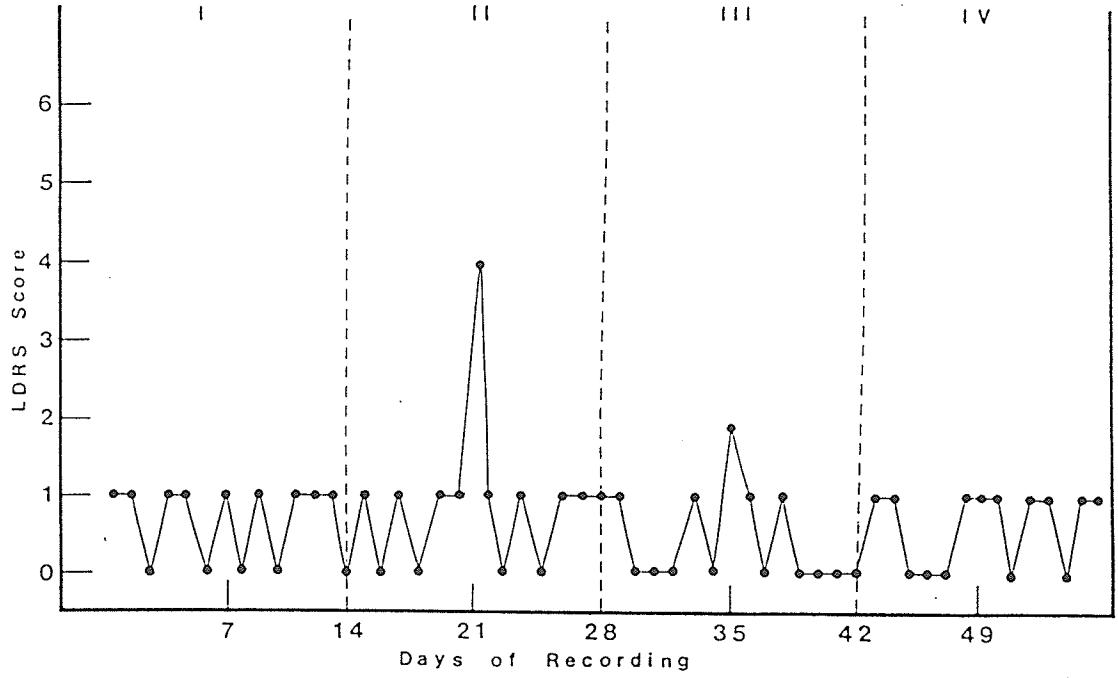


Figure 6. Daily LDRS scores as a function of MILD-R practice for Subject 5. Phase I = baseline; Phase II = first MILD-R practice phase; Phase III = second MILD-R practice phase; Phase IV = withdrawal of MILD-R/return to baseline phase.

Summary Discussion

The general question to which the MILD-R training study was addressed read as follows: Can the frequency of LDs be reliably increased in individuals possessing no special sleep-related abilities other than dream recall? The results of the present study suggest that, with regard to the MILD-R procedure, at least, the answer is a cautious and qualified "yes."

The question seems appropriately answered in the affirmative because each subject reported at least one lucid dream during the course of the study, and the majority of these LDs occurred during one of the two MILD-R practice phases. These results are tempered, of course, by the possibility that some of the LDs observed were of a spontaneous nature. Moreover, an unequivocal "yes" to the above question is complicated by the pattern of the time-series data, which indicated that significant shifts in level of lucidity were not obtained for a majority of the subjects. This latter occurrence may seem incongruous -- especially for Subjects 1 and 4, whose frequency of LDs seems, upon examination of the data, to have increased fairly substantially during the post-baseline phases -- but it makes more sense when the nature of time-series analysis is considered.

Time-series analysis depends upon shifts in level of a dependent measure to assess the impact of the introduction

or withdrawal of an independent variable or treatment (Cook & Campbell, 1979). It seems in the present study that the MILD-R "treatment" did have an impact on subjects' lucidity, but, because the effect was often observed on a nightly basis, and not across a series of nights, the overall shift in level of lucidity was statistically negligible. In most instances, it seems that a minimum of two consecutive reports of LDs were necessary to cause a statistically significant change in level of lucidity (e.g., Subjects 1 and 3). However, a rapid alternation between lucid and non-lucid nights, as observed in Subject 4, for example, tends to statistically "cancel out" any effects, leaving the impression that the data represent a straight line function. That a straight line does not best describe the data in this case is apparent from an inspection of the graphic presentation in Figure 5. It appears, then, that the interpretation of the data should not rest exclusively upon the issue of whether shifts in level of lucidity across phases are statistically significant, but should also take into account the pattern of the data as determined by visual inspection, particularly if there are observable but transient (i.e., non-consecutive) changes in nightly level of reported lucidity.

Three of the subjects (1, 3, and 4) reported LDs during the baseline recording phase. Subjects 1 and 3 reported at the beginning of the study that, to the best of their recol-

lection, they had only experienced one or two lucid dreams over the course of their lives. The observation, then, that these lifetime estimates of LD frequency were either met or exceeded during baseline seems to merit some discussion.

Two factors which may be of importance with regard to the appearance of LDs during baseline are as follows: First, LaBerge (1981) reported an increase in his frequency of LDs as a function of heightened interest in the phenomenon. It is therefore possible that a similar process was also occurring in the present study, although these subjects had a different sort of "interest" in the phenomenon than did LaBerge, who was preparing his dissertation on lucid dreaming at the time that he reported his observations. A second factor may have been the impact of daily dream recording. As Gackenbach (1985) noted in a recent review, recall of sleeping imagery or dreams has repeatedly been positively related to the lucid dreaming ability. Since the recording of dreams is one way by which an individual's dream recall may be increased, it is possible that the baseline recording, which several subjects noted as improving their recall, may have also facilitated lucidity. It seems unlikely, though, that a few days of dream recording could exert as much of a lucidogenic effect as would be necessary to account for the baseline LDs reported by Subject 3, for example, otherwise one might expect the sleep and dreams literature to be rife with observations that morning dream

recording led unexpectedly to some subjects experiencing lucidity. Such is not the case, however, and so the notion that morning dream recording was solely responsible for the LDs observed during baseline does not seem an adequate explanation.

Perhaps the most satisfactory explanation for the LDs occurring during baseline is that the subjects in question had, over the course of their lives, experienced many more LDs than the one or two they estimated at the beginning of the study. These LDs were either not recalled upon awakening (which seems unlikely, given the emphasis in the literature upon the salience of the lucid experience [e.g., Green, 1968]), or else the subjects (and perhaps dreamers in general), having no particular reason to keep track of the phenomenon, simply did not remember the LDs they had experienced over the course of their lives. As such, the LDs occurring during baseline, and perhaps also the isolated LDs experienced during the study by Subjects 2 and 5, may reasonably be interpreted as spontaneous events which may or may not have been influenced by the increased interest and attention brought to bear on dreams by participation in the study.

If, as seems likely, the retrospective self-estimation of lucid dream frequency is as unreliable in general as it seems to have been in the present study, then the continued

use of this approach as a means of assessing lucidity (often for use as an independent or a dependent variable) seems highly questionable. Lucid dream researchers might do well to use an assessment technique which has measurable reliability, such as the LDRS, in their endeavors. Continued failure to use a technique which has measurable reliability leads to results which are, at best, difficult to interpret and, at worst, meaningless.

Turning now to the practice phases, the MILD-R procedure appears to have had an interesting effect on the nightly awakenings of Subjects 3 and 4, who, perhaps not coincidentally, also reported the most success with the procedure. Both of these subjects reported that, during any awakenings over the course of the night, the first thing to often come to mind was the intention to become aware of dreaming. The present study provided no means by which any lucidity subsequent to such occurrences could be assessed, as the subjects did not record their awakenings, but it seems that the presleep intention to become lucid was, at least for these subjects, successfully remembered over the course of the night.

This is an important finding, for it suggests that LaBerge's (1980a, 1980b, 1981) views regarding time of practice might need modification. LaBerge stated that mnemonic induction was of maximum effectiveness when practiced during

spontaneous nightly awakenings. The present results do not challenge this statement, but they do suggest that the less restrictive approach of asking subjects to practice the procedure when they retire might, for at least two reasons, be an alternative worthy of serious consideration:

1. A presleep practice period means that any interested person might practice the technique, not just those who spontaneously awaken from their dreams with some regularity.

2. There is the notion that a presleep induction procedure, because it plants a suggestion that the subject retains throughout the night, may be more likely to exert a lucidogenic effect by simple virtue of the fact that it has the potential to influence more REM periods. (Lucidity seems to be almost exclusively a REM phenomenon [e.g., LaBerge et al., 1981a, 1981b; LaBerge et al., 1983].) A subject awakening spontaneously, as LaBerge (1980b) indicates, is most likely to do so in the early morning hours. This means that a lucid dream induction procedure implemented at that time has the potential to influence fewer REM periods than does a presleep induction procedure, which has the potential to influence each REM period of the night (although the greatest amount of REM occurs in the last third of the night).

The logical implication of this finding for future research is that, if a presleep self-suggestion induction pro-

cedure such as MILD-R is to be implemented, it may be useful to assess the subjects' suggestibility beforehand, as this variable may be related to the effectiveness of the induction, even though its relationship to the spontaneous lucid dreaming ability is unclear (Gackenbach, 1985). (The relationship between suggestibility and lucid dream induction will be discussed further in Chapter IV.)

Subject 3, who was referred to the author for treatment for nightmares, experienced marked improvement in this area during the course of the study. It is difficult to unequivocally attribute all of the positive changes observed in her sleep behavior (e.g., decreased frequency of frightening dreams; decreased sleep-onset latency) to the lucidity training, but, by the same token, it seems to be overly conservative to assert that all of the changes were of a spontaneous nature. It is granted that the nightmares she was experiencing may have been self-limiting, given that they were apparently precipitated by a series of stressful life events. This interpretation, however, does not fully acknowledge the fact that the subject reported a history of nightmares dating back at least 10 years. Moreover, it should be noted that the subject's presenting problem was an intolerable increase in the frequency of nightmares, not the development of a new symptom. The potentially therapeutic role of lucidity training seems further supported by the observation that, during the course of treatment, several oth-

er stressful life events occurred (e.g., testifying for the prosecution at an attempted murder trial; death of her grandfather; job interviews), but the frequency of nightmares did not increase to their pre-treatment level. This suggests that lucidity training may have been at least partially responsible for the reported reduction in disturbing sleep mentation. Without further research, though, it is not possible to make a definitive statement regarding how much of the nightmare reduction was due to lucidity training, and how much was due to involvement in therapy or other factors.

It appears that even though Subject 3 was unable to achieve volitional control over her dreams, the fact that she was often able to recognize when she was dreaming may have been an important factor in reducing the unpleasant nature of much of her sleep mentation. This situation may be interpreted by reference to Heisenberg's Principle of Uncertainty, which stated in part that the very act of observing a phenomenon irrevocably changes that phenomenon (Barnett, 1952). In the present case, it seems that observing one's dreams while lucid seems to be one way of "irrevocably" altering their unpleasant content, even if no "overt" attempts at dream manipulation are reported. To the extent that this is a general phenomenon, it suggests that the lucid dream may not be a suitable analogue to non-lucid dreams, and that it should be studied as a phenomenon unto itself, not as a new paradigm for the study of non-lucid dreams.

Subjects 3 and 4 reported LDs during the post-MILD-R withdrawal of treatment phase. In the case of Subject 3, the frequency of LDs in this phase was approximately equal to that obtained during baseline, but for Subject 4 the frequency of LDs was much greater than that obtained during baseline. This persistence of lucid dreaming after discontinuation of induction suggests that MILD-R practice might exert some lucidogenic carry-over effects. It is interesting to note, however, that the level of lucidity for Subject 4 was significantly lower here than during baseline. According to the subject's reports, the potential to control the dream once she became lucid was neither recognized nor exerted to as great an extent during withdrawal as it was during the practice phases.

These findings suggest that a within-subjects research design, while advantageous in terms of ensuring consistency among the comparison sample, may be complicated by the carry-over effects. Moreover, it is apparent that the effects of the MILD-R procedure do not occur immediately upon implementation of practice, and this, too, complicates the interpretation of its impact. In total, however, it seems reasonable to conclude that, if nothing else, the presleep mnemonic induction of ludid dreams does seem to be worthy of further research. The limitations of the present study do not allow one to make inferences concerning the efficacy of MILD-R relative to other induction procedures, but it does

seem apparent that MILD-R is a more effective means of inducing lucid dreams than is morning dream recording alone.

In addition to providing the first systematic investigation of the effects of practicing a mnemonic LD induction procedure, this study points out the limitations of using a single-case design. While the pooled data from all subjects were impressive (see Table 6 and Figure 1), the small sample size means that the "better" subjects could inflate these group values by contributing disproportionately to the results. Future research with larger samples seems necessary to reduce this problem and to address the issue of increasing lucidity between as well as within subjects. With larger samples, one might also develop more elaborate control groups to aid in ruling out rival explanations for the obtained results. For example, one might devise a comparison between MILD-R and a "placebo" induction procedure to test for subjects' expectancy effects, or one might run conditions with groups of subjects who are aware versus groups of subjects who are unaware of the aim of the MILD-R procedure. One might also test MILD-R against the original MILD procedure, or perhaps vary the time of practice from presleep to sometime during the course of the night.

Each of these proposed studies addresses some important questions regarding the mnemonic induction of lucid dreams. The actual conduct of such research will be difficult,

though, because of the problems associated with acquiring and maintaining a large number of subjects for several weeks (which is the main reason why I was unable to implement such a strategy in this study). Apart from paying subjects for their participation, it appears that the most practical way of securing motivated subjects is to recruit from a clinical population, but this may restrict the generalizability of the results. It seems, then, that the study of LD induction is to be fraught with difficulties, but this does not seem like sufficient reason to abandon the endeavor, especially since it appears to have practical applications apart from its theoretic interest.

Chapter IV

GENERAL DISCUSSION

The Lucid Dream Rating System reliability study indicated that the "False Awakenings," the "Prelucid Dream," and the "Lucid Dream with Control Perceived but not Exercised" categories were of little discriminative value for the sample of dream reports generated to assess the interrater reliability of the LDRS. However, because it was not known whether this was truly reflective of redundancy on the part of these categories, or if it was instead a product of the reporting instructions provided to the Introductory Psychology students, a decision was made to reserve judgment on the revision of the LDRS until further data could be collected. This led to the use of the original 6-point LDRS in the rating of the home dream reports obtained from the lucidity training subjects.

As it turned out, the "False Awakenings" category was used twice by the external rater, the "Prelucid Dream" category was used five times, and the "Lucid Dream with Control Perceived but not Exercised" category was used only once. These figures suggest that it may be useful to eliminate or collapse the questionable LDRS categories, leading to a proposed revision of the system.

Based on the results of the reliability and training studies, it seems that the lucidity continuum may be reliably divided into three areas -- dream vigilance, dream awareness, and dream control. The first area, described by Green (1968) and Ogilvie et al. (1982b) as "prelucid," was reflected by the original LDRS categories of "False Awakenings" and "Prelucid Dream." This study demonstrated the relatively low frequency of usage of these categories, but it also underscored the important role that dream bizarreness seems to play in lucidity. Taken together, these factors suggest that a reconceptualization of the prelucid state may be valuable.

A useful way of construing the prelucid state may be through reference to its primary characteristic -- a vigilance for improbable or incongruous dream events. This vigilance seems to be heightened as a result of lucidity training, and it is manifested by the subjects' reported increase in the bizarreness of their dreams. Because this bizarreness does not always lead to lucidity, though, it seems a misnomer to label such occurrences as "prelucid." Similarly, false awakenings often initiate a lucid state (Green, 1968), but this is by no means an inevitable consequence of them.

From this, it seems that the revised LDRS category falling between the "non-lucid" and "lucid" domains, rather

than being separated into the "False Awakenings" and "Prelucid Dream" categories, should more appropriately be designated as a "Dream Vigilance" category. This new term more clearly reflects the nature of content of the dreams categorized under it, and it also recognizes that dream vigilance, while important, does not necessarily lead to lucidity in a reliable manner.

The original LDRS category of "Lucid Dream" reflects the belief that the key component of the lucid state is an awareness of dreaming while the dream is in progress. The reliability and training studies both indicated the value of this category. However, the original LDRS category of "Lucid Dream with Control Perceived but not Exercised" was used neither frequently nor very reliably. It seems, then, that this latter category may be collapsed into the "Lucid Dream" category, yielding a new classification which might be more appropriately labeled as "Dream Awareness." This new term acknowledges that the awareness may be only of dreaming (i.e., lucidity proper), or that it may also refer to an awareness both of dreaming and of the potential to effect changes in the dream (even though the control may not be directly manifested).

The original LDRS category of "Lucid Dream with Control both Perceived and Exercised" was shown by both the reliability and the training studies to be a useful classifica-

tion. The proposed revision to this LDRS category does not reflect any changes in the rating criteria, but it does suggest the adoption of the less unwieldy label of "Dream Control." This new term seems appropriate in that it captures the essential characteristic of the dreams to be categorized under it, and it also eliminates the now unnecessary distinction between the present category and the former category of "Lucid Dream with Control Perceived but not Exercised" (which has been collapsed into the "Dream Awareness" category for the proposed revision of the LDRS).

For the sake of interest, a differential-ordinal (DO) weighted Kappa (K_w) coefficient of interrater reliability was calculated for the revised LDRS categories. (These post hoc data are presented in Appendix G.) Following the procedure outlined by Cicchetti et al. (1978), the calculations were conducted using the same sample of dream reports as was used to assess the reliability of the original system. It will ultimately be left for future research, however, to demonstrate whether the categories of the revised LDRS are sufficient to capture fully the nature of the lucid dream, or whether they need to be supplemented by other, perhaps unanticipated, categories (or perhaps collapsed even further). In any event, the present research has provided what appears to be a reliable and easy to use instrument for operationally defining degree of reported lucidity.

Predictably, perhaps, the lucidity training results were neither so positive nor so clearly interpretable as the LDRS reliability study results. It does appear that the MILD-R procedure shows promise, but the small, heterogeneous sample makes one cautious in terms of generalizations about its efficacy. One generalization that can be made with some confidence, though, is that the subjects typically found MILD-R to be difficult to practice. Even though the MILD-R instructions seem clearer, easier to follow, and less disruptive than those of LaBerge's (1980b) original procedure, subjects still experienced some difficulty, particularly with the transition from imagining that they can see themselves having a dream to imagining that they are now aware that they are dreaming (MILD-R steps 2 and 3; see Appendix F). Future research using a larger, more homogeneous "normal" sample is necessary to more accurately delineate the conditions under which MILD-R is of value.

One factor which may be of importance is the subjects' ability to imagine creatively. The role of imaginal ability in lucid dream induction is unclear at this point, but it would seem to be an area worthy of further exploration. For example, Barber and Wilson (1979) found that creative imagination skills are associated with suggestibility. Given that MILD-R is a presleep self-suggestion technique, steps to increase a subject's imaginal abilities (e.g., guided fantasy) may also increase the efficacy of the induction

procedure. That this might be a fruitful area of investigation seems underscored by the recent results of Dane and Van de Castle (1984), who found that suggestibility is positively associated with the ability to induce LDs in an experimental setting.

Future research might also endeavor to discover whether the MILD-R procedure can be further simplified. It may be that an individual's understanding of the procedure will be enhanced by breaking down some of the MILD-R steps into smaller sub-steps. An example from the training study will help illustrate the potential utility of this approach:

As described in Chapter III, Subject 3 had particular difficulty with imagining herself being asleep and at the same time realizing that she was dreaming. I helped the subject to imagine this event by introducing a more gradual transition between MILD-R steps 2 and 3. The strategy involved the subject imagining the following series of events: The subject was to first imagine that she was composed of two separable "selves" -- an observer and a dreamer. The "dreamer" was to lie asleep in bed, while the "observer" was to stand at the foot of the bed and watch the dreamer. The observer also had the omniscient power of being able to "read the mind" of the dreamer. Once the dreamer began dreaming, and the observer was able to identify that the dreamer was dreaming, the observing "self" was to rejoin the

dreaming "self" in bed. With the two "selves" reunited in this fashion, the subject was told to imagine that the dreaming would continue, but with the new realization that what was being experienced was a dream. (The other MILD-R steps were understood by the subject and were not reinterpreted for her.)

The subject was able to more easily follow this sequence of imaginary events, and the LDRS scores subsequent to the additional training support the contention that the new description of the MILD-R procedure was capable of exerting a greater impact over her sleep mentation than was her original practice regimen. Whether other subjects might also benefit from a similar procedure is an empirical question for future research to address.

In future, it seems that a longer practice period (e.g., six or more weeks), as well as frequent (e.g., weekly) "booster" sessions, in which the MILD-R procedure and its intent are reiterated, would bode well for any lucidogenic effects attributable to the procedure.

The MILD-R training subjects were, to a large extent, highly concordant with the external rater in the assignment of LDRS scores to their morning dream reports. This was interpreted as a reflection of the extent to which the rating system could be easily and reliably used by non-experts. Another implication of this finding is that, to the extent

one is confident that demand characteristics will not pose a serious threat to interpretability, one might devise a strategy whereby the training subjects rate their own dreams at the time of reporting. This would give the scoring an immediacy which a post hoc approach does not possess, and it might thereby avoid any distortions in recall associated with an increased latency to rate the reports. The present study was more concerned with reducing potential threats to interpretability than with acquiring immediacy in subjective self-ratings, so the subjects here were kept naive with regard to the LDRS scoring criteria, but future research might find it necessary or useful to have the subjects rate their own dream reports upon awakening (or provide ratings instead of dream reports). The present research provided some initial evidence that naive subjects might easily learn to use the LDRS to rate their own dream reports with a degree of accuracy akin to that of an objective expert.

Lucid Dreaming as an Altered State of Consciousness

Much of the lucid dream research either implicitly or explicitly makes the point that lucidity is a discrete state of consciousness (e.g., Tart, 1979). This is typically accomplished by bestowing upon lucidity a host of characteristics which help to distinguish it from other states of consciousness. LaBerge (1983) has made some of the more speculative claims regarding the nature of the lucid state,

suggesting, for example, that LD research has the potential to resolve the "mind-body" problem, but he is not alone in these views (e.g., Gackenbach, 1985). Although stopping short of claiming that lucidity is a discrete physiological state, LaBerge said in a recent interview (cited in Hooper & Teresi, 1985) that lucid dreaming has the unique potential to lift one to a mystical, transcendent plane of reality, and may also promote "psychic healing" of physical injury. It is from writings like this that one begins to develop the notion that many lucid dream researchers feel lucidity is possessed of qualities beyond those inherent in either the waking or the non-lucid dream states.

Given the evidence that EEG sleep patterns obtained during lucid dreaming are not discriminable from the patterns obtained during non-lucid dreaming (e.g., Ogilvie et al., 1982b), it would seem premature to afford lucidity a position as a discrete state of consciousness. Perhaps a more parsimonious view would be to assert that the most important feature of dream lucidity -- the potential to effect voluntary changes in the dream -- is but one component of dream content. Some support for this notion has been provided by Hauri, Sawyer, and Rechtschaffen (1967), who conducted a factor analysis of dream content. Of the 43 variables assessed, only eight factors emerged; one of which was identified by the researchers as "Active Control." In dreams scoring high on this factor, the dreamer was report-

edly active and exerted control over dream events. These attributes, when combined with the direct nature of the control, suggest that the factor identified by Hauri and his colleagues is very similar to the control experience described by lucid dreamers.

If one can assume that active control is indicative of lucidity (as was done in LaBerge et al., 1981a, 1981b, for example), then it seems unnecessary to posit a new state of consciousness when, for all intents and purposes, the phenomenon seems to be adequately described by the extant state of REM dreaming. This reframing of the lucid state does not detract from the potential psychological import of dream control, although it does suggest that one should use the term "lucid state" with care, realizing that it is a convenient descriptor for an element of dream content rather than a reflection of a discrete state of consciousness.

Some Therapeutic Applications of Dream Control

The notion that one might be able to exert volitional control over the events in an ongoing dream is probably the most intriguing aspect of dream lucidity. While this potential for control has been fairly widely exploited in the sleep laboratory (e.g., LaBerge et al., 1981a, 1981b), there is little research concerning the clinical applications of dream control through lucid dreaming. It is somewhat surprising that there is more laboratory than clinical research

being conducted with LDs, for, in my view, the most immediately apparent reason to study the phenomenon concerns its potential as a way of gaining control over dreams which may be unpleasant or troublesome. Moreover, considering the problems associated with recruiting and maintaining experimental subjects' cooperation over an extended period of time, a trend toward the use of clinical samples -- which may be more motivated -- might be expected. At this point, however, references to clinical applications of dream lucidity tend to be infrequent, and, when they are referred to, it is usually in a speculative manner.

To illustrate, Garfield (1975b) suggested that the dream state might be used as a means of increasing one's assertiveness. Her reasoning was that if an individual were to take charge of the dream situation by confronting any threatening characters in the dream, there would then be a transfer of this ability to the waking state, resulting in an increase in one's ability to assert oneself in interpersonal situations. It is not clear why she expects this transfer from the dream to the waking state to occur, but she does say that her approach to assertiveness training might be more efficacious than imaginal training or role-playing because dreams (in her view) are more vivid and realistic than are scenes imagined while awake. Unfortunately, Garfield does not present any data by which one might evaluate these claims.

For his part, Hearne (1981) has speculated on how LDs might be useful as a means of presenting phobic individuals with situations in which they can vividly "face their fears." It is Hearne's contention that this "dream" exposure might aid persons to more readily confront fearful situations *in vivo*, and in this respect it is similar to the implosive therapy approach, in which individuals are to imagine themselves surrounded by a particular phobic stimulus (Last, 1985). No research has systematically investigated Hearne's claim, however.

A seemingly more practical approach toward the clinical use of lucid dreaming has been proposed by Halliday (1982). He outlined how a clinician might use dream lucidity to reduce the frequency and/or intensity of traumatic nightmares. Halliday presented a case study involving a client who was troubled by a recurring dream in which he relived a serious farm accident. The therapeutic strategy involved teaching the client to alter a small detail in the dream scenery once he became aware that he was dreaming. The result of this intervention was an immediate change of dream scenery -- from the traumatic situation to a more pleasant one. Two weeks later, the subject reported that the traumatic dream had not reoccurred.

The generalizations one might make from such a study are decidedly limited. Yet, the value of an approach such

as Halliday's seems to be supported by the results of the MILD-R training study, in which one subject adopted a strategy very similar to that described above.

The potential to alter dreams in progress, and to thereby reduce their unpleasant nature, was reflected most dramatically in the training study by Subject 4. Subject 4 indicated that she had possessed the ability to alter unpleasant dreams since childhood. Her self-taught strategy was to tightly squeeze her (dream) eyes closed whenever she encountered a dream situation which was unpleasant. The result of this behavior was an immediate change in the dream scenery -- described by the subject as akin to switching channels on a television set. For Subject 4, the lucidity training seemed to augment this predisposition to alter unpleasant dreams. Moreover, the subject no longer had to squeeze her eyes closed to alter the dream. Now, she could simply say to herself, "It's time to take control," and then, with some measure of success, proceed to either change the scene completely, or, as was more typical, to alter only those parts of the dream which she found disconcerting.

The lucidity training also enabled her to effect changes in dreams which were not unpleasant, allowing her to "experiment" with dream control for its own sake. Indeed, on occasion the subject went so far as to induce frightening events in order that she might determine the extent of her

control. For example, in a dream reported late in the second MILD-R practice phase, the subject related the following narrative:

. . . We were all sitting in a kitchen . . .
and we were finishing supper. I remember telling myself that the dream was boring and I wished for something scary to happen. The next thing I know, my dad . . . was holding a huge knife and pointing it directly at me. He started to come closer to me and looked like he was going to hurt me. Then I told myself not to be scared, that it was only a dream and that the knife would disappear. Upon thinking that the knife would disappear, it did just that. The person holding the knife looked very shocked . . .

From this example, one might infer that lucidity may be useful not just for reducing unpleasant dream content, but also for affording the dreamer the opportunity to experience things that he or she might not ordinarily be able (or even wish!) to experience in waking life. Without any empirical data regarding the potential psychologic advantages of such an ability, though, it seems wisest to conclude that lucid dreaming is most valuable as a means through which one might gain some degree of mastery over a realm of experience which one often confronts but rarely controls. This mastery may eventually be shown to have consequences for the dreamer in

waking life, but, for the present, it seems that the potential to reduce the frequency and/or intensity of unpleasant dreams is the chief therapeutic application for dream control through lucid dreaming.

Apart from any therapeutic value inherent in controlling the dream content, there may be some clinical utility in examining the nature of any changes the lucid dreamer undertakes in his or her dreams. If one views the potential for dream control as providing the dreamer with a "blank slate," onto which he or she might project virtually any event imaginable, then it becomes reasonable to view the LD as a sort of projective technique. By examining the patterns of content chosen by an individual in his or her lucid dreams, the clinician may be able to gain some knowledge regarding potential areas of exploration in therapy. For example, there may be repeated themes of aggression or sexuality. Or, there might be a pattern of avoidance in which the dreamer chooses to change the dream scene rather than face troublesome events. Each of these patterns of content might be interpreted as a reflection of aspects of the individual's personality and/or way of coping with life stresses, controlling anxiety, and so on. This information would probably emerge in other ways during the course of therapy, but the therapist would be prudent to pay attention to any potential sources of information regarding the client and his or her problems in living. Further research is of

course necessary to elaborate whether lucidity in and of itself is correlated with particular types of psychopathology and to examine the validity of LDs as a projective technique.

Concluding Comments

The present research sought to demonstrate that home lucid dreams might be studied in a more objective fashion than has previously been the case and that lucidity is capable of being induced in a sample of individuals who reportedly vary widely in sleep-related characteristics (e.g., dream recall; frequency of nightmares; previous experience with dream control).

The results of the training study seem to suggest that MILD-R may be useful for some subjects, particularly those who have had prior experience with lucidity (such as Subject 4), or those who have a strong desire to gain control over their dreams (such as Subject 3). The small, heterogeneous sample means that these generalizations cannot be made with confidence, however.

The training study also suggested the feasibility of a presleep practice period for LD induction in some subjects. This finding, coupled with the demonstration that home dream reports can be reliably rated using the LDRS, seems to indicate that lucidity may be reasonably studied in the home en-

vironment. Many aspects of lucidity require the specialized equipment of the sleep laboratory (e.g., studies of lucidity and EEG patterns), but the present research has provided some data which suggest that a move toward the home study of LDs is possible.

Much work needs yet to be done, however, both in the laboratory and at home, for lucid dream research is a relatively young area, and that work which has been done has tended to be both subjective and unsystematic. It is my hope that the present study will prove to have made some small contribution to the facilitation and systematization of LD research, and that it will help to begin integrating the area into the "mainstream" of sleep and dream research, as this, along with its potential use in diagnosis and therapy, is where its future seems ultimately to lie.

References

- Anderson, W. (1979). Open Secrets: A Western guide to Tibetan Buddhism. New York: Penguin.
- Aserinsky, E. (1965). Periodic respiratory pattern occurring in conjunction with eye movements during sleep. Science, 150, 763-766.
- Aserinsky, E., & Kleitman, N. (1953). Regularly occurring periods of eye motility, and concomitant phenomena, during sleep. Science, 118, 273-274.
- Aserinsky, E., & Kleitman, N. (1955). Two types of ocular motility occurring in sleep. Journal of Applied Physiology, 8, 1-10.
- Barber, T.X., & Wilson, S.C. (1979). The Barber Suggestibility Scale and the Creative Imagination Scale: Experimental and clinical applications. The American Journal of Clinical Hypnosis, 21, 84-108.
- Barnett, L. (1952). The universe and Dr. Einstein. New York: Mentor.
- Belicki, D.A., Hunt, H.T., & Belicki, K. (1978). An exploratory study comparing self-reported lucid and non-lucid dreamers. Sleep Research, 7, 166.
- Blackmore, S.J. (1982). Have you ever had an OBE? The wording of the question. Journal of the Society for Psychological Research, 51, 292-302.
- Breger, L., Hunter, I., & Lane, R. (1971). The effect of stress on dreams. Psychological Issues, 7 (Monograph 27).

- Brown, A.E. (1936). Dreams in which the dreamer knows he is asleep. Journal of Abnormal & Social Psychology, 31, 59-66.
- Cartwright, R.D. (1978). Happy endings for our dreams. Psychology Today, 12 (7), 66-76.
- Cicchetti, D.V. (1976). Assessing inter-rater reliability for rating scales: Resolving some basic issues. British Journal of Psychiatry, 129, 452-456.
- Cicchetti, D.V., Aivano, S.L., & Vitale, J. (1977). Computer programs for assessing rater agreement and rater bias for qualitative data. Educational and Psychological Measurement, 37, 195-201.
- Cicchetti, D.V., Lee, C., Fontana, A.F., & Dowds, B.N. (1978). A computer program for assessing specific category rater agreement for qualitative data. Educational and Psychological Measurement, 38, 805-813.
- Cohen, J. (1960). A coefficient of agreement for nominal scales. Educational and Psychological Measurement, 20, 37-46.
- Cohen, J. (1968). Weighted Kappa: Nominal scale agreement with provision for scaled disagreement or partial credit. Psychological Bulletin, 70, 213-220.
- Cook, T.D., & Campbell, D.T. (1979). Quasi-experimentation: Design and analysis issues for field settings. Boston: Houghton Mifflin.

- Dane, J.R., & Van de Castle, R.L. (1984). A comparison of waking instruction and posthypnotic suggestion for lucid dream induction. Lucidity Letter, 3 (4), 10-13.
- De Koninck, J.M., & Koulack, D. (1975). Dream content and adaptation to a stressful situation. Journal of Abnormal Psychology, 84, 250-258.
- Dement, W., & Kleitman, N. (1957a). The relation of eye movements during sleep to dream activity: An objective method for the study of dreaming. Journal of Experimental Psychology, 53, 339-346.
- Dement, W., & Kleitman, N. (1957b). Cyclic variations in EEG during sleep and their relation to eye movements, body motility, and dreaming. Electroencephalography and Clinical Neurophysiology, 9, 673-690.
- Dement, W.C., & Wolpert, E.A. (1968). The relation of eye movements, body motility and external stimuli to dream content. Journal of Experimental Psychology, 55, 543.
- Domhoff, B. (1969). Home dreams versus laboratory dreams: Home dreams are better. In M. Kramer (Ed.), Dream psychology and the new biology of dreaming. Springfield, IL: Thomas.
- Domhoff, B., & Kamiya, J. (1964). Problems in dream content study with objective indicators. I. A comparison of home and laboratory dream reports. Archives of General Psychiatry, 11, 519-524.

- Fleiss, J.L., Cohen, J., & Everitt, B.S. (1969). Large sample standard errors of Kappa and weighted Kappa. Psychological Bulletin, 72, 323-327.
- Fox, O. (1962). Astral projection. New York: University Books.
- Frank, L.K. (1948). Projective methods. Springfield, IL: Thomas.
- Freemon, F.R. (1972). Sleep research: A critical review. Springfield, IL: Thomas.
- Freud, S. (1900). The interpretation of dreams. New York: Avon. (1965 edition)
- Gackenbach, J. (1981). Lucid dreaming: Individual differences in personal characteristics. Sleep Research, 10, 145.
- Gackenbach, J. (1984). An estimate of lucid dreaming incidence. Lucidity Letter, 3 (1), 3-4.
- Gackenbach, J. (1985). A survey of considerations for inducing conscious awareness of dreaming while dreaming. Imagination, Cognition and Personality, 5, 41-55.
- Gackenbach, J., Curren, R., LaBerge, S.P., Davidson, D., & Maxwell, P. (1983). Intelligence, creativity and personality differences between individuals who vary in self-reported lucid dreaming frequency. Lucidity Letter, 2 (2), 4.
- Gackenbach, J., Sachau, D., & Rokes, L. (1982). Vestibular sensitivity and dynamic and static motor balance as a function of sex and lucid dreaming frequency. Sleep Research, 11, 104.

- Gackenbach, J., Snyder, T.J., McKelvey, K., McWilliams, C., George, E., & Rodenelli, B. (1981). Lucid dreaming: Individual differences in perception. Sleep Research, 10, 146.
- Gackenbach, J., Walling, J., & LaBerge, S.P. (1984). The lucid dreaming ability and parasympathetic functioning. Lucidity Letter, 3 (4), 3-5.
- Garfield, P.L. (1974). Creative dreaming. New York: Simon & Schuster.
- Garfield, P.L. (1975a). Psychological concomitants of the lucid dream state. Sleep Research, 4, 183.
- Garfield, P.L. (1975b). Using the dream state as a clinical tool for assertion training. Sleep Research, 4, 184.
- Gillespie, G. (1983). Lucid dreaming and mysticism: A personal observation. Lucidity Letter, 2 (3), 4-5.
- Goodenough, D.R., Shapiro, A., Holden, M., & Steinschriber, L. (1959). A comparison of "dreamers" and "non-dreamers": Eye movements, electroencephalograms, and the recall of dreams. Journal of Abnormal & Social Psychology, 59, 295-302.
- Green, C.E. (1968). Lucid dreams. London: Hamish Hamilton.
- Grinstein, A. (1983). Freud's rules of dream interpretation. New York: International Universities Press.
- Hall, C.S., & Van de Castle, R.D. (1966a). Studies of dreams reported in the laboratory and at home. Institute of Dream Research Monograph Series, #1. Santa Cruz, CA: Institute of Dream Research.

- Hall, C.S., & Van de Castle, R.D. (1966b). The content analysis of dreams. New York: Appleton-Century-Crofts.
- Halliday, G. (1982). Direct alteration of a traumatic nightmare. Perceptual & Motor Skills, 54, 413-414.
- Hartmann, D.P., Gottman, J.M., Jones, R.R., Gardner, W., Kazdin, A.E., & Vaught, R.S. (1980). Interrupted time-series analysis and its application to behavioral data. Journal of Applied Behavior Analysis, 13, 543-559.
- Hauri, P., Sawyer, J., & Rechtschaffen, A. (1967). Dimensions of dreaming: A factored scale for rating dream reports. Journal of Abnormal Psychology, 72, 16-22.
- Hearne, K.M.T. (1981). Control your own dreams. New Scientist, 91 (24), 783-785.
- Hearne, K.M.T. (1982a). Effects of performing certain set tasks in the lucid-dream state. Perceptual & Motor Skills, 54, 259-262.
- Hearne, K.M.T. (1982b). 'Lucid' dreams and ESP: An initial experiment using one subject. Journal of the Society for Psychical Research, 51, 7-11.
- Hearne, K.M.T. (1982c). An automated technique for studying psi in home 'lucid' dreams. Journal of the Society for Psychical Research, 51, 303-304.
- Hearne, K.M.T. (1983). A 'scene-change phenomenon' in externalized imagery. Lucidity Letter, 2 (1), 2-3, 14.
- Hempel, C.G. (1966). Philosophy of natural science. Englewood Cliffs, NJ: Prentice-Hall.

- Hersen, M., & Barlow, D.H. (1976). Single-case experimental designs: Strategies for studying behavior change. New York: Pergamon Press.
- Hoffman, E., & McCarley, R.W. (1980). Bizarreness and lucidity in REM sleep dreams: A quantitative evaluation. Sleep Research, 9, 134.
- Hooper, J., & Teresi, D. (1985). Lucid dreaming. New Age Journal, 2 (4), 34-41, 78.
- Hunt, H.T. (1982). Forms of dreaming. Perceptual & Motor Skills, 54, 559-633.
- Koulack, D. (1969). Effects of somatosensory stimulation on dream content. Archives of General Psychiatry, 20, 718-725.
- Koulack, D. (1972). Rapid eye movements and visual imagery during sleep. Psychological Bulletin, 78, 155-158.
- Koulack, D., & Goodenough, D.R. (1976). Dream recall and dream recall failure: An arousal-retrieval model. Psychological Bulletin, 83, 975-984.
- LaBerge, S.P. (1979). Lucid dreaming: Some personal observations. Sleep Research, 8, 153.
- LaBerge, S.P. (1980a). Induction of lucid dreams. Sleep Research, 9, 138.
- LaBerge, S.P. (1980b). Lucid dreaming as a learnable skill: A case study. Perceptual & Motor Skills, 51, 1039-1042.
- LaBerge, S.P. (1981). Lucid dreaming: Directing the action as it happens. Psychology Today, 15 (1), 48-57.

- LaBerge, S.P. (1983). Psychophysiological parallelism in lucid dreams. Lucidity Letter, 2 (4), 3-4.
- LaBerge, S.P., & Dement, W.C. (1982). Voluntary control of respiration during lucid REM dreaming. Sleep Research, 11, 107.
- LaBerge, S.P., Levitan, L., Gordon, M., & Dement, W.C. (1983). Physiological characteristics of three types of lucid dream. Lucidity Letter, 2 (2), 1.
- LaBerge, S.P., Nagel, L.E., Dement, W.C., & Zarcone, V.P. (1981a). Lucid dreaming verified by volitional communication during REM sleep. Perceptual & Motor Skills, 52, 727-732.
- LaBerge, S.P., Nagel, L.E., Dement, W.C., & Zarcone, V.P. (1981b). Evidence for lucid dreaming during REM sleep. Sleep Research, 10, 148.
- LaBerge, S.P., Nagel, L.E., Taylor, W.B., Dement, W.C., & Zarcone, V.P. (1981). Psychophysiological correlates of the initiation of lucid dreaming. Sleep Research, 10, 149.
- LaBerge, S.P., Owens, J., Nagel, L.E., & Dement, W.C. (1981). "This is a dream": Induction of lucid dreams by verbal suggestion during REM sleep. Sleep Research, 10, 150.
- Last, C.G. (1985). Implosion. In A.S. Bellack & M. Hersen (Eds.), Dictionary of behavior therapy techniques. New York: Pergamon Press.

- Lewis, H.B., Goodenough, D.R., Shapiro, A., & Sleser, I. (1966). Individual differences in dream recall. Journal of Abnormal Psychology, 71, 52-59.
- Lomas, J., & Kimura, D. (1976). Intrahemispheric interaction between speaking and sequential manual activity. Neuropsychologia, 14, 23-33.
- Moss, K.L. (1984). The lucidagogic effect of medical residency on-call nights on dreaming. Lucidity Letter, 3(4), 1.
- Murray, E.J. (1965). Sleep, dreams, and arousal. New York: Appleton-Century-Crofts.
- Ogilvie, R.D., Hunt, H.T., Kushniruk, A., & Newman, J. (1983). Lucid dreams and the arousal continuum. Sleep Research, 12, 182.
- Ogilvie, R.D., Hunt, H.T., Sawicki, C., & McGowan, K. (1978). Searching for lucid dreams. Sleep Research, 7, 165.
- Ogilvie, R.D., Hunt, H.T., Tyson, P.D., Lucescu, M.L., & Jeakins, D.B. (1982a). Alpha activity and lucid dreams. Sleep Research, 11, 108.
- Ogilvie, R.D., Hunt, H.T., Tyson, P.D., Lucescu, M.L., & Jeakins, D.B. (1982b). Lucid dreaming and alpha activity: A preliminary report. Perceptual & Motor Skills, 55, 795-808.
- Plutchick, R., & Conte, H. (1974). Sex differences in reported psychophysiological reactivity. Psychological Reports, 35, 1221-1222.

- Rabin, A.I. (1981). Projective methods: A historical introduction. In A.I. Rabin (Ed.), Assessment with projective techniques. New York: Springer.
- Rampa, T.L. (1969). The third eye. London: Corgi.
- Schwartz, B.A., & Lefebvre, A. (1973). (Transitions between wakefulness and REM periods. II. Fragmented REM periods.) Revue d'Electroencephalographie et de Neurophysiologie Clinique, 3, 165-176.
- Sampson, H. (1965). Deprivation of dreaming sleep by two methods: Compensatory REM time. Archives of General Psychiatry, 13, 79-86.
- Snyder, T.J., & Gackenbach, J. (1981). Lucid dreaming and cerebral organization. Sleep Research, 10, 154.
- Spitzer, R.L., Cohen, J., Fleiss, J.L., & Endicott, J. (1967). Quantification of agreement in psychiatric diagnosis: A new approach. Archives of General Psychiatry, 17, 83-87.
- Spreng, L.F., Johnson, L.C., & Lubin, A. (1968). Autonomic correlates of eye movement bursts during stage REM sleep. Psychophysiology, 4, 311-323.
- Stewart, K. (1954). Dream theory in Malaysia. Complex, 9, 3-30.
- Tart, C.T. (1979). From spontaneous event to lucidity: A review of attempts to consciously control nocturnal dreaming. In B.B. Wolman (Ed.), Handbook of dreams: Research, theories and applications. New York: Van Nostrand Reinhold.

- Tholey, P. (1983). Relation between dream content and eye movements tested by lucid dreams. Perceptual & Motor Skills, 56, 875-878.
- Tryon, W.W. (1982). A simplified time-series analysis for evaluating treatment interventions. Journal of Applied Behavior Analysis, 15, 423-429.
- Van Eeden, F.A. (1913). A study of dreams. Proceedings of the Society for Psychical Research, 26, 431-461.
- Walker, P.C., & Johnson, R.F.Q. (1974). The influence of presleep suggestions on dream content: Evidence and methodological problems. Psychological Bulletin, 81, 362-370.
- Weisz, R., & Foulkes, D. (1970). Home and laboratory dreams collected under uniform sampling conditions. Psychophysiology, 6, 588-596.
- Witkin, H.A. (1969). Influencing dream content. In M. Kramer (Ed.), Dream psychology and the new biology of dreaming. Springfield, IL: Thomas.
- Wolpert, E.A. (1968). Psychophysiologic parallelism in the dream. Progress in Clinical Psychology, 8, 76-90.
- Woolfolk, R. (1975). Psychophysiological correlates of meditation. Archives of General Psychiatry, 32, 1326-1333.

Appendix A

Morning Dream Report Form

This morning's date _____

Codename _____

Please complete this form each morning as soon as you wake up, as this is when your memory of dreaming is most clear and accurate. If you do not recall dreaming, describe any thoughts you had while sleeping. If there is nothing to report, please indicate "Nothing to report" rather than leaving the form blank. Please describe the dream as exactly and as fully as you remember it. Your report should contain, whenever possible, a description of the setting of the dream, whether it was familiar to you or not, a description of the people and their relationship to you, a description of your feelings during the dream, and whether it was pleasant or unpleasant. Of special importance are any thoughts you might have had about the dream while it was in progress or anything you remember saying to yourself or thinking in the dream. Thank-you for your cooperation.

Appendix B

Lucid Dream Rating System

This is a system used in the rating of dream reports for lucidity. Below you will find a series of categories, each of which reflects a degree of awareness of the dream as a dream and of the potential to exert control over it. Each dream receives only one score; that being the one corresponding to the highest degree of lucidity reported. Be sure to familiarize yourself with the criteria for all scores before actually assessing any dream reports. To aid in scoring, examples of general statements of the type associated with each of the scoring categories are provided below. The criteria for assigning a given score are as follows:

Score

0 = Report of no dream recall.

1 = Report of a dream which does not meet the criteria for inclusion in categories 2 through 6.

2 = False Awakenings. Here the subject reports that he or she dreamed of having a dream or that he or she dreamed of awakening but in fact remained asleep. Examples of statements a report might include or imply which would earn a score of 2: "I dreamed that I woke up and . . ."; "I dreamed that I was asleep and having a dream about . . .".

3 = Prelucid Dream. Here the subject begins to question the reality of the events he or she is experiencing in the dream. It is often initiated by the recognition of some glaring incongruity between what is occurring in the dream and what the subject considers objective reality (e.g., the ability in the dream to fly or to walk through walls). Examples of statements a report might include or imply which would earn a score of 3: "I thought, 'This is so weird it must be a dream'"; "Then I asked myself, 'Am I dreaming this?'"; "I wondered if I could be dreaming all this".

4 = Lucid Dream. Here the subject is aware of dreaming, and is convinced that what is being experienced is a dream. The realization may or may not be preceded by prelucid questioning. Examples of statements a report might include or imply which would earn a score of 4: "I knew this couldn't be real"; "I knew then that I must have been dreaming"; "That's when I felt for sure that this was a dream".

5 = Lucid Dream with Control Perceived but not Exercised. Here the subject is aware of dreaming and of the potential to control the dream, but control is not exerted. The subject is lucid as in 4, but also realizes that if he or she

is dreaming, then he or she can do whatever he or she pleases. However, beyond this realization, there is no actual attempt to alter the dream's content or progress. Examples of statements a report might include or imply which would earn a score of 5: "I knew this was a dream and that I could change it if I wanted, but I just let it go on to see what would happen"; "I knew I could wake up if things got too bad" without the subject's report of actually waking. (While choosing not to change the dream might be construed as exercising control over it, a score of 6 is reserved for those dreams in which control is more "overtly" described. This recognizes that a perception of control is not necessarily the same as exercising control.)

6 = Lucid Dream with Control both Perceived and Exercised. Here the subject is aware of dreaming and of the potential to control the dream, and such control is demonstrated. The subject is aware as in 5, but chooses to actually alter the dream's content or progress. Examples of statements a report might include or imply which would earn a score of 6: "I thought, 'If this is a dream, then I can do whatever I please,' so then I decided to . . ."; "I knew I could wake up if things got too bad, so that's what I did"; "I decided to try an experiment to see if I was really dreaming, so I floated in the air for awhile to prove to myself that I was".

Appendix C

Lucid Dream Rating System Reliability Study Handout

Many of us have had the experience of being asleep and dreaming, and then suddenly realizing that we are dreaming. Dreams in which we know that we are dreaming are called lucid dreams. These lucid dreams don't usually occur very often, but when they do it is a remarkable experience. People who have had lucid dreams report that they have felt tremendous feelings of exhilaration and freedom in these dreams. They report that they can also sometimes control what is going on in the dream. For example, they might say to themselves in the dream, "I feel like flying," and then they do just that! Or, just to make sure that they are not awake and are really dreaming, they might say to themselves something like, "Okay, if this is a dream, then when I open this closet door there will be a brand new car (or something else which the dreamer might desire) behind it." Being able to control your dreams while they are in progress is a fun and exciting thing to be able to do, and it may contribute to a good night's sleep or enhanced feelings of well-being.

Because lucid dreams are so fascinating, there has been much interest in studying them. However, since they usually don't occur that often, they are very difficult to research. But, by asking a large number of people to provide a detailed description of one lucid dream they have had, it becomes possible to obtain a sizable sample of reports to analyze. The aim of this study is to obtain a large number of lucid dream reports in order to help evaluate a system for rating lucid dreams.

Your task in this study is to describe a lucid dream you have had (based on the above definition of lucid dreams). If you cannot recall a lucid dream, you are to describe the most memorable dream you can recall. The directions for your description are at the top of the next page. In the space provided at the bottom of this page, please describe what it was about the dream that made you think it qualified as a lucid dream, or, if you could not recall a lucid dream, indicate what it was about the dream that made it so memorable. (It might be easier to answer this question after writing out your dream report.) If you have any questions, please approach the experimenter. Thank you.

Why do you think your dream was a lucid dream? OR Why was the dream you chose to report so memorable?

Dream Report Form

Please describe the dream as exactly and as fully as you remember it. Your report should contain, whenever possible, a description of the setting of the dream, whether it was familiar to you or not, a description of the people and their relationship to you, a description of your feelings during the dream, and whether it was pleasant or unpleasant. Of special importance are any thoughts you might have had about the dream while it was in progress or anything you remember saying to yourself or thinking in the dream. Please remember to indicate on the preceding page your reasons for thinking the dream was a lucid one, or, if you could not recall a lucid dream, your reasons for why the dream you chose to report was so memorable. Thank-you for your cooperation.

Background Questionnaire

Please answer the following questions as best you can, continuing your answers on the back of the page if necessary.

1. Age _____ 2. Sex _____ 3. Height _____ 4. Weight _____

5. What is the first language you learned to speak? _____

6. Education:

University graduate Major area? _____

Some university

High school graduate

Some high school

Grade school only (or none)

7. Present living situation:

Alone or with roommate

With spouse

With parents

With other relatives

8. Combined annual income for all members of your present household:

\$50,000 and over

\$20,000 to \$49,999

\$15,000 to \$19,999

\$10,000 to \$14,999

under \$10,000

9. Occupation of chief wage-earner of present household:

Professional or managerial in large firm; proprietor

Semi-professional or managerial in small firm

Clerical and sales Agriculture or unskilled labor

Skilled or semi-skilled labor Student

10. In an average week, how many dreams do you remember in the morning? _____

11. A dream in which you become aware of dreaming, while the dream is in progress, is called a lucid dream. Based on this description, how many lucid dreams would you estimate that you have had in your lifetime? _____

Would you please try to describe the conditions under which your lucid dreams have occurred?

Approximately how often do your lucid dreams occur?

12. Indicate on the following scale how important your dreams are to you:

1 2 3 4 5 6 7

not at all important somewhat important extremely important

13. Indicate on the following scale how often you think about your dreams:

1 2 3 4 5 6 7

never think sometimes think about them daily

Why do you think about your dreams?

14. Indicate on the following scale the extent to which you can voluntarily control what happens in your dreams:

1 2 3 4 5 6 7

If you have experienced some control over your dreams, how often do you choose to voluntarily control your dreams?

Would you please try to describe the conditions under which you are able to control what happens in your dreams?

Additional comments pertaining to any of the questions:

Sleep Patterns Questionnaire

1. How often do you have nightmares?

1	2	3	4	5	6	7
---	---	---	---	---	---	---

less than once a year	monthly	weekly	daily
--------------------------	---------	--------	-------

2. How often do you have trouble falling asleep?

1	2	3	4	5	6	7
---	---	---	---	---	---	---

less than once a year	monthly	weekly	daily
--------------------------	---------	--------	-------

3. How often do you awaken early in the morning, before your usual time to get up, and then have difficulty returning to sleep?

1	2	3	4	5	6	7
---	---	---	---	---	---	---

less than once a year	monthly	weekly	daily
--------------------------	---------	--------	-------

4. How often do your dreams awaken you during the night?

1	2	3	4	5	6	7
---	---	---	---	---	---	---

less than once a year	monthly	weekly	daily
--------------------------	---------	--------	-------

5. Have you ever consulted a professional (e.g., psychologist; physician) about a sleep-related problem? _____
At what age? _____ For what problem? _____

With what outcome? _____

What is the present status of this condition? _____

6. What, if any, are your present medical problems? _____

7. What medications or drugs are you taking?

Drug: _____ Dosage/day: _____ Reason for prescription: _____

8. How often do you use alcohol? _____

In what quantity? _____

9. How often do you use recreational drugs? _____

What drugs do you use? _____

In what quantity? _____

Appendix D
Background Questionnaire

Please answer the following questions as best you can, continuing your answers on the back of the page if necessary.

1. Age _____ 2. Sex _____ 3. Height _____ 4. Weight _____

5. What is the first language you learned to speak? _____

6. Education:

- University graduate Major area? _____
 Some university
 High school graduate
 Some high school
 Grade school only (or none)

7. Present living situation:

- Alone or with roommate
 With spouse
 With parents
 With other relatives

8. Combined annual income for all members of your present household:

- \$50,000 and over
 \$20,000 to \$49,999
 \$15,000 to \$19,999
 \$10,000 to \$14,999
 under \$10,000

9. Occupation of chief wage-earner of present household:

- Professional or managerial in large firm; proprietor
 Semi-professional or managerial in small firm
 Clerical and sales Agriculture or unskilled labor

Skilled or semi-skilled labor Student

10. In an average week, how many dreams do you remember in the morning?

11. A dream in which you become aware of dreaming, while the dream is in progress, is called a lucid dream. Based on this description, how many lucid dreams would you estimate that you have had in your lifetime?

Would you please try to describe the conditions under which your lucid dreams have occurred?

Approximately how often do your lucid dreams occur?

12. Indicate on the following scale how important your dreams are to you:

1 2 3 4 5 6 7

13. Indicate on the following scale how often you think about your dreams:

1 2 3 4 5 6 7

never think sometimes think about
about them think about them them daily

Why do you think about your dreams?

14. Indicate on the following scale the extent to which you can voluntarily control what happens in your dreams:

1 2 3 4 5 6 7

If you have experienced some control over your dreams, how often do you choose to voluntarily control your dreams?

Would you please try to describe the conditions under which you are able to control what happens in your dreams?

Additional comments pertaining to any of the questions:

Sleep Patterns Questionnaire

1. How often do you have nightmares?

1	2	3	4	5	6	7
---	---	---	---	---	---	---

less than once a year	monthly	weekly	daily
--------------------------	---------	--------	-------

2. How often do you have trouble falling asleep?

1	2	3	4	5	6	7
---	---	---	---	---	---	---

less than once a year	monthly	weekly	daily
--------------------------	---------	--------	-------

3. How often do you awaken early in the morning, before your usual time to get up, and then have difficulty returning to sleep?

1	2	3	4	5	6	7
---	---	---	---	---	---	---

less than once a year	monthly	weekly	daily
--------------------------	---------	--------	-------

4. How often do your dreams awaken you during the night?

1	2	3	4	5	6	7
---	---	---	---	---	---	---

less than once a year	monthly	weekly	daily
--------------------------	---------	--------	-------

5. Have you ever consulted a professional (e.g., psychologist; physician) about a sleep-related problem? _____
At what age? _____ For what problem? _____

With what outcome? _____

What is the present status of this condition? _____

6. What, if any, are your present medical problems? _____

7. What medications or drugs are you taking?
Drug: _____ Dosage/day: _____ Reason for prescription: _____

8. How often do you use alcohol? _____

In what quantity? _____

9. How often do you use recreational drugs? _____

What drugs do you use? _____

In what quantity? _____

Appendix E

Initial Presentation to MILD-R Training Subjects

First of all, I would like to thank you for your interest in the study. This study is part of a research project dealing with the development of method whereby people can learn to control what happens in their dreams. The study requires a fair degree of involvement on your part. If you decide to participate, you will be asked to keep a daily morning record of your dreams for a period of eight weeks. I realize that this is a long time for you to do this, but it becomes easier -- almost automatic -- with practice, and most people find it to be an interesting experience. Your reports will not have your name on them, so no report can be identified as yours by the person who will be rating them.

This project consists of a series of four two-week phases. We will meet at the end of each of these phases to discuss the study and to prepare for the next phase. In each phase you will be required to record your dreams. In fact, for the first phase this is all that you will be asked to do. After this time, we will meet again and I will give you a handout containing a presleep technique that you can use to become aware of dreaming while you are dreaming. Once you become aware, it might be possible for you to control the dream any way you choose. Most people find it a challenging and fun experience to experiment with the degree to which they can learn to control what goes on in their dreams.

The technique consists of a short series of events which you are to try to imagine immediately prior to sleep. You will be asked to practice this technique at least five nights a week for a four-week period. After this, you will be asked to stop practicing it for two weeks but will continue to record your dreams each morning. At the end of the study you will be asked to go over your dream reports and rate them along certain dimensions according to a set of instructions which you will be given at that time.

If you decide to participate, you will be free to withdraw at any time. If you encounter any difficulties at all with any of the procedures, or just have a question, I hope you will feel free to contact me at any time. I will give you a card with my number on it as well as a number where messages can be left if I can't be reached. Thank-you for your time. Do you have any questions?

Appendix F

Presleep Dream Control Technique (MILD-R) Handout

Many of us have had the experience of being asleep and dreaming and then suddenly realizing that we are dreaming. Dreams in which we know that we are dreaming are called lucid dreams. These lucid dreams don't usually occur very often, but when they do it is a remarkable experience. People who have had lucid dreams report that they have felt tremendous feelings of exhilaration and freedom in these dreams. They also report that they can sometimes control what is going on in these dreams. For example, they might say to themselves in the dream, "I feel like flying," and then they do just that! Or, just to make sure that they are not awake and are really asleep and dreaming, they might say to themselves something like, "Okay, if this is a dream, then when I open this closet door there will be a brand new car (or something else which the dreamer might desire) behind it." Being able to control your dreams while they are in progress is a fun and exciting thing to be able to do, and it may contribute to a good night's sleep or to increased feelings of well-being.

Because lucid dreams are so fascinating, there has been much interest in studying them. However, since they don't occur that often, they are very difficult to research. In order to make lucid dreams easier to study, a procedure has been developed by which a person can train him- or herself to have lucid dreams. The study in which you are now participating is designed to evaluate the effectiveness of this technique with people like you who have an interest in dreams.

The technique is based on the principle that people can remember to do things they might not ordinarily remember to do if they spend some time beforehand visualizing themselves performing the intended activity. Now, that sounds pretty complicated, but an example may help to make it clearer. Suppose one morning that you wanted to remember to pick up some milk at the store on the way home from work that evening. By imagining in the dream the steps you would take in carrying out this activity, it will form a stronger association in your mind and you are more likely to remember to do it that evening. What you would do is imagine yourself going through the steps involved in carrying out this activity, and then going over the entire sequence several times until it is clear in your mind. This will help to ensure that the intention to remember to stop at the store on the way home stays with you throughout the day. The steps you would imagine might include: leaving the office, getting into your car, driving out of the parking lot and down the street, pulling into the store's parking lot, walking into

the store, picking up a carton of milk, paying for it, and then leaving the store. The more clearly you imagine the scene, the more real you try to make it, the more likely you will remember to do whatever it is that you wanted to remember to do.

The technique by which you will train yourself to have lucid dreams is very similar to this example. The technique involves you trying to visualize yourself becoming aware of dreaming while a dream is in progress (i.e., having a lucid dream). In other words, the dream control technique consists of trying to imagine yourself going through the sequence of events involved in becoming aware of dreaming (much as you imagined yourself going through the sequence of events associated with picking up some milk at the store). By going through the sequence of events, it is possible for you to remember to become lucid in your dreams. Once you become lucid, you can then choose to alter the dream or to experiment with the extent to which you can control it.

I realize that it may not be easy for you to understand the technique right away. For this reason, I suggest that you spend some time during the day going over the procedure so that it will be easier for you to practice when you go to bed. Please try your best to practice the technique as it is described on the next page. Please try also to practice it at least five nights a week for the next two weeks, and indicate on the attached "Record of Practice" those dates on which the procedure was or was not practiced. You may also want to write down any comments relating to the procedure so that we can discuss them when we meet in two weeks.

Presleep Dream Control Technique

1. Before going to bed, think of a recent dream you have had, and go over it until it is clear in your mind.

2. After the dream is clear, go to bed, and then imagine that you are outside of yourself and can see your body lying asleep in bed and having this dream.

3. Then, imagine yourself being in your sleeping body and realizing that what is going through your mind is a dream.

4. Repeat the above steps until you understand that you are trying to visualize yourself becoming aware of dreaming.

5. Then, repeat over and over to yourself as you try to go to sleep, "When I dream, I want to remember that I'm dreaming," so that your intention stay clear throughout the night.

Record of Practice

Please indicate below the dates of practice and of non-practice of the presleep dream control technique.

I practiced the procedure
last night. This morning's
date is:

I did not practice the pro-
cedure last night. This
morning's date is:

Appendix G

Table 9 displays the matrix of obtained and expected proportions and the designated weights for the revised 4-point LDRS. Table 10 presents the average frequency of usage and indices of rater agreement for the reformulated categories. The K_w value for the revised LDRS was .9219, $\bar{z} = 6.05$, $p < .001$, and the .95 confidence interval for the new system ranged from .5634 to 1.00.

Table 9
Specific Category Rater Agreement Data for Revised LDRS

		Judge 2				
Judge 1	Agreement	NLD*	DV	DA	DC	Total
NLD	Weight	1.00	.60	.40	0	
	Obtained	.777	-	-	-	.78
	Expected	.616	.016	.101	.047	
DV	Weight	.60	1.00	.80	.40	
	Obtained	.006	.011	-	-	.02
	Expected	.0158	.004	.003	.001	
DA	Weight	.40	.80	1.00	.80	
	Obtained	.006	.006	.123	.006	.14
	Expected	.111	.003	.018	.008	
DC	Weight	0	.40	.80	1.00	
	Obtained	.006	-	.006	.056	.06
	Expected	.047	.0012	.008	.004	
Total		.79	.02	.13	.06	1.00

*Note: NLD = non-lucid dream; DV = dream vigilance; DA = dream awareness; DC = dream control.

Table 10

Specific Category Rater Agreement for Revised LDRS

Category	Average Frequency	Index of Rater Agreement		
		Expected	Obtained	DO Kw
NLD	.785	.8510	.9934	.9555
DV	.020	.6230	.7520	.3422
DA	.135	.5129	.9692	.9367
DC	.060	.1663	.9524	.9430
Total	1.00	.6993	.9765	.9219