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The Psychological Content of Lucid versus Nonlucid Dreams

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In a review of Stephen LaBerge's (1985) *Lucid Dreaming*, David Foulkes (1985) asked a key question: How are lucid and nonlucid dreams different? He pointed out that such a consideration may be the most interesting implication for ordinary dreaming. The issue is, Foulkes notes, what *else* changes when you change ordinary dreaming by adding a self that intends and reflects. The focus of this chapter is to review research relevant to these concerns. That is, beyond the obvious difference of awareness of dreaming while dreaming, do the psychological contents of lucid and nonlucid dreams differ in other respects?

The data presented in this chapter are, in the main, from the manifest or surface level of the dream. The bulk of the work to date comparing dream types is from dreams collected from home diaries, classroom exercises, and survey responses. In all cases, the dreamer made evaluations about aspects of the dream. Because these are self-evaluations of dreams, one can argue that, to some extent, latent content is obtained. That is, to the extent that dreamers rate the content of dreams with such considerations in mind.

Lucid and nonlucid dreamers self-evaluations of their lucid and nonlucid dreams will be offered first. These are available from reports of their long-term memory of these dream experiences by survey (Gackenbach & Shilling, 1983) as well as their short-term memory vis-à-vis self-evaluations taken from daily dream logs (Gackenbach, 1978; Gackenbach & Schillig, 1983; Gackenbach,

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Curren, LaBerge, Davidson, & Maxwell, 1983; Gackenbach, Curren, & Cutler, 1983).

After this review, the remainder of the chapter will be devoted to the reporting of a recently completed 4-year project aimed at the content analyses by independent judges of the manifest content of lucid and nonlucid dream experiences. Hall and Van de Castle's (1966) system of content analyses, with some modification, was utilized. Dreams gathered from college students and adults from their dream examples, their dream diaries, and from the sleep laboratory are included in this data base.

Although, case reports or the analyses of hundreds of lucid dreams from a single individual abound in the literature (LaBerge, 1980b; Moers-Messmer, 1938), they are subject to the biases of the single individual and consequently will not be considered herein. It is suggested that the reader consult the chapters by Gillespie, and Worsley for such a perspective. Finally, caution in interpretation is advised in the analysis of the psychological content of these dream experiences because, as Worlsey (1982) points out, surveys may include information from lucid dreamers who do not appreciate the subtleties involved. Furthermore, descriptive content analyses of these dreams are constrained by the limits of systems developed prior to the current research surge on lucidity. Finally, such an approach ignores the actual flow of the dream narrative, that is, the storylike quality.

SELF-EVALUATIONS OF CONTENT

The work of Gackenbach and Schillig (1983) on lucid versus nonlucid dreams demonstrates the conceptual difference between these dream experiences. They separately factor-analyzed self-evaluations of the content of lucid and nonlucid dreams recalled by adults for both morning-after dream logs and lucid dreaming questionnaires. Gackenbach and Shillig found that the structure of nonlucid dreams was primarily characterized by their perceptual qualities, whereas lucid dreams were characterized by a sense of being able to control the dream and a sense of intellectual, emotional, and physical balance. Differences between lucid and nonlucid dream experiences have been typically conceptualized in terms of three general types of contents: sensations and perceptions, cognitions, and emotions.

Sensations and Perceptions

A wide range of approaches to the question of whether sensations and perceptions differentially characterize the lucid from the nonlucid dream have been investigated. The primary waking sensory modality is vision, and its relative representativeness in lucid and nonlucid dreams has been examined from

four perspectives: general vision, color, brightness, and clarity of imagery. In morning-after dream reports, subjects evaluated their lucid dreams as more visual than their nonlucid dreams (Gackenbach & Schillig, 1983). However, in two later studies using the same instrument but where the dream recall of each dream was controlled, no dream-type difference in vision emerged (Gackenbach, LaBergen, Davidson, & Maxwell, 1983; Gackenbach, Curren, & Cutler, 1983). Long-term recall (i.e., information on dreams gathered by questionnaire) of this dream event evidenced the opposite, that is, nonlucid dreams were reported as more visual than lucid (Gackenbach & Schillig, 1983). The authors explain these discrepant findings by saying that, due to the infrequency of experiencing dream lucidity, it lacks the salience of nonlucid dreams for effective long-term recall.

Lucid dreams were determined to be more colorful than nonlucid dreams by Gackenbach and Schillig (1983) and Gackenbach, Curren, LaBerge, Davidson, and Maxwell (1983) in morning-after reports but less colorful as ascertained by long-term recall (Gackenbach & Schillig, 1983). No differences were noted by Gackenbach, Curren, and Cutler (1983). The latter is probably the most accurate estimate, as this study involved randomly selected student samples rather than the high dream interest adult samples used by Gackenbach and Schillig (1983) and Gackenbach, Curren, LaBerge, Davidson, and Maxwell (1983). Additionally, this study controlled for dream recall whereas Gackenbach and Schillig did not.

Relatedly, Hearne (1983) notes that an average of 73.4% of two samples of lucid dreamers report that colors in lucid dreams are the same or brighter than colors seen while awake, whereas only 54.75% said the same of nonlucid dreams. As regards brightness, Hearne (1978) reports no difference from prior to the dawning of dream lucidity to after its onset in one adept subject and later argued that there is a brightness ceiling in lucid dreams (Hearne, 1981). Worsley (1982) points out that such a ceiling may be a problem with functioning in different modalities and not with brightness *per se*.

Finally, as to the differential vividness or clarity of lucid versus nonlucid dreaming images, Hearne (1978) found no difference in students' self-reports of vividness of the dream taken from prior to lucidity onset and from during lucidity but notes elsewhere (Hearne, 1983) that 65.5% of his adult lucid dreaming sample report their lucid images as more vivid than their nonlucid images. In none of Hearne's (1978, 1983) work has dream recall as a covariate of the lucidity abilities been accounted for. Consequently, as regards vision, the better controlled studies clearly indicate no difference between lucid and nonlucid dreams.

The second major sensory modality is audition. With the exception of Gackenbach and Schillig's questionnaire data, lucid dreams have collectively been found to be perceived as more auditory than nonlucid dreams (Gackenbach, Curren, LaBerge, Davidson, & Maxwell, 1983; Gackenbach, Curren, and Cutler, 1983; Gackenbach & Schillig, 1983; Hearne, 1983).

Dream content differences in the minor sensations of taste, smell, kinesthesia, touch, pain, and temperature have also been investigated. Taste and smell have generally evidenced no dream-type differences in morning-after reports (see the two Gackenbach *et al.* 1983 studies; Gackenbach & Schillig, 1983). However, in two survey studies with no dream recall control, nonlucid dreams were reported as evidencing more of these senses (Gackenbach & Schillig, 1983; Hearne, 1983). Likewise, these two surveys noted pain as being reported more in nonlucid dreams. No dream-type differences have been noted as regards temperature (Gackenbach & Schillig, 1983). The most often noted minor sensations occurring more often in lucid than in nonlucid dreams are those of the body sensations of touch and kinesthesia (Gackenbach & Schillig, 1983; Hearne, 1983; Moers-Messmer, 1938; and see the two Gackenbach *et al.*, 1983 studies), although a lack of difference (Gackenbach & Schillig, 1983) has also been reported.

In sum, of the two major waking sensory modalities—vision and audition—the latter shows a strong dream-type difference. When this is considered with the findings of dream-type differences in touch/kinesthesia, the pivotal role of "balance" in the lucid dreaming experience becomes evident. As noted, this emerged in Gackenbach and Schillig's factor analysis and has since been supported by the work of Gackenbach, Snyder, Rokes, and Sachau (1986) and Gackenbach, Snyder, Sachau, and Rokes (1986).

Cognitions

As with the sensory and perceptual components of lucid dreams, the cognitive components have been investigated from multiple perspectives using various techniques. Waking expectations, clarity of thought, memory of waking life, dream control, and the ability to do experiments in the lucid dream are highly interrelated. In order to do the dream experiments, which have been clearly demonstrated in the sleep laboratory (Fenwick *et al.*, 1984; LaBerge, Nagel, Dement, & Zarcone; 1981), and by individual adepts in their homes (LaBerge, 1980a; Moers-Messmer, 1938; see Gillespie, Chapter 13, in this volume) and which have been reported in a general lucid dreaming population (Hearne, 1983), the dreamer needs the proper waking expectations and a clear dream mind in order to be able to remember a waking suggestion to do the experiment. Upon remembering, dream control is required to carry it out.

Gackenbach and LaBerge (1986) have pointed out that

> The waking assumptions that dreamers hold about what lucid dreams are like or could be like determine to an extent the precise form taken by their lucid dreams. For instance, the philosopher Ouspensky assumed on theoretical grounds that "man cannot in sleep think about himself *unless the thought is itself a dream*" (1931). From this premise, he reasoned that "a man can never pronounce his own name in sleep." It should therefore come as no surprise that Ouspensky reported "as expected" that "if I pronounced my name in sleep, I immediately woke up." A generation later, a lucid dreamer referred to by Green (1968) had a similar experience as did Garfield (1974). However, LaBerge (1980a) wrote that when he read Ouspensky's account, he neither followed the philosopher's reasoning nor accepted his original premise about thinking in dreams. Consequently, he could see no reason why saying his name while dreaming should present any difficulty at all and was able to do so. This illustrates that the assumptions which the dreamer makes about what can happen during a lucid dream, may wholly or in part determine what *does* happen. (pp. 61–62).

Despite the pivotal role of waking expectations, there may be limitations to this dream experience for some. Although lucid dreams have been found to possess more voices or speech (see the two Gackenbach *et al.* 1983 studies; Gackenbach & Schillig, 1983) than nonlucid dreams, the understanding of such material received through either audition or vision (i.e., reading) has been reported as difficult (Moers-Messmer, 1938; Wilmes, 1983; Worsley, 1983). In these instances, there was no supposition of an inability to understand language; if anything, the waking expectation was the opposite. Yet in all three accounts, these lucid dreamers report difficulty in doing so. The light-level limitation notion of Hearne's (1981) is another illustration of this point.

As for thought clarity while lucid, Hearne (1978) found a significant increase in self-reported thought clarity by one proficient lucid dreamer in the sleep laboratory, from prior to lucidity onset to just after lucidity emerged. Similarly, in a survey study Hearne (1983) reported that over 80% of two adult lucid dream samples said that their lucid dreaming thoughts were the same or clearer than their waking thoughts. Gackenbach (1978) determined that lucid dreamers felt that their memory of waking life was clearer during lucid dreams than during other dreams. However, the aforementioned studies were done without dream recall control.

Dream control—that is, the ability of the dreamer while dreaming to consciously manipulate the dream experience—has consistently and repeatedly been shown to be higher in lucid dreams than in nonlucid dreams. This has been found by questionnaire (Gackenbach & Schillig, 1983; Hearne, 1983), by self-evaluation of an individual's dreams while keeping a dream journal (Hearne, 1978; see the two Gackenbach *et al.* 1983 studies;), and in the sleep laboratory by the successful completion of prearranged experiments (Fenwick *et al.*, 1984; LaBerge *et al.*, 1981).

The relative bizarreness of lucid versus nonlucid dreams is another cognitive aspect that has been the focus of considerable inquiry. Historically, lucid dreams have been perceived as more realistic and less bizarre than nonlucid dreams (Green, 1968), and some of the new wave of lucidity research has supported this perspective (Gackenbach, 1978; Hearne, 1983). However, other recent research has reported more bizarreness in lucid dreams (Hearne, 1978; Hoffman & McCarley, 1980; and see the two Gackenbach *et al.* 1983 studies;) or no difference (Gackenbach & Schillig, 1983).

These mixed findings may be due in part to the association of lucid dream initiation with bizarreness (Green, 1968) or with dream incongruities (Gackenbach, 1978, 1981). This has recently received experimental attention. For instance, Hoffman and McCarley (1980) tested the hypothesis that the degree of dream lucidity will be correlated with the amount of accompanying bizarreness by scoring 104 sleep laboratory dream reports for bizarreness and lucidity and found they were related. However, "lucidity" as operationally defined by their scale was essentially equivalent to "perception of anomaly." Furthermore, it may be that the Gackenbach, Curren, LaBerge, Davidson, and Maxwell finding of higher bizarreness evaluations for lucid dreams than for nonlucid dreams was due in part to the presence of an inconsistency or an oddity as the key device in the realization that one is asleep and dreaming. It would seem, as observed by Ogilvie, Hunt, Tyson, Lucescu, and Jeakins (1982), that bizarreness is needed for the dawning of dreaming awareness, but once achieved, the lucid dream scene is relatively realistic.

To summarize the cognitive components of dream lucidity mentioned herein, dream control is possible, given the appropriate waking expectations, yet inherent limitations beyond personal expectation may exist. Second, bizarreness seems to function as a key lucidity induction ingredient, but its role in the ongoing content of these dreams is unclear.

Emotions

Lucid dreams have historically been characterized as eliciting strong emotions (Green, 1968), and more recent survey data continue to support this contention (Hearne, 1983). However, they have been found to be emotionally both negative (Gackenbach & Schillig, 1983) and positive (Gackenbach, 1978; Gackenbach & Schillig, 1983; Gackenbach, Curren, LaBerge, Davidson, & Maxwell, 1983). A lack of dream-type differences for either emotion have also been reported (Gackenbach, Curren, & Cutler, 1983).

Summary of Self-Evaluations of Content

Several weaknesses are evident with these data. All the self-evaluations of dreams were done on dreams gathered in a home setting. Although, in some cases, verification of understanding of the concept of lucidity was determined without sleep laboratory signal verification (i.e., predetermined eye movements that serve as a signal from the dreamer to the experimenter that the former knows he or she is dreaming), one can never be certain if the subject is in fact talking about a REM-sleep phenomenon, a borderline state, or another experience. Second, all biases inherent in any self-report measure, such as underreporting, overreporting, halo effect, hostile reports (Feldman, 1985), or, as noted earlier (Worsley, 1983), the probable failure of inexperienced lucid dreamers to fully appreciate the subtleties of mentation in this state, are present in these reports.

With these cautions in mind, a general statement about the psychological content of these unique dream experiences can be made. Lucid dreams beyond the awareness of dreaming while dreaming seem to also be singularly characterized by a sense of bodily balance, as evidenced by their superiority in auditory and kinesthetic sensations, and control of the dream events.

JUDGES' EVALUATIONS OF CONTENT

Although in recent years there has been a shift from descriptive-oriented systems of dream content analysis to process-oriented systems (Foulkes, 1985), the bulk of the dream content analyses work to date is descriptive (Winget & Kramer, 1979). Certainly a process analysis of lucid versus nonlucid dreams is called for, but the first priority is for a descriptive analysis so comparisons can be made to previously collected normative data. Of the 150-plus content scales devised to date, Hall and Van de Castle's (1966) is one of the most widely used (Webb, 1979). Consequently, it is the scale of choice in the present investigation.

All but the Objects subscale were used in this inquiry. Additionally, four bizarreness scales and three of particular interest to dream lucidity (i.e., palpable sensations, balance, and control) were added. Hypotheses regarding the characters subscale are not possible as no previous content work has been done with dream characters and the lucid experience.

To the extent that dream lucidity emerges from nightmares (Green, 1968), one might expect a higher incidence of negative emotions, aggressive social interactions, failures in achievement, bad fortune from the environment, and negative descriptive elements as well as a lower incidence of positive emotions, friendly interactions, achievement success, good fortune from the environment, and positive descriptive elements in lucid than in nonlucid dreams. However, Gackenbach (1982) reported that only 15% of 313 lucid dreams reported over a 16-week period by college students were nightmare-initiated. If this is more accurate than Green's prediction of the majority coming from nightmares than the aforementioned data, differences would not emerge. Also, to the extent that these dream experiences are positive, one would predict the opposite of the previously mentioned.

With regards to the activities scoring category, based on the conclusion that lucid dreams are clearly characterized by auditory and kinesthetic sensations and a perception of dream control, it is predicted that there will be a higher incidence of verbal, physical, movement, auditory, and cognitive activities in lucid than in nonlucid dreams.

With regards to the Bizarreness subscales, lucid dreams should be less

bizarre than nonlucid dreams. They should also evidence more palpable sensations, control, and balance than the nonlucid dream experience.

METHODOLOGICAL CONSIDERATIONS

Samples

Dream transcripts (n = 421) were obtained from 10 samples of either students or adults. They were collected in classroom exercises, from home dream diaries, or from the sleep laboratory. Table 1 shows the distribution of these dreams as a function of sample and dream type. The actual numbers included in subsequent statistical analyses were somewhat smaller for several reasons. Prelucid dreams were deleted. When samples were compared, dreams from samples with unclear or clearly inconsistent sample characteristics were deleted (i.e., elderly dreams deleted from the adult sample, as they were not highly interested in dreams, whereas the rest of the adult group was interested). Dreams used to calculate reliability information were not used, and dreams with duplicate dream numbers were omitted. The preferred statistical analyses would consider these variables: type of dream (lucid, nonlucid), type of sample (adult, student), method of dream collection (classroom, diary, laboratory), and sex of subject (male, female). The last variable in order to compare to the Hall and Van de Castle normative data. However, there were not enough dreams scored to fill all possible cells so two separate sets of analyses were calculated. In the first set of analyses, only the dream transcripts of college students were utilized. Because the dreams came from college students and could be classified as lucid or nonlucid and according to the sex of dreamer, they most closely paralleled the normative data of Hall and Van de Castle. It should be noted that, in a recent use of this sytem Hall, Domhoff, Blick, and Weesner (1982) report few if any differences as a function of sex of subject from the original 1947–1952 group of

Table 1. Number of Dreams Content-Analyzed as a Function of Sample Type and Dream Type

	Sample		
Dream type	Students	Adults	Sleep laboratory[a]
Lucid	144	117	36
Nonlucid	104	7	5

[a]The sleep laboratory dreams were collected from 13 subjects in two sleep laboratories (Stanford University and St. Thomas' Hospital, London).

college students. In this inquiry, four of the five student samples were from a midwestern univeristy, whereas one was from an eastern college. There were 236 dreams (male lucids = 44; female lucids = 88; male nonlucids = 42; female nonlucids = 62) included in this first set of analyses. The major reason for the second set of analyses was the inclusion of 41 dreams collected in the sleep laboratory, 36 REM-episode signal-verified lucid dreams, and 5 REM-episode nonlucid dreams. These were compared to students' nonlaboratory dreams collected by class exercise and home dream diary. However, because the laboratory dreams were from self-selected adults who were highly involved in their dreams, it was thought advantageous to also compare these to the dreams collected by home dream diaries or questionnaire of a parallel group of adults. Sample characteristics other than dream content were only available on the midwestern univeristy students. Consequently, in order to compare samples on variables other than dream content, the eastern college student dreams were dropped (lucid = 15; nonlucid = 9). Therefore, of the three samples compared, two are from high dream-interested adults and one is from students. The dreams of two of the samples were collected from dream diary or questionnaire (one adult and one student), and one sample was collected in the sleep laboratory (adults). Due to the small number of nonlucid dreams collected from the sleep laboratory sample (n = 5) and from the adult samples (n = 7), sex of dreamer was dropped from the second set of analyses. Consequently, the content of 117 student lucid, 104 adult lucid, 36 adult laboratory lucid, 95 student nonlucid, 7 adult nonlucid, and 5 adult laboratory nonlucid dreams were statistically analyzed.

Instrument

As noted, many of the scoring categories from the Hall and Van de Castle system of dream content analyses were used but were adapted for easier computer data entry. Specifically, dreams were scored for characters, social interactions, activities, achievement outcomes, environmental press, emotions, and descriptive elements. In all cases, dreams were scored in terms of the frequency of each element in the category. The character who was involved was not considered except in the case of the character's scoring category. Additionally, consequences of achievement outcome and environmental press were not considered. This resulted in a simplified scoring procedure. Specific variables scored can be found in Tables 3 to 9.

Additional scales were added. Four scales measuring bizarreness include Domhoff's (1962) metamorphoses as well as one measuring animate characters, inanimate environment, and dream transformations (see Table 10 for details of these scales). Finally, three scales of particular interest to dream lucidity and not covered directly in the aforementioned were also included. Previous research indicated the presence of palpable sensations (i.e., touch or body sensations)

with dream lucidity as well as balance. Items assessing both were added to the judges' scoring sheets as was an item concerning dream control.

Procedure

Lucid and nonlucid dreams analyzed in this study were gathered over a 4-year period from participants in various lucid-dreaming research projects. The majority of the nonlaboratory lucid dreams were gathered when subjects thought

Table 2. Total Incidences of Dream Content Subscales for 10 Dreams Evaluated by Each Judge and Average Percentage Agreements

Scales	Judges				Average percent agreement
	1	2	3	4	
Characters					
Number	33	36	30	30	90%
Sex	33	34	30	27	88%
Identity	33	34	30	30	91%
Age	15	16	14	16	93%
Social interactions					
Aggresive	7	9	14	12	69%
Friendly	8	7	6	13	69%
Sexual	0	0	0	0	100%
Activities	38	36	34	58	78%
Achievement					
Success	2	4	4	4	75%
Failure	3	4	6	6	68%
Environmental press					
Misfortune	4	3	2	6	57%
Good Fortune	0	0	0	0	100%
Emotions	14	14	12	12	91%
Bizarreness					
Animate	2	2	2	4	75%
Inanimate	1	1	1	1	100%
Transformation	1	0	0	2	53%
Metamorphoses	1	0	0	0	75%
Descriptive elements					
Modifiers	18	71	23	41	49%
Temporal	2	12	4	3	45%
Negative	4	16	7	1	29%
Miscellaneous scales					
Palpaple	9	3	11	3	50%
Control	53	48	41	33	77%
Balance	8	33	52	42	47%

they were giving an example of a lucid dream (e.g., Gackenbach, Curren, LaBerge, Davidson, & Maxwell, 1983, report losing half of their sample when collecting illustrative lucid dreams due, typically, to confusion with morning-after dream recall). About half of the nonlucid dreams came from a 3-month dream diary project. The laboratory lucid dreams were from a sample of 114 dreams of 12 subjects provided by LaBerge (personal communication, 1985) and from a sample of seven lucid dreams of 1 subject sent by Worsley (personal communication, 1985). Lucid dreams selected for inclusion in subsequent data analyzes were only those obtained from unambiquous REM sleep where both the judge and the dreamer agreed that there had been lucidity accompanied by a clear eye-movement signal. The few nonlucid dreams were clearly identified as such by both the subject and the judge and also came from unambiguous REM episodes.

Four female judges were trained on a simplified version of the Hall and Van de Castle system of content analyses. In order to calculate scorer reliability, they all scored the same 10 randomly chosen dreams from the college students. Scorer reliabilities were expressed in percentage agreement. Specifically, as detailed in Table 2, total subscale incidences were calculated for each judge. For instance, for age of character, the total number of adult, teen, child, and infant characters for each judge was computed. Percentage agreement scores were then computed for every possible two-judge set, and the average of the six possible judge sets was then computed to obtain average percentage agreement scores for each scale listed in Table 2. These ranged from a low of 29% for the negative subscale of Descriptive Elements to 100% for several scales. The mean of these average percentage agreements was 73%. Considering the sample size (10 dreams) and the number of judges (4), this is an acceptable figure.

RESULTS

As pointed out by Winget and Kramer (1979), several solutions to the problem of differences in word length of dream transcripts have been offered. Hall and Van de Castle selected dreams of between 50 and 300 words in an attempt to address this problem. The method selected in this study was to determine if there were differences in word length as a function of the independent variables and, if so, to treat word length as a covariate. Results of the student analyses will be presented first, followed by those comparing samples, including the sleep laboratory dreams.

Students

In a Sex × Dream analysis of variance on number of words per dream, both a main effect for dreams ($F(1,232) = 7.36$, $p < .007$) and the Sex × Dream

interaction ($F(1,232) = 5.57$, $p < .019$) reached significance. Nonlucid dream transcripts had more words in them ($\bar{x} = 82.16$) than lucid dream transcripts ($\bar{x} = 63.89$). This was entirely accounted for by the females (female lucids, $\bar{x} = 66.60$; female nonlucids, $\bar{x} = 100.00$; male lucids $\bar{x} = 58.48$; male nonlucids, $\bar{x} = 55.83$). Consequently, in all subsequent student sample analyses, word count was a covariate.

Results of most of the 102 2(type of dream: lucid and nonlucid) × 2 (sex of dreamer; male and female) analyses of covariance with number of words per dream as the covariate on Hall and Van de Castle's subscale scores are presented in Tables 4 to 10.[2] Tables 11 and 12 are results from the 24 types of Dream × Sex of dreamer analyses of covariance for the additional scales—bizzareness, palpable sensations, dream control, and dream balance. Finally, Table 3 gives the percentage of significant effects for both the proportional comparisons and the analyses of covariance from Tables 4 to 17.

Three types of information are presented in Tables 4 to 10—relative proportions from Hall and Van de Castle's sample and this sample and adjusted means and F-ratios for effects involving type of dream. In each case, proportions for this sample were calculated in the same manner as the Hall and Van de Castle normative sample. For instance, the total male characters for females proportion was calculated by dividing the total males ($n = 507$) by the total number of human characters for females ($n = 1{,}363$) to reach a proportion of .372. It should be noted that the proportions on the student sample are uncontrolled for word length. However, only about 10% of the 236 student dreams in the first set of analyses exceeded the Hall and Van de Castle limits. Finally, Tables 11 and 12 list adjusted means and F-ratios for the Bizzarreness subscales and the three additional subscales (Palpable Sensations, Control, and Balance).

Sample Comparisons

As with the student analyses, a Sample × Dream-type analysis of variance was computed on number of words in the dream transcripts. There was a sample main effect ($F(2,358) = 43.35$, $p < .0001$) as well as a Sample × Dream-type interaction ($F(2,358) = 11.50$. $p < .0001$). The dreams collected in the sleep laboratory were longer ($\bar{x} = 199.85$) than those from the highly interested in dreams adults ($\bar{x} = 108.95$) and both were longer than the student dreams ($\bar{x} = 75.18$). A posteriori tests on the means from the interaction showed that there was no difference as a function of sample for the length of nonlucid dreams.

[2]Ten analyses, six number-of-character units, two temporal reference scales, and two negative scale subscales are not included in these tables as there are not comparable normative proportions in Hall and Van de Castle and because they were all nonsignificant.

Consequently, the sample main effect was due, in the main, to sample differences in reporting lucid dreams.

Only significant dreamer effect findings and adjusted means of the 102 2(dream type; lucid or nonlucid) × 3(sample; student, adult, or sleep laboratory) analyses of covariance with number of words as the covariate on the Hall and Van de Castle scoring categories are offered in Tables 14 to 18. Table 18 lists the same type of information as with the student analyses for the 24 analyses involving Bizarreness scales and the additional scales. Finally, Table 13 gives information on the population from which the majority of each sample was drawn so that assessments of potential sample similarities and differences can be made.

DISCUSSION

The overwhelming finding of these numerous analyses assessing manifest content differences between lucid and nonlucid dreams is that *they are more alike than they are different*. Specifically (see Table 3), for the proportion tests as well as for the two sets of analyses of covariance, 70% to 80% of the tests resulted in *no dream type differences*. Although they are more alike than they are different, the differences occurred at greater than chance levels. That is, by chance alone, one would expect 5% of the total 612 proportional paired comparisons or 31 tests to be significant. In fact, 169 were significant. Likewise, with the 252 analyses of covariance, one would expect 13 to be significant by chance. Fifty-seven analyses had either a main effect and/or an interaction involving dream type. Consequently, although the similarities outnumber the differences, the differences are significant and not due to chance fluxuations. That is, there is a substantive difference between lucid and nonlucid dreams. The nature of these differences will be taken up next, first for student analyses and then for the sample analyses.

Students

Because many of the hypotheses are tied to whether or not lucid dreams are more (Green, 1968) or less (Gackenbach, 1982) likely to be initiated by nightmares, the incidence of various triggers of dream lucidity was examined for the student sample. Consistent with Gackenbach's finding, only 18% of the 136 lucid dreams analyzed were judged to have arisen out of a nightmare. This was slightly more likely to occur with women than with men. Also relatively consistent with Gackenbach was the finding that 11% (vs. her 19.2%) of these dreams arose out of the recognition of an incongruent element and 67% (vs. her 48%) as a function of the "dreamlike sense" of the dream.

Table 3. Percentages of Significant Differences for Both Proportional Paired Comparisons and Analyses of Covariance for Hall and Van de Castle Subscales

Tests	Subscales						
	Overall	Characters	Social interaction	Activities	Achievement and environmemtal press	Emotions	Descriptive elements
Student proportions[a]							
Numbers of tests	102	37	22	8	8	5	22
Males							
Norms–lucid	27%	30%	5%	37%	37%	20%	41%
Norms–nonlucid	27%	24%	23%	25%	37%	0%	36%
Lucid–nonlucid	17%	8%	23%	37%	0%	0%	27%
Females							
Norms–lucid	45%	41%	27%	63%	50%	20%	68%
Norms–nonlucid	28%	24%	18%	37%	25%	60%	36%
Lucid–nonlucid	25%	8%	0%	50%	50%	60%	55%
All lucid–nonlucid[b]	29%	22%	14%	47%	22%	25%	48%
Analyses of covariance[c]							
Student sample only	20%	24%	5%	50%	25%	20%	14%
Student, adult, and sleep lab samples	26%	27%	9%	50%	25%	20%	36%

[a]With the exception of the number of tests, this section lists the percentage of significant differences obtained on the paired comparison tests between proportions. Three sets of proportions were compared within sex of subject. They were the Hall and Van de Castle norms (Norms) and lucid and nonlucid proportions from the current study.
[b]Percentage of significant defferences between all lucid-nonlucid paired comparisons for the student sample with nonlucids including those from this study and the Hall and Van de Castle norms.
[c]Percentage of analyses of covariance with either a significant dream-type main effect *or* a significant sex × dream interaction for the students only and the students, adults, and sleep lab analyses.

Table 4. Proportions, Adjusted Means, and F-Ratios for Sex, Number, and Age of Characters Subscales on the Student Sample

Subscale	Proportions						Adjusted means				F-ratios[a]
	Males			Females			Lucids		Nonlucids		
	Hall	Nonlucid	Lucid	Hall	Nonlucid	Lucid	M	F	M	F	
Number											
Single							1.24		2.06		$F(1,231) = 3.70$, $p<.056$
	$.687_{a}$[b]	$.755_{ab}$	$.835_{b}$	$.719_{ab}$	$.681_{a}$	$.757_{b}$	0.66	1.78	1.83	2.21	$F(1,231) = 0.18$, n.s
Group							0.39		0.74		$F(1,231) = 10.62$, $p<.001$
	$.313_{a}$	$.225_{b}$	$.165_{b}$	$.281_{b}$	$.269_{b}$	$.180_{a}$	0.34	0.41	0.55	0.87	$F(1,231) = 0.54$, n.s
Sex											
Male							0.80		1.02		$F(1,231) = 1.26$, n.s.
	$.530_{a}$	$.566_{b}$	$.681_{b}$	$.372_{a}$	$.255_{b}$	$.221_{b}$	1.34	0.53	1.33	0.81	$F(1,231) = 0.77$, n.s.
Female							0.84		1.03		$F(1,231) = 6.65$, $p<.011$
	$.258_{a}$	$.162_{b}$	$.132_{b}$	$.401_{a}$	$.464_{b}$	$.482_{b}$	0.27	1.13	0.38	1.47	$F(1,231) = 1.09$, n.s.
Joint							0.13		0.42		$F(1,231) = 18.57$, $p<.0001$
	$.131_{a}$	$.071_{b}$	$.055_{b}$	$.133_{a}$	$.189_{b}$	$.059_{c}$	0.11	0.14	0.17	0.60	$F(1,231) = 7.33$, $p<.007$
Indefinite							0.45		0.37		$F(1,231) = 1.24$, n.s.
	$.081_{a}$	$.202_{b}$	$.132_{b}$	$.093_{b}$	$.092_{b}$	$.239_{ab}$	0.27	0.55	0.48	0.29	$F(1,231) = 7.97$, $p<.005$
Age											
Adult							1.66		2.19		$F(1,231) = 9.40$, $p<.002$
	$.973_{a}$	$.963_{a}$	$.987_{a}$	$.933_{a}$	$.955_{a}$	$.930_{a}$	1.61	1.68	1.88	2.40	$F(1,231) = 0.91$, n.s.
Teenager							0.01		0.03		$F(1,231) = 1.35$, n.s.
	$.006_{a}$	$.000_{a}$	$.000_{a}$	$.014_{a}$	$.019_{a}$	$.006_{a}$	0.00	0.01	0.00	0.05	$F(1,231) = 0.81$, n.s.
Child							0.05		0.05		$F(1,231) = 0.02$, n.s.
	$.018_{a}$	$.024_{a}$	$.000_{a}$	$.042_{a}$	$.019_{a}$	$.041_{a}$	0.00	0.08	0.05	0.05	$F(1,231) = 1.72$, n.s.
Baby							0.04		0.02		$F(1,231) = 0.51$, n.s.
	$.003_{a}$	$.012_{a}$	$.013_{a}$	$.011_{a}$	$.006_{a}$	$.023_{a}$	0.02	0.05	0.02	0.02	$F(1,231) = 0.35$, n.s.

[a]Top = dream main effect. Bottom = dream × sex interaction.
[b]Paired comparisons were computed within each sex between proportions. Significant ($p<.05$) differences are indicated by differing subscripts. Proportions that do not differ have the same subscript.

Table 5. Proportions, Adjusted Means, and F-Ratios for Character Identities Subscales on the Student Samples

	Proportions						Adjusted means				
	Males			Females			Lucids		Nonlucids		
Subscale	Hall	Nonlucid	Lucid	Hall	Nonlucid	Lucid	M	F	M	F	F-ratios[a]
Father							0.02		0.06		$F(1,230) = 2.68$, n.s.
	$.025_{a}$[b]	$.020_{a}$	$.011_{a}$	$.032_{a}$	$.020_{ab}$	$.005_{b}$	0.02	0.01	0.05	0.06	$F(1,230) = 0.22$, n.s.
Mother							0.02		0.03		$F(1,230) = 1.01$, n.s.
	$.024_{a}$	$.010_{a}$	$.000_{a}$	$.046_{a}$	$.010_{a}$	$.009_{b}$	0.00	0.02	0.02	0.03	$F(1,230) = 0.02$, n.s.
Parents							0.01		0.00		$F(1,230) = 0.80$, n.s.
	$.011_{a}$	$.000_{a}$	$.000_{a}$	$.013_{a}$	$.000_{a}$	$.005_{a}$	0.00	0.01	0.00	0.00	$F(1,230) = 0.51$, n.s.
Brother							0.02		0.03		$F(1,230) = 0.23$, n.s.
	$.013_{a}$	$.011_{a}$	$.011_{a}$	$.015_{a}$	$.010_{a}$	$.009_{a}$	0.02	0.02	0.02	0.03	$F(1,230) = 0.13$, n.s.
Sister							0.05		0.07		$F(1,230) = 0.11$, n.s.
	$.009_{a}$	$.000_{a}$	$.011_{a}$	$.025_{a}$	$.036_{a}$	$.027_{a}$	0.02	0.07	0.00	0.11	$F(1,230) = 0.66$, n.s.
Husband							0.02		0.01		$F(1,230) = 0.49$, n.s.
	—	—	—	$.009_{a}$	$.005_{a}$	$.014_{a}$	0.00	0.03	0.00	0.02	$F(1,230) = 0.31$, n.s.
Wife							—		—		—
	$.008_{a}$	$.000_{a}$	$.000_{a}$	—	—	—	—	—	—	—	—
Son							0.02		0.00		$F(1,230) = 0.69$, n.s.
	$.001_{a}$	$.000_{a}$	$.000_{a}$	—	$.000_{a}$	$.000_{a}$	0.00	0.02	0.00	0.00	$F(1,230) = 0.43$, n.s.
Daughter							0.01		0.01		$F(1,230) = 0.00$, n.s.
	—	$.000_{a}$	$.000_{a}$	—	$.005_{a}$	$.004_{a}$	0.00	0.01	0.00	0.02	$F(1,230) = 0.00$, n.s.
Child							0.03		0.05		F(1,230) = 0.00, n.s.
	$.018_{a}$	$.010_{a}$	$.000_{a}$	$.042_{a}$	$.020_{ab}$	$.018_{b}$	0.00	0.05	0.02	0.06	F(1,230) = 0.69, n.s.
Infant							0.03		0.01		F(1,230) = 0.89, n.s.
	$.003_{a}$	$.000_{a}$	$.000_{a}$	$.011_{a}$	$.005_{a}$	$.018_{a}$	0.00	0.05	0.00	0.02	F(1,230) = 0.55, n.s.
Family							0.04		0.10		F(1,230) = 4.25, $p<.04$
	$.095_{a}$	$.020_{b}$	$.000_{b}$	$.147_{a}$	$.041_{b}$	$.023_{b}$	0.00	0.06	0.05	0.13	F(1,230) = 0.23, n.s.
Relative							0.03		0.04		F(1,230) = 0.13, n.s.
	$.023_{a}$	$.010_{a}$	$.011_{a}$	$.045_{a}$	$.015_{b}$	$.018_{b}$	0.02	0.03	0.02	0.05	F(1,230) = 0.07, n.s.
Known							0.41		0.67		F(1,230) = 4.37, $p<.038$
	$.313_{a}$	$.232_{b}$	$.220_{b}$	$.368_{a}$	$.240_{b}$	$.181_{b}$	0.41	0.41	0.55	0.76	F(1,230) = 0.30, n.s.
Prominent							0.00		0.03		F(1,230) = 2.63, n.s.
	$.016_{a}$	$.010_{a}$	$.000_{a}$	$.010_{a}$	$.010_{a}$	$.000_{a}$	0.00	0.00	0.02	0.03	F(1,230) = 0.00, n.s.
Occupation							0.08		0.19		F(1,230) = 2.99, n.s.
	$.171_{a}$	$.091_{b}$	$.044_{b}$	$.085_{a}$	$.056_{a}$	$.027_{b}$	0.00	0.07	0.21	0.18	F(1,230) = 0.20, n.s.
Ethnic							0.01		0.05		F(1,230) = 2.92, n.s.
	$.020_{ab}$	$.030_{a}$	$.000_{b}$	$.021_{a}$	$.010_{a}$	$.005_{a}$	0.00	0.01	0.07	0.03	F(1,230) = 0.90, n.s.
Stranger							0.21		0.21		F(1,230) = 0.00, n.s.
	$.232_{b}$	$.000_{b}$	$.121_{c}$	$.171_{a}$	$.112_{b}$	$.077_{b}$	0.25	0.20	0.00	0.35	F(1,230) = 8.85, $p<.003$
Uncertain							0.19		0.18		F(1,230) = 0.12, n.s.
	$.119_{a}$	$.091_{a}$	$.066_{a}$	$.133_{a}$	$.051_{b}$	$.086_{b}$	0.14	0.22	0.21	0.16	F(1,230) = 1.79, n.s.
Creature							0.03		0.04		F(1,230) = 0.04, n.s.
	$.001_{a}$	$.010_{b}$	$.011_{b}$	—	$.015_{a}$	$.018_{a}$	0.02	0.03	0.02	0.05	F(1,230) = 0.02, n.s.
Animal							0.08		0.11		$F(1,230) = 0.42$, n.s.
	$.060_{a}$	$.061_{a}$	$.022_{a}$	$.042_{a}$	$.026_{a}$	$.045_{a}$	0.05	0.09	0.14	0.08	$F(1,230) = 1.74$, n.s.

[a]Top = dream main effect. Bottom = dream × sex interaction.
[b]See footnote [b] on Table 4.

Table 6. Proportions, Adjusted Means, and F-Ratios for Social Interactions Subscales on the Student Sample

Subscale	Proportions						Adjusted means				F-ratios[a]
	Males			Females			Lucids		Nonlucids		
	Hall	Nonlucid	Lucid	Hall	Nonlucid	Lucid	M	F	M	F	
Aggression											
Murder (8)							0.05		0.03		$F(1,231) = 0.48$, n.s.
	$.06_{a}$[b]	$.13_{a}$	$.12_{a}$	$.02_{a}$	$.00_{ab}$	$.06_{b}$	0.07	0.03	0.07	0.00	$F(1,231) = 0.40$, n.s.
Attack (7)							0.07		0.13		$F(1,231) = 2.27$, n.s.
	$.22_{b}$	$.43_{a}$	$.15_{b}$	$.15_{a}$	$.13_{a}$	$.11_{a}$	0.07	0.07	0.24	0.06	$F(1,231) = 2.87$, n.s.
Chasing-confining (6)							0.21		0.15		$F(1,231) = 0.58$, n.s.
	$.15_{a}$	$.26_{a}$	$.27_{a}$	$.13_{a}$	$.33_{b}$	$.40_{b}$	0.16	0.24	0.14	0.16	$F(1,231) = 0.15$, n.s.
Destruction (5)							0.02		0.00		$F(1,231) = 2.05$, n.s.
	$.06_{a}$	$.00_{a}$	$.04_{a}$	$.04_{a}$	$.00_{a}$	$.06_{a}$	0.02	0.02	0.00	0.00	$F(1,231) = 0.01$, n.s.
Serious threat (4)							0.02		0.00		$F(1,231) = 2.89$, n.s.
	$.05_{a}$	$.00_{a}$	$.08_{a}$	$.04_{a}$	$.00_{a}$	$.06_{a}$	0.05	0.01	0.00	0.00	$F(1,231) = 1.10$, n.s.
Rejection (3)							0.08		0.11		$F(1,231) = 0.00$, n.s.
	$.18_{a}$	$.13_{a}$	$.12_{a}$	$.36_{a}$	$.27_{ab}$	$.15_{a}$	0.07	0.09	0.07	0.13	$F(1,231) = 0.01$, n.s.
Verbal (2)							0.08		0.05		$F(1,231) = 1.04$, n.s.
	$.18_{b}$	$.00_{a}$	$.15_{b}$	$.15_{a}$	$.17_{a}$	$.13_{a}$	0.09	0.08	0.00	0.08	$F(1,231) = 0.80$, n.s.
Covert (1)							0.03		0.04		$F(1,231) = 0.01$, n.s.
	$.10_{a}$	$.04_{a}$	$.08_{a}$	$.11_{a}$	$.10_{a}$	$.04_{a}$	0.05	0.02	0.02	0.05	$F(1,231) = 0.14$, n.s.
Total 5–8							0.35		0.32		$F(1,231) = 0.04$, n.s.
	$.50_{b}$	$.83_{a}$	$.58_{b}$	$.34_{a}$	$.47_{ab}$	$.62_{b}$	0.32	0.36	0.45	0.23	$F(1,231) = 1.89$, n.s.
Total 1–4							0.22		0.19		$F(1,231) = 0.82$, n.s.
	$.50_{b}$	$.17_{a}$	$.42_{b}$	$.66_{a}$	$.53_{ab}$	$.38_{b}$	0.25	0.20	0.10	0.26	$F(1,231) = 0.63$, n.s.
Friendly											
Marriage							0.01		0.01		$F(1,231) = 0.04$, n.s.
	$.04_{a}$	$.00_{a}$	$.00_{a}$	$.08_{a}$	$.02_{a}$	$.04_{a}$	0.00	0.01	0.00	0.02	$F(1,231) = 0.02$, n.s.
Physical inviting							0.02		0.04		$F(1,231) = 0.13$, n.s.
	$.09_{a}$	$.10_{a}$	$.14_{a}$	$.08_{a}$	$.07_{a}$	$.04_{a}$	0.02	0.01	0.02	0.05	$F(1,231) = 0.02$, n.s.
Dating							0.02		0.07		$F(1,231) = 1.64$, n.s.
	$.08_{a}$	$.30_{b}$	$.00_{ab}$	$.15_{a}$	$.10_{a}$	$.12_{a}$	0.00	0.03	0.07	0.06	$F(1,231) = 0.58$, n.s.
Helping, protecting							0.12		0.16		$F(1,231) = 0.30$, n.s.
	$.42_{b}$	$.30_{b}$	$.86_{a}$	$.32_{a}$	$.34_{a}$	$.40_{a}$	0.14	0.11	0.07	0.23	$F(1,231) = 1.72$, n.s.
Gift, loan							0.00		0.02		$F(1,231) = 1.57$, n.s.
	$.11_{a}$	$.10_{a}$	$.00_{a}$	$.10_{a}$	$.02_{b}$	$.00_{b}$	0.00	0.00	0.02	0.02	$F(1,231) = 0.34$, n.s.
Verbal							0.05		0.16		$F(1,231) = 5.02$, $p<.026$
	$.20_{a}$	$.10_{a}$	$.00_{a}$	$.19_{a}$	$.39_{b}$	$.24_{ab}$	0.00	0.07	0.02	0.26	$F(1,231) = 1.61$, n.s.
Covert							0.03		0.03		$F(1,231) = 0.00$, n.s.
	$.06_{a}$	$.10_{a}$	$.00_{a}$	$.08_{a}$	$.05_{a}$	$.16_{a}$	0.00	0.05	0.02	0.03	$F(1,231) = 0.75$, n.s.
Sexual											
Intercourse							0.02		0.02		$F(1,231) = 0.05$, n.s.
	$.27_{a}$	$.50_{a}$	$.99_{a}$	$.26_{a}$	$.00_{a}$	$.33_{a}$	0.02	0.01	0.05	0.00	$F(1,231) = 0.89$, n.s.
Petting							0.01		0.01		$F(1,231) = 0.05$, n.s.
	$.18_{a}$	$.25_{a}$	$.00_{a}$	$.26_{a}$	$.00_{a}$	$.33_{a}$	0.00	0.01	0.02	0.00	$F(1,231) = 1.79$, n.s.
Kissing							0.01		0.02		$F(1,231) = 0.70$, n.s.
	$.11_{a}$	$.00_{a}$	$.00_{a}$	$.21_{a}$	$.67_{b}$	$.33_{ab}$	0.00	0.01	0.00	0.03	$F(1,231) = 0.43$, n.s.
Sexual overtures							0.00		0.02		$F(1,231) = 2.67$, n.s.
	$.30_{a}$	$.25_{a}$	$.00_{a}$	$.16_{a}$	$.33_{a}$	$.00_{a}$	0.00	0.00	0.02	0.02	$F(1,231) = 0.05$, n.s.
Sexual fantasies							—		—		—
	$.14_{a}$	$.00_{a}$	$.00_{a}$	$.11_{a}$	$.00_{a}$	$.00_{a}$	—		—		—

[a]Top = dream main effect. Bottom = dream × sex interaction.
[b]See footnote [b] on Table 4.

Two types of descriptive information are presented for the various scoring categories in Tables 4 to 10: relative proportions of a variable in a content category (i.e., number of males relative to all human characters identified by sex) and the average number of each variable per dream adjusted for differences in dream word count (i.e., the adjusted for word count average number of dream males). The former is derived as per Hall and Van de Castle and presented in order to afford comparisons to their normative data. As per Hall, Domhoff, Blick, and Weesner (1982), paired comparisons between proportions within each sex were also computed. Because the proportions are not controlled for word count, there are more differences (also see Table 3) between lucid and nonlucid dreams for that type of measurement than there are for the analyses-of-covariance-generated means. Additionally, there is a conceptual difference between these measures. The proportions are based on all dreams (denominator) and the number *for which the category was present* (numerator). The adjusted means are the average incidence counted of a category *per dream*. This conceptual distinction resulted in a difference in the direction of the finding for only one variable (number of characters). In all other cases where there was a dreamer effect (main or interactive) for the analyses of covariance, the proportional tests reflected the difference in the same direction. However, there were many incidences where the paired comparisons on the proportions were significantly different, but no difference was found in the covariance analyses.

It can be seen in Tables 4 and 5 that, for the dream-type main effects for the analyses of covariance, there were fewer characters in the lucid dreams than in the nonlucid dreams. With some minor variations, the proportions parallel this finding. That is, there were proportionately fewer characters in lucid than in nonlucid dreams.

Contrary to expectation (see Table 6) for both types of analyses (proportion paired comparisons and analyses of covariance), there were generally no dream-type differences in the frequency of aggressive, friendly, or sexual social interactions. The one dream main effect for verbal friendly interactions could be attributed to chance variation. It favored nonlucid dreams.

In terms of the frequency of types of activities (see Table 7) as expected, for proportions and covariance, the lucid dreams of these students contained significantly more auditory and cognitive components than their nonlucid dreams or than the nonlucid dreams of the normative sample of students. In the previous literature, no dream-type differences have reliably been found for visual elements. However, in these analyses, an interaction from the analysis of covariance was significant such that for males only lucid dreams were significantly *less* visual than nonlucid dreams. The same was true with the proportions data.

Also, as expected but for the female proportion data only, lucid dreams were more physical than either type of nonlucid dream. Contrary to expectation, but for the female proportional data only, verbal and movement activities were less frequently judged to exist in lucid than in the normative nonlucid dreams

Table 7. Proportions, Adjusted Means, and F-Ratios for the Activities on the Student Sample

	Proportions					Adjusted means					
	Males			Females		Lucids			Nonlucids		
Subscale	Hall	Nonlucid	Lucid	Hall	Nonlucid	Lucid	M	F	M	F	F-ratios[a]
Verbal	.216$_a$[b]	.133$_b$	.127$_b$	.262$_a$	.217$_{ab}$	.188$_b$	0.39	0.57 0.66	0.43	0.72 0.92	$F(1,231) = 0.34$, n.s.
Physical	.265$_a$	.252$_a$	.246$_a$	.195$_b$	.175$_b$	.239$_a$	0.73	0.80 0.84	0.81	0.77 0.74	$F(1,231) = 0.01$, n.s.
Movement	.248$_a$	.296$_a$	.209$_a$	.251$_a$	.243$_{ab}$	.196$_b$	0.64	0.69 0.72	0.95	1.00 1.03	$F(1,231) = 1.79$, n.s.
Location change	.082$_a$	.096$_a$	.045$_a$	.074$_b$	.175$_a$	.069$_b$	0.14	0.19 0.22	0.31	0.57 0.74	$F(1,231) = 2.91$, n.s.
Visual	.118$_{ab}$	.141$_a$	.075$_b$	.124$_a$	.061$_b$	.094$_{ab}$	0.20	0.34 0.33	0.45	0.26	$F(1,231) = 2.67$, n.s.
Auditory	.016$_b$	.007$_b$	0.37$_a$	.014$_a$	.008$_a$	.024$_a$	0.11	0.10 0.09	0.02	0.35 0.03	$F(1,231) = 0.07$, n.s.
Expressive	.022$_a$	.015$_a$	.037$_a$	.034$_a$	.057$_b$	.015$_b$	0.11	0.08 0.06	0.05	0.16 0.24	$F(1,231) = 5.33$, $p<.022$
Cognitive	.032$_a$	.059$_b$	.224$_c$	.046$_a$	.065$_b$	.175$_c$	0.66	0.64 0.64	0.19	0.24 0.27	$F(1,231) = 4.62$, $p<.033$
											$F(1,231) = 0.17$, n.s.
											$F(1,231) = 1.15$, n.s.
											$F(1,231) = 3.54$, n.s.
											$F(1,231) = 24.20$, $p<.0001$
											$F(1,231) = 0.05$, n.s.

[a]Top = dream main effect. Bottom = dream × sex interaction.
[b]See footnote [b], Table 4.

Table 8. Proportions, Adjusted Means, and F-Ratios for Achievement and Environmental Press Subscales on the Student Sample

	Proportions						Adjusted means				
	Males			Females			Lucids		Nonlucids		
Subscale	Hall	Nonlucid	Lucid	Hall	Nonlucid	Lucid	M	F	M	F	F-ratios[a]
Achievement											
Success							0.08		0.23		$F(1,231) = 5.84$, $p<0.16$
	$.15_a$[b]	$.69_b$	$.50_b$	$.08_b$	$.60_b$	$.30_a$	0.11	0.07	0.21	0.24	$F(1,231) = 0.01$, n.s.
Failure							0.14		0.13		$F(1,231) = 0.08$, n.s.
	$.15_a$	$.31_{ab}$	$.50_b$	$.10_a$	$.40_b$	$.70_c$	0.11	0.16	0.10	0.16	$F(1,231) = 0.00$, n.s.
Environmental press											
Death							0.03		0.04		$F(1,231) = 0.07$, n.s.
	$.08_a$	$.13_a$	$.18_a$	$.10_a$	$.25_a$	$.13_a$	0.05	0.02	0.02	0.05	$F(1,231) = 0.83$, n.s.
Injured or ill							0.02		0.02		$F(1,231) = 0.00$, n.s.
	$.21_a$	$.00_a$	$.09_a$	$.25_a$	$.17_a$	$.13_a$	0.02	0.02	0.00	0.03	$F(1,231) = 0.56$, n.s.
Accident, distrust, loss of possession							0.01		0.04		$F(1,231) = 2.60$, n.s.
	$.25_a$	$.13_a$	$.09_a$	$.19_b$	$.25_b$	$.00_a$	0.02	0.00	0.02	0.05	$F(1,231) = 1.51$, n.s.
Threat from environment							0.03		0.03		$F(1,231) = 0.01$, n.s.
	$.13_a$	$.38_b$	$.18_{ab}$	$.13_a$	$.00_a$	$.13_a$	0.05	0.02	0.07	0.00	$F(1,231) = 0.91$, n.s.
Falling							0.05		0.06		$F(1,231) = 0.13$, n.s.
	$.05_a$	$.38_b$	$.27_b$	$.03_a$	$.25_b$	$.19_b$	0.07	0.03	0.07	0.05	$F(1,231) = 0.04$, n.s.
Obstacle							0.06		0.01		$F(1,231) = 3.90$, $p<.049$
	$.28_a$	$.00_b$	$.18_{ab}$	$.30_{ab}$	$.08_a$	$.44_b$	0.05	0.07	0.00	0.02	$F(1,231) = 0.03$, n.s.
Good fortune							—		—		— —
	$.06_b$	$.00_{ab}$	$.00_a$	$.06_a$	$.00_b$	$.00_b$	—		—		— —

[a]Top = dream main effect. Bottom = dream × sex interaction.
[b]See footnote [b] Table 4.

Table 9. Proportions, Adjusted Means, and F-Ratios for Emotions Subscale on the Student Sample

	Proportions						Adjusted means				
	Males			Females			Lucids		Nonlucids		
Subscale	Hall	Nonlucid	Lucid	Hall	Nonlucid	Lucid	M	F	M	F	F-ratios[a]
Happy							0.06		0.20		$F(2,231) = 5.99$, $p<.015$
	$.195_a$[b]	$.261_a$	$.176_a$	$.195_a$	$.341_a$	$.115_b$	0.07	0.06	0.14	0.24	$F(1,231) = 0.53$, n.s.
Sad							0.02		0.04		$F(1,231) = 0.36$, n.s.
	$.094_a$	$.087_a$	$.000_a$	$.129_a$	$.045_a$	$.058_a$	0.00	0.03	0.05	0.03	$F(1,231) = 1.42$, n.s.
Anger							0.15		0.12		$F(2,231) = 1.00$, n.s.
	$.156_a$	$.261_{ab}$	$.470_b$	$.126_a$	$.136_{ab}$	$.250_b$	0.18	0.14	0.14	0.10	$F(1,231) = 0.08$, n.s.
Confusion							0.08		0.16		$F(1,231) = 1.61$, n.s.
	$.215_a$	$.130_a$	$.118_a$	$.178_b$	$.318_a$	$.173_b$	0.05	0.10	0.07	0.23	$F(1,231) = 0.36$, n.s.
Apprehension							0.17		0.12		$F(1,231) = 0.63$, n.s.
	$.340_a$	$.261_a$	$.235_a$	$.372_b$	$.159_a$	$.404_b$	0.09	0.22	0.14	0.11	$F(1,231) = 2.02$, n.s.

[a]Top = dream main effect. Bottom = dream × sex interaction.
[b]See footnote [b] Table 4.

Table 10. Proportions, Adjusted Means, and F-Ratios of Descriptive Elements Subscale on the Student Sample

	Proportions						Adjusted means				
	Males			Females			Lucids		Nonlucids		
Modifies	Hall	Nonlucid	Lucid	Hall	Nonlucid	Lucid	M	F	M	F	F-ratios[a]
Chromatic							0.22		0.38		$F(1,230) = 0.26$, n.s.
Achromatic	$.07_a$[b]	$.21_b$	$.21_b$	$.11_a$	$.07_b$	$.04_b$	0.48	0.09	0.52	0.27	$F(1,230) = 0.05$, n.s.
							0.01		0.19		$F(1,230) = 3.21$, n.s.
Large	$.04_b$	$.04_b$	$.00_a$	$.05_b$	$.06_b$	$.01_a$	0.00	0.01	0.10	0.26	$F(1,230) = 0.33$, n.s.
							0.18		0.25		$F(1,230) = 0.15$, n.s.
Small	$.18_a$	$.12_a$	$.13_a$	$.13_a$	$.05_b$	$.00_c$	0.30	0.11	0.31	0.21	$F(1,230) = 0.05$, n.s.
							0.15		0.22		$F(1,230) = 0.13$, n.s.
Intense	$.09_a$	$.07_a$	$.11_a$	$.08_a$	$.06_{ab}$	$.04_b$	0.25	0.10	0.17	0.26	$F(1,230) = 0.74$, n.s.
							0.02		0.28		$F(1,230) = 3.60$, $p<.05$
Weak	$.29_a$	$.02_b$	$.00_b$	$.30_a$	$.11_b$	$.02_c$	0.00	0.03	0.05	0.44	$F(1,230) = 1.37$, n.s.
							0.05		0.09		$F(1,231) = 0.31$, n.s.
Filled	$.05_a$	$.03_b$	$.01_b$	$.04_a$	$.02_a$	$.03_a$	0.02	0.07	0.07	0.10	$F(1,231) = 0.39$, n.s.
							0.17		0.11		$F(1,231) = 0.35$, n.s.
Empty	$.02_a$	$.01_a$	$.02_a$	$.01_a$	$.04_b$	$.17_c$	0.05	0.23	0.02	0.16	$F(1,231) = 0.13$, n.s.
							0.04		0.02		$F(1,231) = 1.00$, n.s.
	$.01_a$	$.02_a$	$.01_a$	$.00_b$	$.00_b$	$.02_a$	0.02	0.05	0.05	0.00	$F(1,231) = 2.80$, n.s.

Straight							0.17		0.01		$F(1,231) = 2.45$, n.s.
Crooked	$.00_a$	$.00_a$	$.00_a$	$.00_b$	$.00_b$	$.09_a$	0.00	0.25	0.00	0.02	$F(1,231) = 1.72$, n.s.
							0.17		0.04		$F(1,231) = 2.08$, n.s.
Hot	$.01_b$	$.04_a$	$.00_b$	$.01_a$	$.00_b$	$.09_c$	0.00	0.25	0.10	0.00	$F(1,231) = 2.76$, n.s.
							0.18		0.04		$F(1,230) = 2.76$, n.s.
Cold	$.01_a$	$.03_b$	$.18_c$	$.01_b$	$.00_b$	$.07_a$	0.40	0.07	0.07	0.02	$F(1,230) = 2.10$, n.s.
							0.05		0.00		$F(1,230) = 5.42$, $p<.02$
Fast	$.01_a$	$.00_a$	$.02_a$	$.01_b$	$.00_b$	$.06_a$	0.05	0.06	0.00	0.00	$F(1,230) = 0.05$, n.s.
							0.02		0.06		$F(1,230) = 2.41$, n.s.
Slow	$.04_a$	$.00_b$	$.01_{ab}$	$.02_a$	$.02_a$	$.01_a$	0.02	0.01	0.00	0.10	$F(1,230) = 3.37$, n.s.
							0.04		0.05		$F(1,230) = 0.00$, n.s.
Old	$.01_a$	$.03_b$	$.04_b$	$.01_a$	$.01_a$	$.00_a$	0.09	0.01	0.07	0.03	$F(1,230) = 0.26$, n.s.
							0.25		0.85		$F(1,230) = 3.60$, $p<.05$
Young	$.04_a$	$.23_b$	$.08_c$	$.04_a$	$.26_b$	$.11_c$	0.19	0.28	0.57	1.03	$F(1,230) = 0.17$, n.s.
							0.13		0.18		$F(1,230) = 0.07$, n.s.
Pretty, good	$.05_a$	$.10_b$	$.01_c$	$.04_b$	$.03_b$	$.08_a$	0.02	0.18	0.26	0.13	$F(1,230) = 1.54$, n.s.
							0.69		0.32		$F(1,230) = 0.42$, n.s.
Ugly, bad	$.05_a$	$.03_a$	$.02_a$	$.07_a$	$.12_b$	$.37_c$	0.05	1.01	0.07	0.48	$F(1,230) = 0.31$, n.s.
							0.41		0.34		$F(1,230) = 0.46$, n.s.
	$.03_b$	$.04_b$	$.16_a$	$.06_a$	$.13_b$	$.16_b$	0.36	0.44	0.10	0.50	$F(1,230) = 0.25$, n.s.

[a]Top = dream main effect. Bottom = dream × sex interaction.
[b]See footnote [b] Table 4.

Table 11. Adjusted Means and F-Ratios for Bizarreness Subscales on the Student Sample

Subscale	Adjusted means: Lucids M	Adjusted means: Lucids F	Adjusted means: Nonlucids M	Adjusted means: Nonlucids F	F-ratios[a]
A. Animate characters sum	0.23		0.34		$F(1,231) = 1.60$, n.s.
1. Appearance in a dream of monsters and alien beings	0.16	0.27	0.43	0.27	$F(1,231) = 3.85$, $p<.051$
2. Appearance of fictional, dead, or prominent characters unknown personally to dreamer	0.05		0.01		$F(1,231) = 1.99$, n.s.
3. Absence for inappropriate clothing, tools, or implements	0.00	0.07	0.00	0.02	$F(1,231) = 1.24$, n.s.
4. Distorted or disfigured body parts not present in reality	0.02		0.05		$F(1,231) = 0.43$, n.s.
5. Impossible acts or magic by animate characters	0.02	0.02	0.05	0.05	$F(1,231) = 0.12$, n.s.
6. Wrong or inappropriate role of dreamers or other characters	0.00		0.04		$F(1,231) = 5.81$, $p<.017$
B. Inanimate environment sum	0.00	0.00	0.05	0.03	$F(1,231) = 0.07$, n.s.
1. Violation of physical laws by inanimate objects	0.02		0.02		$F(1,231) = 0.08$, n.s.
	0.00	0.02	0.02	0.02	$F(1,231) = 0.73$, n.s.
	0.03		0.03		$F(1,231) = 0.00$, n.s.
	0.02	0.03	0.02	0.03	$F(1,231) = 0.01$, n.s.
	0.12		0.19		$F(1,231) = 1.50$, n.s.
	0.11	0.12	0.29	0.13	$F(1,231) = 2.94$, n.s.
	0.05		0.08		$F(1,231) = 0.39$, n.s.
	0.02	0.06	0.10	0.06	$F(1,231) = 1.06$, n.s.
	0.02		0.03		$F(1,231) = 0.02$, n.s.
	0.02	0.02	0.05	0.02	$F(1,231) = 0.49$, n.s.
2. Realistic objects but in the wrong place	0.01		0.03		$F(1,231) = 1.41$, n.s.
	0.00	0.01	0.02	0.03	$F(1,231) = 0.02$, n.s.
3. Inappropriate or fantastic combination of environmental features	0.02		0.02		$F(1,231) = 0.00$, n.s.
	0.00	0.02	0.02	0.02	$F(1,231) = 1.26$, n.s.
C. Dream transformation sum	0.02		0.11		$F(1,231) = 2.11$, $p<.02$
	0.02	0.02	0.07	0.13	$F(1,231) = 0.00$, n.s.
1. An object suddenly appears or disappears	0.00		0.02		$F(1,231) = 1.99$, n.s.
	0.00	0.00	0.02	0.02	$F(1,231) = 0.18$, n.s.
2. A sudden shift backward or forward in time	—		—		—
	—		—		—
3. A person suddenly appears or vanishes, but the entire dream scene is unaltered	0.01		0.01		$F(1,231) = 0.11$, n.s.
	0.00	0.01	0.00	0.02	$F(1,231) = 0.07$, n.s.
4. Scene shift where the entire environment is altered without the character having moved	0.02		0.08		$F(1,231) = 0.92$, n.s.
	0.02	0.01	0.05	0.10	$F(1,231) = 0.00$, n.s.
D. Metamorphoses sum	0.02		0.02		$F(1,231) = 0.20$, n.s.
	0.00	0.03	0.00	0.03	$F(1,231) = 0.15$, n.s.
1. From one person to another	0.00		0.01		$F(1,231) = 1.09$, n.s.
	0.00	0.00	0.00	0.02	$F(1,231) = 0.66$, n.s.
2. Animal to person or vice versa	—		—		—
	—		—		—
3. Inanimate to animate and vice versa	—		—		—
	—		—		—
4. From one object to another	0.02		0.01		$F(1,231) = 0.83$, n.s.
	0.00	0.03	0.00	0.02	$F(1,231) = 0.57$, n.s.

[a]Top = dream main effect. Bottom = dream × sex interaction.

with no difference with the student nonlucid dreams. A similar situation occurred for males with the verbal proportion data.

There was no hypothesis regarding the location change activity. Lucid dreams were found to have fewer location changes than nonlucid dreams in the covariance analysis.

Table 8 lists findings from both the achievement and enviromental-press scoring categories. Regarding the former, nonlucid dreams were significantly higher in success achievement outcomes than lucid dreams for the covariance analysis and for the proportions within this sample. Regarding environmental press, more obstacles were found in lucid dreams for both types of analyses.

Regarding emotions, as can be seen in Table 9, only one dreamer effect emerged for the analyses of covariance, with the frequency of happy emotions favoring the nonlucid dream. For all other emotions, the findings were ambiguous and not as strong.

The final Hall and Van de Castle scoring category used in the present study was descriptive elements (see Table 10). There were no dream-type differences for the negative or temporal scales and only a few for the modifiers. Lucid dreams had fewer intense and old modifiers but more cold modifiers than nonlucid dreams in the covariance analyses. For the proportional comparisons, among males, lucid dreams had fewer achromatic and young modifiers and more hot and ugly modifiers than either type of nonlucid dream. For females, lucid dreams had fewer achromatic, large, and intense modifiers and more filled, empty, straight, crooked, hot, cold, young, and pretty modifiers than either type of nonlucid dream. This sex difference in the number of modifiers implicated in dream-type differences may be explained by females superiority in verbal skills (Maccoby & Jacklin, 1974). Otherwise, there does not seem to be a positive or negative valenced tendency to these dream type differences.

Only 3 of the 21 analyses of covariance on bizarreness scoring categories had a significant effect involving dream type. It can be seen in Table 11 that these effects were from the animate characters and inanimate environment scales. However, as this occurred at chance levels, one must conclude that there was no difference as a function of bizarreness.

Finally, in Table 12, the finding of *less* balance associated with lucid than with nonlucid dreams was contrary to expectation as was the lack of a dream-type difference for palpable sensations and control.

To summarize the student sample findings regarding dream type differences, *across types of analyses and sex of subject* lucid dreams have fewer characters and more obstacles and auditory and cognitive activities than nonlucid dreams. One sex difference across types of analyses also emerged. Specifically, males had less visual activities in their lucid than in their nonlucid dreams. All other findings were attenuated by conflicts between proportional differences and the analyses of covariance. Consequently, caution in interpretation is advised.

Table 12. Adjusted Means and F-Ratios for Miscellaneous Scales on the Student Sample[a]

Scale	Adjusted means: Lucids M	Lucids F	Nonlucids M	Nonlucids F	F-ratios[b]
Palpable sensations (touch and body	1.25		1.32		$F(1,231) = 0.07$, n.s.
sensations)	1.14	1.31	1.24	1.37	$F(1,231) = 0.09$, n.s.
Control over dream	6.06		5.69		$F(1,231) = 0.42$, n.s.
	5.32	6.43	5.69	5.69	$F(1,231) = 0.92$, n.s.
Balance (physical, psychological,	5.20		6.95		$F(1,231) = 4.07$, $p<.045$
and intellectual)	5.27	5.17	5.90	7.66	$F(1,231) = 0.88$, n.s.

[a]Unlike all of the other scales, which are frequency counts, with palpable dream control and balance the judge was asked to make an evaluation along a 10-point scale (3-point for palpable) with a high score representing a lot of that quality in the dream.
[b]Top = dream main effect. Bottom = dream × sex interaction.

Sample Comparisons

It will be recalled that this second set of analyses of covariance was primarily undertaken in order to examine the content of sleep laboratory, signal verified REM-sleep lucid dreams to REM-sleep nonlucid dreams also collected in the laboratory. It is advantageous to compare this sample to the sample just analyzed (students). The laboratory and the student dreams just analyzed differ in two major ways—type of dreamer (adults vs. students) and method of dream collection (laboratory vs. diary/questionnaire). Consequently, a third sample of adults was added who are highly interested in their dreams. Furthermore, they are more similar in other sample characteristics to the sleep laboratory adults as can be seen in Table 13, than to the students. However, these adults dreams were collected with the same procedures as were the student sample (diary/questionnaire).

Only significant interactions and main effects and the relevant adjusted means involving dream type are listed in Tables 14 to 18. As with the student analyses, across-sample, lucid dreams were scored as having fewer characters than nonlucid dreams. As can be seen in Table 14, there were two interactions that evidenced the same dream-type direction but that were attenuated by sample.

Table 15 lists the significant dream-type effects for activities. Consistent with the student analyses findings and with the hypotheses, lucid dreams were judged to have more auditory and cognitive activities than nonlucid dreams. Also as hypothesized but not evidenced in the prior analyses, lucid dreams had more physical activities than nonlucid ones. Unexpectedly, lucid dreams were judged to evidence significantly fewer location change activities than their counterparts.

Table 13. Percentage of Valid Cases for Descriptive Information on Samples[a]

Variable			Sample		
Type	Name	Categories	Students	Adults	Sleep lab
General demographics	Sex of subject	Males	40%	40%	50%
		Females	60%	60%	50%
		Cases[b]	413	125	10
	Race	White	98%	97%	100%
		Nonwhite	2%	3%	0%
		Cases	275	122	10
	Age	≤16–19	69%	6%	0%
		20–25	29%	25%	20%
		26–30	5%	22%	10%
		31–40	1%	32%	60%
		41–55	<1%	13%	10%
		56+	0%	2%	0%
		Cases	407	122	10
	Community size	Rural	50%	33%	0%
		Urban	50%	67%	100%
		Cases	409	122	9
Family	Marital status	Married	6%	32%	50%
		Single	92%	55%	50%
		Divorced/widowed	2%	12%	0%
		Cases	404	121	10
	Number of children	0	95%	66%	80%
		1	2%	9%	10%
		2	1%	15%	10%
		3+	1%	10%	0%
		Cases	432	121	10
	Birth order	First	28%	44%	30%
		Later	72%	56%	70%
		Cases	409	122	10
Education	College major	Social science	17%	15%	10%
		Education	20%	6%	10%
		Humanities	1%	10%	10%
		Business	40%	10%	0%
		Physical science	7%	26%	50%
		Arts	4%	17%	20%
		Cases	332	98	10
	Highest degree	High school	0%	14%	0%
		Some college	100%	35%	10%
		Vocational certificate	0%	6%	0%
		Bachelors	0%	20%	20%
		Some graduate	0%	9%	0%
		Graduate degree	0%	16%	70%
		Cases	403	120	10
Political/religious orientation	Political beliefs	Liberal	28%	52%	89%
		Moderate	53%	38%	11%
		Conservative	18%	10%	0%
		Cases	399	120	9
	Self-religiosity	High	50%	23%	30%
		Moderate	37%	42%	40%
		Low	13%	35%	30%
		Cases	405	122	10

(continued)

Table 13. (Continued)

Variable			Sample		
Type	Name	Categories	Students	Adults	Sleep lab
	Religious affiliation	Protestant	56%	24%	10%
		Catholic	36%	13%	10%
		Jewish	1%	3%	0%
		Agnostic/atheist	3%	19%	10%
		Other	5%	40%	70%
		Cases	385	123	10
	Currently meditating	Yes	6%	39%	44%
		No	94%	61%	56%
		Cases	398	122	9
Health	Colds frequency	Frequently	26%	6%	0%
		Infrequently	74%	94%	100%
		Cases	415	122	10
	Smoking	Never	82%	74%	90%
		Sometimes	17%	21%	10%
		Often	1%	5%	0%
		Cases	413	123	10
	Alcohol	Never	9%	19%	30%
		Sometimes	90%	80%	70%
		Often	1%	1%	0%
		Cases	414	123	10
	Exercise	Never	12%	29%	10%
		Sometimes	65%	51%	60%
		Often	23%	20%	30%
		Cases	412	122	10
	General	Good	86%	85%	100%
		Fair	14%	14%	0%
		Poor	<1%	1%	0%
		Cases	397	121	9

[a]It should be noted that, for the student and adult samples, these figures are for the population from which the dreams were drawn.
[b]Total valid cases for each sample for each variable.

Table 14. Selected Adjusted Means and F-Ratios for Character Subscales on Student, Adult, and Sleep Lab Samples

	Adjusted means						
	Lucid			Nonlucid			
	Lab	Adult	Student	Lab	Adult	Student	F-ratios[a]
Sex							
Female		0.85			1.07		$F(1,357) = 4.72$, $p<.031$
	0.89	0.86	0.83	1.20	1.29	1.04	$F(2,357) = 0.81$, n.s.
Joint sex		0.14			0.42		$F(1,357) = 20.47$, $p<.0001$
	0.19	0.13	0.13	0.00	0.43	0.44	$F(2,357) = 1.14$, n.s.
Number							
Single		1.77			2.08		$F(1,357) = 6.52$, $p<.011$
	2.28	1.63	1.74	3.00	1.57	2.07	$F(2,357) = 1.51$, n.s.
Group		0.50			0.77		$F(1,357) = 7.86$, $p<.005$
	1.03	0.42	0.40	0.20	0.71	0.80	$F(2,357) = 1.74$, n.s.
Age							
Adult		1.65			2.15		$F(1,357) = 8.54$, $p<.007$
	1.89	1.53	1.68	2.40	1.14	2.21	$F(2,357) = 1.77$, n.s.
Identity							
Father		0.02			0.07		$F(1,359) = 7.37$, $p<.007$
	0.03	0.03	0.01	0.20	0.00	0.07	$F(2,359) = 1.69$, n.s.
Mother		0.02			0.05		$F(1,359) = 3.89$, $p<.049$
	0.03	0.02	0.01	0.00	0.14	0.04	$F(2,359) = 1.39$, n.s.
Parent		0.01			0.01		$F(1,359) = 0.36$, n.s.
	0.00	0.01	0.01	0.00	0.14	0.00	$F(2,359) = 7.45$, $p<.001$
Son		0.01			0.01		$F(1,359) = 0.00$, n.s.
	0.00	0.00	0.02	0.20	0.00	0.00	$F(2,359) = 6.89$, $p<.001$
Family		0.02			0.11		$F(1,359) = 9.62$, $p<.002$
	0.00	0.01	0.03	0.00	0.14	0.12	$F(2,359) = 0.53$, n.s.

[a]Top = dream main effect. Bottom = dream × sample.

Significant dream-type effects for the scoring categories of social interactions, achievements, and emotions are presented in Table 16. Consistent with the student analyses, lucid dreams in these analyses were judged to have fewer friendly verbal interactions and happy emotions than nonlucid dreams. The dream-type-by-sample interaction for friendly covert interactions is entirely accounted for by the nonlucid dreams collected in the sleep laboratory. They were judged to be higher in this type of social interaction than any of the other types of dreams. As regards the achievement success and failure interactions, they were also virtually entirely encounted for by the sleep-laboratory-collected lucid dreams.

The next set of analyses of covariance resulted in many more significant effects involving dreams than those computed for the students alone. Specifical-

Table 15. Selected Adjusted Means and F-Ratios for Character Subscales on Student, Adult, and Sleep Lab Samples

	Adjusted means						
	Lucid			Nonlucid			
	Lab	Adult	Student	Lab	Adult	Student	F-ratios[a]
Physical		1.52			0.78		$F(1,357) = 8.39$, $p<.004$
	5.42	0.93	0.84	0.40	0.71	0.80	$F(2,357) = 15.30$, $p<.0001$
Location change		0.45			0.51		$F(1,357) = 6.48$, $p<.011$
	1.14	0.58	0.13	0.20	0.43	0.54	$F(2,357) = 2.72$, n.s.
Auditory		0.14			0.02		$F(1,357) = 5.26$, $p<.022$
	0.28	0.13	0.10	0.00	0.00	0.02	$F(2,357) = 0.16$, n.s.
Cognitive		0.96			0.32		$F(1,357) = 15.66$, $p<.0001$
	3.17	0.52	0.68	2.00	0.00	0.25	$F(2,357) = 0.66$, n.s.

[a]Top = dream main effect. Bottom = dream × sample.

Table 16. Selected Adjusted Means and F-Ratios for Social Interactions, Achievements and Emotions Subscales on Student, Adult, and Sleep Lab Samples

	Adjusted means						
	Lucid			Nonlucid			
	Lab	Adult	Student	Lab	Adult	Student	F-ratios[a]
Social interactions							
Friendly verbal		0.07			0.17		$F(1,357) = 6.15$, $p<.014$
	0.17	0.08	0.04	0.04	0.00	0.17	$F(2,357) = 1.93$, n.s.
Friendly covert		0.03			0.04		$F(1,357) = 0.11$, n.s.
	0.03	0.02	0.03	0.20	0.00	0.03	$F(2,357) = 3.05$, $p<.049$
Achievements							
Success		0.49			0.25		$F(1,357) = 0.07$, n.s.
	2.11	0.39	0.08	0.20	0.00	0.27	$F(2,357) = 13.20$, $p<.0001$
Failure		0.24			0.13		$F(1,357) = 1.18$, n.s.
	1.03	0.09	0.13	0.00	0.14	0.14	$F(2,357) = 5.02$, $p<.007$
Emotions							
Happy		0.13			0.21		$F(1,357) = 4.69$, $p<.031$
	0.22	0.18	0.06	0.20	0.00	0.22	$F(2,357) = 1.46$, n.s.

[a]Top = dream main effect. Bottom = dream × sample.

ly, as can be seen in Table 17, consistent with the previous analyses, fewer intense modifiers were judged to be present in the lucid than in the nonlucid dreams across sample. Additionally, lucid dreams were judged to have fewer achromatic modifiers and negative prefixes than nonlucid dreamers. Again, there does not appear to be a positive or negative valenced trend in these analyses. As before, the three interactions are accounted for by the sleep laboratory dreams.

Finally, Table 18 lists the adjusted means and F-ratios for the covariance analyses on Bizarreness scales and the three miscellaneous scales. The bizarreness findings are primarily sample × dream-type interactions such that the lucid dreams collected in the sleep laboratory were judged to be the most bizarre. This is surprising when one considers that the literature clearly indicates that dreams collected in the sleep laboratory are generally less bizarre than those collected at home (Cartwright & Kaszniak, 1978).

Interactions also dominated the miscellaneous scale analyses. For dream control and palpable sensations, sleep laboratory dreams accounted for the interactions with lucid dreams, evidencing more of each quality. Such was also the case for the adult dreams for dream control; in fact, the highest levels of dream control were judged to be for the lucid dreams collected from the adults. The interaction for balance was in the same direction for the student sample as occurred in the student analyses but was opposite, and in the expected direction,

Table 17. Selected Adjusted Means and F-Ratios for Descriptive Elements Subscales of Student, Adult, and Sleep Lab Samples

	Adjusted means						
	Lucid			Nonlucid			
	Lab	Adult	Student	Lab	Adult	Student	F-ratios[a]
Modifiers							
Achromatic		0.07			0.21		$F(1,356) = 4.46$, $p<.035$
	0.17	0.11	0.01	0.00	0.14	0.22	$F(2,356) = 0.19$, n.s.
Intense		0.04			0.20		$F(1,356) = 4.73$, $p<.03$
	0.08	0.06	0.02	0.20	0.00	0.21	$F(2,356) = 0.44$, n.s.
Weak		0.07			0.10		$F(1,357) = 1.11$, n.s.
	0.17	0.05	0.06	0.40	0.00	0.09	$F(2,357) = 3.04$, $p<.049$
Empty		0.11			0.02		$F(1,357) = 2.22$, n.s.
	0.58	0.01	0.04	0.00	0.00	0.02	$F(2,357) = 3.73$, $p<.025$
Fast		0.10			0.07		$F(1,356) = 0.07$, n.s.
	0.47	0.06	0.02	0.00	0.14	0.06	$F(2,356) = 3.34$, $p<.037$
Negatives							
Prefixes		0.44			1.39		$F(1,357) = 4.03$, $p<.046$
	2.33	0.23	0.04	2.20	0.00	1.45	$F(2,357) = 0.17$, n.s.

[a]Top = dream main effect. Bottom = dream × sample.

Table 18. Selected Adjusted Means and F-Ratios for Bizarreness and Miscellaneous Subscales of Student, Adult, and Sleep Lab Samples

	Adjusted means						
	Lucid			Nonlucid			
	Lab	Adult	Student	Lab	Adult	Student	F-ratios[a]
Bizarreness							
Animate characters sum score		0.47			0.33		$F(1,357) = 0.14$, n.s.
1. Appearance in a dream of monsters and alien beings	1.53	0.38	0.24	0.40	0.00	0.35	$F(2,357) = 4.64$, $p<.01$
		0.07			0.00		$F(1,357) = 4.00$, $p<.046$
2. Impossible acts or magic by animate characters	0.06	0.09	0.05	0.00	0.00	0.00	$F(2,357) = 0.07$, n.s.
		0.17			0.03		$F(1,357) = 0.96$, n.s.
Dream transformation sum score	0.53	0.20	0.03	0.00	0.00	0.03	$F(2,357) = 4.54$, $p<.011$
		0.19			0.11		$F(1,357) = 0.02$, n.s.
1. A person suddenly appears or vanishes, but the entire dream scene is unaltered	0.89	0.13	0.03	0.20	0.00	0.12	$F(2,357) = 2.89$, $p<.057$
		0.04			0.01		$F(1,357) = 0.47$, n.s.
Miscellaneous scales[b]	0.22	0.01	0.01	0.00	0.00	0.01	$F(2,357) = 3.03$, $p<.05$
1. Palpable sensations		1.42			1.21		$F(1,357) = 0.63$, n.s.
	2.19	1.45	1.16	0.00	1.14	1.27	$F(2,357) = 5.06$, $p<.007$
2. Dream control		6.66			5.67		$F(1,357) = 0.64$, n.s.
	5.22	8.56	5.41	0.00	3.14	6.16	$F(2,357) = 14.15$, $p<.0001$
3. Physical, emotional, or intellectual balance		4.98			6.56		$F(1,357) = 2.75$, n.s.
	3.94	5.16	5.13	0.20	0.86	7.32	$F(2,357) = 5.13$, $p<.006$

[a]Top = dream main effect. Bottom = dream × sample.
[b]Unlike the other scales, which are frequency counts, with palpable control and balance the judge was asked to make an evaluation along a 10-point scale (3-point scale for palpable) with a high score representing a lot of that quality in the dream.

for the adults and for the sleep-laboratory lucid dreams. That is, for the two adult samples, balance was more prevelent in their lucid than in their nonlucid dreams.

To summarize the results with the sample analyses, consistent with the student analyses, lucid dreams were evaluated as having fewer characters, friendly verbal social interactions, happy emotions, and intense modifiers and more auditory and cognitive activities than nonlucid dreams.

CONCLUSIONS

The purpose of this chapter was to review the research examining differences in content between lucid and nonlucid dreams. This review covered two types of data—self-evaluations of the content by the dreamer as well as content evaluations by independent judges. The latter were new data not presented elsewhere. Both approaches were largely descriptive of the manifest level of content, although it could be argued that the self-evaluations involve some part of the latent content through the subjects' need to describe their own experience.

Before considering the differences between lucid and nonlucid dreams, it should be pointed out that lucid dreams are more *like* nonlucid dreams than different. Although the differences are few, they are not due to chance variations but are consistent across a variety of studies.

Consistent differences from the self-evaluations involve auditory and kinesthetic dream sensations and dream control as particularly characteristic of the lucid dream experience. Consistent with these self-observations are the findings from independent judges of dream lucidity as having more auditory and cognitive activities. Not evaluated in the self-observation studies was the role of characters. In the judges' evaluations across samples, sex, and dream collection method, lucid dreams had fewer characters. Although other dream-type differences emerged in the various studies, the most compelling differences are clearly in the auditory/cognitive domain.

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10

Individual Differences Associated with Lucid Dreaming

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Lucid dreaming has been said to be within the capability of all individuals (LaBerge, 1985). Based on analyses of the incidence of this dream experience among university students and among persons with an expressed interest in dreaming, a majority have reported experiencing at least one lucid dream during their lifetime, and about 20% have reported experiencing lucid dreams with relative frequency. Our goal in this chapter is to describe and to integrate what has been learned through research about individuals who experience lucid dreams. To this end we will present data derived from the study of four separable but not unrelated functional domains for which subject differences associated with lucid dreaming, or lucidity, have been found. These functional domains are (1) oculomotor/equilibratory; (2) visual/imaginal; (3) intellectual/creative, and (4) personal/interpersonal. The extent of individual differences in lucid dreaming and the methods by which these differences have been investigated will also be discussed. Because methodology is an integral part of research into individual differences, methodological considerations will first be presented.

METHODOLOGY

There are two general methodological considerations that pertain to individual differences associated with lucid dreaming. The first is conceptual and is related to the definition of lucid dreaming, the extent to which subjects understand that definition, and the measurement of lucidity. The second is procedural

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