

The Relationship between Field Independence and Lucid Dreaming Ability

JAYNE GACKENBACH, NANCY HEILMAN, and SHEILA BOYT

University of Northern Iowa

STEPHEN LaBERGE Stanford University

It was hypothesized that field independence would be more characteristic of individuals who are able to recognize that they are dreaming while still in the dream (i.e., "lucid dreamers"), than of those who do not possess this ability. In three studies the measures of field independence utilized were: Group Embedded Figures Test, Embedded Figures Test and Portable Rod-and-Frame Test. The hypothesis was strongly supported for men and partially supported for women.

In the usual dream state, we are unconscious of the fact that what we are doing is - dreaming. One explanation for this is that we are generally not psychologically differentiated enough to distinguish ourselves from the dream content and are thus unable to achieve reflective self-consciousness while dreaming. There are, however, exceptions to this generalization when we sufficiently disembed ourselves from the context of our dreams and realize that we are dreaming while still dreaming. During these so-called "lucid" dreams, dreamers can possess cognitive capacities that seem remarkably wakeful, including a high degree of deliberate control over dream content (Tart, 1979).

Paradoxically, while these lucid dreamers are, in a sense, awake to the inner world of dreams, they are evidently soundly asleep in regard to the external world. Volitional signals communicated by subjects during lucid dreams have verified that they take place during unequivocal REM sleep (LaBerge, Dement & Zarcove, 1981; cf. Hearne, 1978).

Authors' address: Jayne Gackenbach, Nancy Heilman and Sheila Boyt, Department of Psy

chology, University of Northern Iowa, Cedar Falls, Iowa 50614; Stephen LaBerge, Sleep Research Laboratory, Stanford University, Stanford, California 94305. Send reprint requests to first-named author.

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project were asked to participate in the follow-up study. The research purposes of the A.R.E. dream project were to determine factors which affect dream recall. Subjects were sent several personality and dream recall questionnaires as well as a dream tally sheet for summarizing dream reports. Participants kept a 28-day record of the dreams. One question on the dream tally sheets dealt with lucidity. Therefore, lucid dreaming frequency was obtainable from morning-after dream records (Reed, 1978).

People vary in their reported frequencies of lucid dreaming. For some, lucid dreaming appears to be a natural ability though for most it is a relatively uncommon occurrence. Also, for some at least, lucid dreaming is apparently a learnable skill (LaBerge, 1980). As the preceding description naturally suggests, we hypothesized that psychological differentiation as measured by the perceptual style of field-independence ought to underlie the capacity for lucid dreaming.

There is a variety of evidence supporting this hypothesis. Cartwright (1966) notes that field independence is related to greater dream imaginativeness and amount and has been associated with ability to control dream images for problem-solving activities rather than being controlled by them. Field independence has also been related to better dream recall by Schonbar (1965) and Goodenough, Witkin, Koulack, Lewis and Cohen (1974). Some characteristics of the dreams of field independent individuals parallel the characteristics of a lucid dream. The dreamlike hallucinations which occur during hypnagogic reverie are less bizarre for field independent than for field dependent subjects (Bertini, Lewis & Witkin, 1969). Correspondingly, lucid dreams have been reported as being generally more realistic than nonlucid dreams (Gackenbach, 1978; Gackenbach & Schillig, 1983; Green, 1968). The cognitive faculties in the lucid dream are relatively rational (Garfield, 1974; Green, 1968) and critical (Brown, 1936) with a memory of one's waking life (Brown, 1936; Green, 1968). This cognitive capacity results in a noticeable increase in control associated with dream lucidity (Gackenbach & Schillig, 1983). Additionally, frequent lucid dreaming is also associated with a good dream recall ability (Gackenbach, 1978), a factor regarded by LaBerge (1980) as a prerequisite to proficient lucid dreaming. Among the additional evidence suggesting a relationship between field

independence and lucid dreaming frequency is the fact that subjects scoring high on the former measure (Blackburn, 1972; Long, 1974; Noppe, 1977) as well as the latter (Gackenbach & Hammonds, 1983) are more creative than subjects scoring lower on both dimensions. Moreover, both field independence (Linden, 1973) and lucid dreaming frequency (Reed, 1978) increase with the practice of meditation. Field independence has been shown to increase with arousal (Callaway, 1959; Oltman, 1964); likewise, LaBerge, Nagel, Taylor, Dement and Zarcove (1981) have found evidence associating the initiation of lucid dreams with physiological activation. Of course, all of this evidence is indirect; the purpose of the present inquiry was to directly investigate the relationship between field independence and lucidity.

Method

Subjects. Ninety-nine of the 181 A.R.E. members who finished the month-long dream research project agreed to participate in the present study. Of these, 68 women and 22 men (X age=45 years), most of whom were married with an education beyond high school, returned completed packets.

Instruments. *The Group Embedded Figures Test* (GEFT; Witkin, Oltman, Raskin, & Karp, 1971) is an 18-item test which is an adaptation of the *Embedded Figures Test* (Witkin et al., 1971) and was designed to measure "extent of competence at perceptual disembedding" (p. 3) which, if successful, signifies greater differentiation in perceptual functioning or field independence. The task on each item is to locate a previously seen simple form within a larger and more complex form. The subject is prevented from simultaneously seeing the simple and complex forms by the placement of simple forms on the back of the test booklet and the complex forms on the booklet pages. The subject may, however, look back at the simple form as often as necessary. The score on the test is the total number of correctly identified items. Although the GEFT is not as powerful an estimate of field independence as the *Embedded Figures Test*, its reliability and validity coefficients are within acceptable ranges. The GEFT was chosen for use in the present study because, unlike the *Embedded Figures Test*, it does not have to be individually administered. *Lucid Dreaming Questionnaire* (LDQ; Gackenbach, 1978) consists of a series of 30 questions developed from information already known about lucidity. Self reported lucid dreaming frequency information was obtained from this instrument."

Procedure. Since subjects were self-selected, they were sent a letter of inquiry requesting their participation in a research project on lucid dreaming. The letter described the study and asked the A.R.E. members to sign a subject consent form and return it to the researcher, indicating their willingness to

participate in the study.

A cover letter describing the study and requesting the participants to fill out the LDQ and the GEFT within two weeks was then sent to the re

Experiment 1 In the first investigation, members of the Association of Research and Enlightenment (A.R.E.) who participated in an A.R.E.-sponsored dream
A comprehensive personality inventory was also mailed to these research participants.
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spondents. Twenty-one subjects who did not return the packet of materials were sent a reminder nine weeks after the letters of inquiry were mailed but prior to the cutoff date for data collection. All participants were apprised of the major findings of the study five months after their participation.

Results

Among those who self-reported, GEFT score differences between those who frequently experience lucid dreams (one or more a month to one or more a week; $n = 14$), those who infrequently experience lucid dreams (i.e., once in their lifetime to two to six per year; $n = 54$), and those who have never experienced a lucid dream ($n = 22$) were found to be non significant.

Because of the small number of males in each type of dream cell, correlations were calculated separately for each sex between indicators of the lucid dreaming ability taken from both the LDQ and from those reported during the month-long A.R.E. dream project and GEFT scores. These correlations were also nonsignificant.

trial was to locate a previously seen simple figure within a larger complex figure which has been so organized so obscure or embed the sought after simple figure.

Procedure. It came to the attention of the researcher through informal contacts with students that there might have been some confusion between lucid dreaming and dream recall ability based on a simple definition of lucidity (i.e., a dream where you know you're dreaming during the dream). Consequently, a more detailed explanation of dream lucidity was drawn up and administered to the same classes. Some of the students who were not in class during the administration of the lucid verification sheets were contacted by phone and interviewed to be certain that they understood what dream lucidity entailed.

A consent form was signed by each subject before participating in this project. When the subject was seated, the experimenter gave standard EFT

instructions. A set of trial cards was used to explain the procedure to the subject. First, a complex figure was shown to the subjects for 15 seconds. At the end of that time, a simple enclosed figure was presented to the subject. The card with the simple design on it was always placed over the complex figure so that the two were never seen together. The simple design was present for 10 seconds. At the end of that time the card was flipped over, again revealing the complex figure. At this time the stopwatch was started. The subject was told to begin to search for the simple figure which was embedded in the complex figure and to indicate to the male experimenter if he or she wished to see the simple form again. Upon this request, the experimenter again placed the simple figure on top of the complex figure, hiding the latter from view. The simple figure was left in this position for 10 seconds before removing it. The stopwatch was stopped during these 10 seconds and started again when the simple figure was removed. This enabled the experimenter to get a score for "searching time" only. The final score is the mean time for 12 trials recorded in seconds. At the completion of each testing session, the subject was debriefed.

Discussion

In this first study no relationship between psychological differentiation (field independence-dependence) and lucidity was found, when individuals self-reported how frequently they experienced dream lucidity on the LDQ or when they reported it the morning after the dream during the A.R.E. dream project. Several problems with this study are evident. It was self-administered by subjects in their homes, resulting in uncontrolled testing conditions. The GEFT was later administered under controlled conditions to college students who varied in their self-reported lucid dreaming frequency and no dreamer group differences as a function of sex on GEFT scores were found (Gackenback & Hammonds, 1983). The most prominent problem is the use of the GEFT, which is considered a weak measure of field independence (Arbuthnot, 1972). In the next study the possibility of a relationship between field independence-dependence and lucid dreaming ability will be investigated using a more reliable measure, the Embedded Figures Test (EFT; Witkin et al., 1971).

Experiment 2 Method

Subjects. Subjects were drawn from 528 students enrolled in psychology courses at a small eastern college. They were asked during class time to indicate along a 7-point scale, ranging from never to one or more per week, the frequency with which they experience lucid dreams.

Instruments. The Embedded Figures Test (EFT; Witkin, Oltman, Raskin, & Karp, 1971) was individually administered. The subject's task on each

Results

Forty males (14 frequent, 12 infrequent, and 14 never lucid dreamers) and 41 females (14 frequent, 13 infrequent, and 14 never lucid dreamers) participated in Experiment 2. Dreamer groups were defined as in Experiment 1.

A sex-by-dreamer analysis of variance was calculated on mean time to complete the 12 EFT cards. As hypothesized, frequent lucid dreamers were significantly more ($F(2, 75) = 23.54, p < .0001$) field independent (mean= 34.49) than both nonlucid dreamers (mean= 69.15) and infrequent lucid dreamers (mean= 63.49). The sex-by-dream type interaction was also significant ($F(2,75)= 3.97, p < .02$). See Table 1 for the means. Both male and female frequent lucid dreamers were significantly more

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TABLE 1 Sex by Lucid Dream Type Embedded Figures Test Means (Experiment 2) and Rod-and-Frame Accuracy Scores (Experiment 3)

Type of Lucid Dreamer

also administered. Although psychological differentiation has been measured by a variety of tasks such as the Tilting-Room-Tilting-Chair (TRTC), Rod-and-Frame Test (RFT), Embedded Figures Test (EFT), and the Group Embedded Figures Test (GEFT), Arbuthnot (1972) recommends the RFT and EFT in combination as the best measures. Therefore, the Rod-and Frame Test and the Embedded Figures Test were selected as the measures of field dependence/independence in Experiment 3.

Infrequent

Males

Frequent

23.18b +00.22

45.81c -01.00ab

66.182 -00.74ab

Nonlucid

70.472 -01.26

67.83 -00.15 ab

Females

61.00 -01.16ab

Adjusted means for right-handed subjects for Rod-and-Frame performance in Experiment 3 are in the bottom row. The top row means are for EFT performance in Experiment 2. Subscripts within each study with different letters differ at the $p < .05$ level using the Duncan's a-postori procedure, whereas those with the same subscript do not differ.

field independent than infrequent and nonlucid dreamers. The latter two groups did not differ from each other as a function of sex. Frequent lucid dreamers accounted for this interaction in that male frequenters were significantly more field independent than their opposite sex counterparts.

Discussion

As predicted, field independence was found to characterize the frequent lucid dreamer, especially among males, however, several problems became evident upon evaluating the results of this study. First, with regard to the verifiability of lucid dreaming frequency from self-reports, it became apparent that some individuals either did not understand what a lucid dream was or confused it with dream recall ability. Although an attempt was made to clarify this problem with a detailed explanation of dream lucidity, only by gathering a sample lucid dream can one be absolutely certain that the concept is understood. For this reason, verifying dreams were gathered in Experiment 3. Another problem with the first two studies is the lack of a control for dream recall ability. As noted earlier, field independence has been found to be associated with high dream recall ability (Schonbar, 1965) as has lucid dreaming frequency (Gackenbach, 1978). Therefore, the findings of Experiment 2 might be an artifact of dream recall ability and not lucid dreaming ability. Dream recall ability is also controlled for in Experiment 3.

The focus of the next study in this sequence is to replicate the findings of Experiment 2 on the EFT with the aforementioned controls. An additional measure of field independence, the Rod-and-Frame Test (RFT), is

Experiment 3 Method

Subjects. Students enrolled in psychology courses at a midwestern university received course credit for their participation. Research participants were again divided into groups according to the frequency with which they reported having lucid dreams, as in Experiment 1. Potential participants ($n=707$) were asked to not only indicate the frequency with they dream lucidly but to also give a verifying dream demonstrating that they understood the concept of lucid dreaming. A large segment of the potential subject pool (51%) were

lost because they either provided no dream, exempting nonlucid dreamers, or the dream they provided was either clearly not a lucid dream or was questionably or partly lucid. The key indicate for identifying a dream as lucid is the inclusion of some kind of recognition phrase (i.e., "then I realized it was only a dream"). Verification prescreening of the subject pool resulted in the following distribution of potential subjects: frequent females, 40; frequent males, 33; infrequent females, 61; infrequent males, 71; never females, 73; and never males, 82. Subjects were randomly selected from each of these groups.

Instruments. The Embedded Figures Test was again administered, as in Experiment 2.

Apparatus. A black piece of corrugated cardboard was attached to the front of the portable rod-and-frame, Model PR-2 from Research Media, forming a 25-inch light-tight tunnel. A blanket was placed over the back of the subject's head to cover the opening and block out all light as they sat leaning into the apparatus. In this position the subject's eyes were about 1.5 feet from the screen. During the experiment the screen was illuminated. The female experimenter sat behind the apparatus, allowing her access to the controls. The rod and the frame were always set 20 degrees from vertical, either to the left or right in a counterbalanced fashion.

Procedure. Informed consents were signed by each subject upon arrival. Half of those tested from each sex-by-dreamer cell were presented with EFT first and half with the RFT first. The EFT was given in the same manner as previously explained (see Experiment 2). The instructions for the RFT were given before the subject was put into position. As per Witkin, Dyk, Faterson, Goodenough and Karp (1962), subjects were told that they would see a rod placed in a square frame inside of the tube.

They were to

It has been found that self-reported lucid dreaming frequency is significantly correlated with the frequency of such dreams based on morning after reports (Gackenbach & Schillig, 1983).

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instruct the experimenter to place the rod in such a position that it was parallel to the wall and perpendicular to the floor or in a true vertical position. The

experimenter moved the rod in 30 increments until it was within one degree of vertical, at which point the experimenter moved it in 10 increments. Subjects were instructed to direct the experimenter after each move by saying "more," "back," etc., until they thought it was in the correct position. After the instructions were given, the subject was placed in position and time was allowed for dark adaptation. Eight trials per subject were performed with the frame placed in each direction, right and left, making a total of 16 trials. After the first eight trials, the apparatus was turned off while the frame was tilted in the opposite direction. The score for each trial was the number of degrees from true vertical that the subjects had positioned the rod. Zero degrees meant true vertical. Scores could vary from +20° to -20° deviation with positive scores indicating that the rod was displaced to the right, and negative scores indicating that the rod was displaced to the left. Following completion of both tests, the subjects were debriefed.

Results

Sixteen male and 18 female verified frequent lucid dreamers, 19 male and 19 female verified infrequent lucid dreamers and 19 male and 16 female nonlucid dreamers participated in this study. Sex-by-dream analyses of covariance with dream recall as the covariate were calculated on both Embedded Figures and Rod-and-Frame scale scores. Self-reported dream recall ability was obtained from information gathered during a mass testing of potential research participants.

Sex-by-dreamer analysis of covariance on mean time to completion for the EFT did not reach significance on any factor. Dependent variables for the Rod-and-Frame Test were accuracy, the sum of the deviations divided by the number of trials (CE), and consistency (VE), defined as

Twenty-two left- or mixed-handers were therefore omitted, resulting in 12 male and 15 female frequent, 13 male and 17 female infrequent and 13 male and 15 female never. As in the original analysis, nothing was found for either the EFT or consistency for Rod-and-Frame performance. However, the elimination of left-handers did allow the sex-by-dreamer interaction for the analysis of covariance on accuracy scores to reach conventional levels of significance ($F(2,78) = 3.43, p < .037$). Adjusted means for this interaction are portrayed in Table 1. Male frequent lucid dreamers were found to be more field independent than those reporting never having had such a dream. However, for women, there was no difference between dreamer groups on RFT accuracy scores.

In order to determine the relative EFT performance across studies with established norms, unadjusted EFT means from Experiment 3 were compared to both EFT means

from Experiment 2 and Witkin et al. (1971) normative mean EFT performance for college students (57.53 seconds). The Experiment 3 EFT performance was significantly more field independent ($X = 40.44$; $t(295) = 4.92, p < .005$) than the normative data as well as the Experiment 2 EFT performance ($X = 55.71$; $t(206) = 4.46, p < .005$). Dreamer type group differences also emerged. The sample differences just noted were accounted for entirely by infrequent lucid and nonlucid dreamers. That is, Experiment 2 and Experiment 3 ($X = 40.63$) frequent lucid dreamers did not perform significantly differently, whereas Experiment 3 infrequent lucid ($X = 41.63$) and nonlucid dreamers ($X = 29.07$) were significantly more field independent (lower EFT scores) than their Experiment 2 counterparts (infrequent, $t(63) = 4.39, p < .005$; non lucids, $t(65) = 4.00, p < .005$). However, if one collapses across samples and compares these dreamer group means to the normative mean and to one another, an interesting pattern occurs. Infrequent lucid dreamers (X , Experiments 2 and 3 = 55.39) and nonlucid dreamers (X , Experiments 2 and 3 = 51.28) do not differ from the norm provided by Witkin et al. Frequent lucid dreamers, (X , Experiments 2 and 3 = 37.56), on the other hand, were found to be significantly more field independent than both the normative college students ($t(244) = 4.997, p < .005$) and the other dreamer types (infrequent, $t(135) = 4.96, p < .005$; nonlucids, $t(141) = 3.52, p < .005$). It can be concluded that the ability to dream lucidly with some frequency is concurrent with the perceptual style of field independence as measured by the EFT.

$$V_E = 2(X - CE)$$

where x = each raw score and n = number of trials. Deshaies and Pargman (1978) found these independent scores, rather than absolute scores, to be the best way to express both aspects of error performance. For the accuracy score the sex-by-dreamer interaction approached significance ($F(2,100) = 2.85, p < .06$), while no significance was found for the consistency analysis.

Further analysis. In order to partial out any error variance which may be contributing to the above findings, additional analyses of covariance were calculated for right-handers only. Rod-and-Frame and Embedded Figures Test performance is known to differ as a function of handedness with right-handers outperforming left-handers on both tasks (Harris, 1978).

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Conclusion In three studies over a five-year period, the relationship between field independence and lucid dreaming ability was investigated. Three different measures of psychological differentiation were utilized in these studies: the Group Embedded Figures Test, the Embedded Figures Test and the portable Rod-and-Frame

Test. These studies were progressively

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more accurate in the measurement of both field independence, from only the GEFT to both the EFT and the RFT, and lucid dreaming ability, through verification of the subject's understanding of the phenomenon.

The findings with the EFT in Experiments 2 and 3 are clear-cut: for males and females alike, frequent lucid dreaming ability was associated with field independence while field dependence was associated with those who report having never or having infrequently dreamt lucidly.

With the RFT, however, a sex difference emerged: for males, frequent lucid dreaming ability was associated with more accurate performance, while for females no group differences were noted.

The sex difference in the findings of this investigation has precedents in the literature. Witkin, Dyk, Faterson, Goodenough and Karp (1962), in a review of intercorrelations between measures of psychological differentiation, conclude that the RFT and the EFT scores are significantly correlated for males but not so for females. Harris (1978) points out that the inconsistent performance of females across EFT and RFT tasks may result from their use of verbal mediation in the former task. That is, due to differences in cerebral organization, females do not perform as well as males on spatial orientation tasks unless they can mediate their judgments verbally.

In conclusion, the hypothesis received strong support for males on both RFT and EFT. That is, field independence does seem to be associated with lucid dreaming ability among men. For women, however, the relationship between psychological differentiation and lucid dreaming ability was found to vary as a function of the task. While a purely spatial orientation task (RFT) revealed no group differences for female dreamers, in a verbally mediated spatial orientation task (EFT), female frequent lucid dreamers outperformed infrequent or nonlucid dreamers. This fits with Snyder and Gackenbach's (1981) finding that

female frequent lucid dreamers show a greater degree of unilateral cerebral organization than infrequent or non lucid dreamers. Indeed, Garrick (1978) has proposed that hemispheric lateralization underlies the field independence dimension. Like tasks measuring field independence, lucid dreaming seems to require complementary functioning of both hemispheres.

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A Life Span Approach to the Study of Eidetic Imagery

EROL F. GIRAY, PAUL ROODIN, WARREN ALTKIN, and PAUL FLAGG

State University of New York, Oswego

GENE YOON St. Louis University

This paper focuses on eidetic imagery from a developmental perspective. The study compares the frequency of eidetic imagery among subjects ranging from 20 to 94 years old. The hypothesis is that the frequency of eidetic imagery will be higher in the older adult/aged subjects than among younger adult groups.

The data from this study is combined with the results of an early study conducted by the authors in which the frequency of eidetic imager in age groups 5 to 18 years was measured. The combined data show a significant higher frequency of eidetic imagery in age groups 5 to 7 and the 60-94 year group. This pattern of frequencies demonstrates a U-shaped function with respect to age. The data lend support to a much broader developmental perspective on the role of eidetic imagery throughout the life span and have important implications for the study of early development as well as aging. The study indicates the necessity for additional life span research in the field of eidetic imagery.

It is increasingly apparent that eidetic imagery as a phenomenon must be taken into account in attempts to derive comprehensive theories of cognitive-perceptual development. In the present paper, attention will focus on the role of eidetic imagery in development.

An eidetic image may be defined as a positively colored visual image, aroused and maintained by scanning of the represented stimulus object, phenomenally located in or in front of the plane of the original stimulus object, and persisting for a long period of time (greater than 40 seconds). This definition is said to cover the *typographic eidetic* according to Ahsen (1977a), who defines the *structural eidetic* as more spontaneous and not necessarily dependent on a previous experience of an actual stimulus and is seen inside the mind in the literal sense of the word.

There has been considerable debate over the existence of eidetic imagery. A

major part of this controversy is concerned with whether

Authors' addresses: Erol F. Giray, Paul Roodin, Warren Altkin, and Paul Flagg, Department of Psychology, State University of New York, Oswego, New York 13126; Gene Yoon, Department of Psychology, St. Louis University, St. Louis, Missouri 63103. Send reprint requests to second-named author,