

Creativity, Sleep and Primary Process Thinking in Dreams

Research into the nature and nurture of creativity has exploded since Guilford's (1950) classical address in which he presented not only a theoretical framework for studying creativity but also a call to activity by psychologists who had long neglected the study of genius and superior achievement.

Since then, many researchers have examined the creative person (e.g., Barron, 1972; Drevdahl & Cattell, 1958; MacKinnon, 1961; Maslow, 1959) and the creative process (e.g., Barron & Welsh, 1952; Beittel, 1963; Mednick, 1962; Olton, 1979; Taylor, 1959), with less attention to creative products (e.g., Michael, 1968; Rhyne, 1973; Rossman, 1964) and environmental press (e.g., Domino, 1969; Mackler & Shontz, 1965; Weisberg & Springer, 1961).

Similarly, the area of sleep and dreams has also experienced a substantial increase in research since Aserinsky and Kleitman's (1953) epochal discovery of the cycles of ocular motility and inactivity in sleep. Since then, sleep researchers have looked at the phylogeny and ontogeny of sleep (e.g., Allison & Cicchetti, 1976; Williams, Karacan & Hirsch, 1974), as well as the electrophysiological and neurobiochemical aspects of REM and nonREM sleep (e.g., Jouvet, 1975; Rechtschaffen, 1973).

Despite the proliferation of studies in both the area of creativity and the area of sleep and dreams, and the link between them, both on theoretical grounds and biographical evidence, few studies have attempted to determine what empirical links, if any, exist between creativity and sleep-dreams.

Domino (1976) studied two groups of high school adolescents, closely matched on several dimensions, with an

experimental group exhibiting a high degree of creative achievement, as determined by teacher nominations based on actual creative productions and above-the-median scores on two creativity measures. All adolescents kept a dream diary for two weeks. Then the dream protocols were independently rated by five clinical psychologists for the presence of primary process, a hypothetical construct based on Freud's psycho-dynamic theory. The results indicated not only that the dream protocols of creative students were judged to exhibit greater primary process thinking as predicted, but also that primary process thinking was significantly related to creativity test scores even within each group. In addition, the dreams of the creative students, while showing greater symbolism, more unusual combinations and other aspects of primary process thinking were also less contradictory.

In a more recent study (Domino, 1982) two other groups of high school students were asked to complete a questionnaire about their attitudes towards dreams. Creative students endorsed to a greater degree than their less creative peers the beliefs that dreams predict the future, that dreams have hidden meanings, more symbols and more color. Creative students also perceived dreams as reflective of goals and aspirations, and as potentially productive of inventions and artistic creations. Creative students also believed to a greater extent than their peers, that an understanding of dreams can be useful and that dreams can be programmed. These students made a greater effort to remember their dreams.

The results of these two studies suggest that there are differences both in dream content and in attitudinal variables between creative and less creative people and begin to present some empirical support for what has long been reported in introspective reports of highly creative individuals (e.g., Ghiselin, 1955; Rosner & Abt, 1970). The studies to be reported here represent some exploratory efforts to further investigate what empirical links exist between creativity and sleep-dreams.

HYPOTHESES

There are many theoretical frameworks within which to try to understand creativity and the role of sleep-dreams. Much has been written from a humanistic point of view (e.g., Rogers, 1962), from a psychoanalytic perspective (e.g., Kubie, 1958), from a psychometric approach (e.g., Guilford, 1965) and an associative framework (e.g., Maltzman, 1960). One notion compatible with several points of view, is the idea that creativity involves letting go of the everyday perspective, and a restructuring of the environment, physically, cognitively and affectively, to achieve a new and creative synthesis. Such a hypothesis is

congruent with a variety of formulations, from Kris's (1952) "regression in the service of the ego" and Fitzgerald's (1966) openness to experience, to Mednick's (1962) associative hierarchy. Both creativity and falling asleep involve relinquishing conscious control and letting go of everyday, rational awareness. It was therefore hypothesized that individuals who are able to fall asleep rapidly, within normal limits, would tend to be more creative, that is, exhibit more primary process thinking in their dreams. A related hypothesis was that those who are potentially more creative, as evidenced by creativity test scores, should fall asleep more quickly, experience more sleep difficulties — since they would be more apt to pay attention to their dreams — be more likely to use their dreams to solve problems and judge themselves to be more creative.

Finally, it was hypothesized that the dreams of creative subjects should show more regressive dream content, more dream distortion and more visual content than those of control subjects.

STUDY I
Subjects and
Procedure

A sample of 200 college students volunteered for a study requiring the keeping of a dream diary for a two-week period, followed by a battery of psychological questionnaires. All students were enrolled fulltime, between the ages of 18 and 25, with a diverse range of major study areas. One questionnaire administered focused on individual differences in sleep patterns with one question asking: "How long does it usually take for you to fall asleep?" The available response options were: a) a few minutes at most; b) ten to twenty minutes; c) about one-half hour; d) somewhere between 30 and 60 minutes; e) longer than one hour. Those subjects who checked options a or b were defined as fast sleepers, while those choosing options d and e were defined as slow sleepers.

From the larger sample of 200 students, two subsets of protocols were chosen: 23 fast sleepers (8 males and 15 females) and 23 slow sleepers (9 males and 14 females). These subjects were chosen using the following criteria: at least three complete dreams during the two week period, completion of all questionnaires and validity scale scores on the California Psychological Inventory (Gough, 1960) within normal limits, to assure at least at an elementary level, absence of faking.

Dream protocols for these subjects, ranging from a minimum of 3 to a maximum of 33, were rated by the senior author on the scale of primary process thinking (SPPT) developed by Auld, Goldenberg and Weiss (1968) and used in the Domino

(1976) study. All ratings were done without knowledge of group membership, but after a period of training in which another sample of dreams was used to determine reliability of ratings, with acceptable reliability defined as above 80 per cent inter-rater agreement.

A full description of the SPPT can be found in Auld et al., (1968). Briefly, it is a seven-point rating scale, with each point clearly defined and representing a continuum from clear, logical and possible dream narratives to more bizarre, autistic and uncanny features. For each subject, a mean SPPT score was obtained. The scores were then subjected to a two-way ANOVA with fast-slow sleep and sex as the two main effects. The results are presented in Table 1.

Results
and
Discussion

A significant difference between fast and slow sleepers on SPPT scores was obtained, with means of 2.66 and 2.19 respectively. No significant sex differences on interactive effects were obtained. Thus subjects who describe themselves as falling asleep in less than twenty minutes exhibit more primary process thinking in their dreams than subjects who indicate they take substantially longer to fall asleep.

STUDY II
Subjects and
Procedure

Among the questionnaires administered to the 200 subjects of Study I, the following yielded measures of creativity: a) a 59-item Creativity scale developed by Domino (1970) for the Adjective Check List (Gough & Heilbrun, 1965); b) the Franck Drawing Completion Test (Franck & Rosen, 1969). This test consists of incomplete drawings the subject completes as he wishes. The test was originally developed as a projective measure of masculinity-femininity, but several studies have shown its applicability to creativity (e.g., Anastasi & Schaefer, 1971; Domino, 1977); c) Consequences (Christensen, Merri-

TABLE 1 Results of two-way ANOVA on SPPT scores for fast (N = 23) and slow (N = 23) sleepers and for males (N = 17) and females (N = 29).

Source	SS	df	MS	F	P
Total	19.01	45	—	—	—
Fast-Slow	2.51	1	2.51	6.436	< .05
Male-Female	.22	1	.22	.564	n.s.
Interaction	.01	1	.01	.026	n.s.
Error	16.27	42	.39	—	—

field & Guilford, 1958), a measure generated by Guilford's Structure-of-Intellect model, requires the subject to list the possible consequences of certain events. The number of remote responses provides a measure of originality.

All raw scores were transformed to T scores (\bar{X} of 50 and SD of 10) and were summed for each subject, to obtain a global creativity index. The 30 top-scoring subjects on this index were identified as creative and their responses to selected items of the sleep questionnaire were compared with those of the 30 lowest scoring subjects, designated as the control group. The results are presented in Table 2.

Results
and
Discussion

As indicated in Table 2, responses to three of the four dream questionnaire questions show statistically significant differences between creative and control subjects. On question 1, the majority of creative subjects (26) select options a or b, whereas less than half of the control subjects (13) do so. These results are clearly congruent with those of Study 1, particularly if one accepts primary process thinking as potential evidence of creativity.

Question 2 also shows a clear distinction between creative and control subjects, with 28 of the 30 creative subjects indicating that they have solved problems or challenges through dream. Subjects were requested to describe their experiences if they checked the response option "Yes." A qualitative analysis of the descriptive comments also suggests some differences between creative and control subjects. For example, most control subjects either did not elaborate ($N = 8$) or indicated that they had solved mathematical or practical problems ($N = 9$). By contrast, many of the creative subjects' responses involved interpersonal problems ($N = 14$). Typical are the comments written by a creative subject: "by reflecting on the feeling tones of the dream, I can usually get insights as to what's really going on in a relationship, which I often act on, to clear up difficulties in the actual relationship." Other responses by creative subjects ($N = 4$) involved references to artistic or creative endeavors, such as using dream materials to create poetry or paintings.

Question 3 asked respondents to estimate their own creativity. Here also the difference between creative and control subjects is statistically significant, with the majority of creative subjects indicating they are above average or quite creative. In fact, for the entire sample of subjects ($N = 189$) for whom data was available, answers to this question scored on a 1 to 5 basis correlated .53, $p < .001$, with the sum of the three creativity scores.

TABLE 2 Comparison of creative (N = 30) and control (N = 30) subjects on selected responses to a sleep questionnaire.

<i>Questions</i>		
(1) How long does it usually take for you to fall asleep?		
<i>Options</i>		
	<i>Creatives</i>	<i>Controls</i>
(a) a few minutes at most	10	4
(b) ten to twenty minutes	16	9
(c) about one-half hour	2	8
(d) somewhere between 30 and 60 minutes	0	5
(e) longer than one hour	2	4
		$\chi^2 = 13.80$
		$p < .01$
(2) Have you ever solved a problem or met a challenge through your dreams?		
(a) Yes	28	19
(b) No	2	11
		$\chi^2 = 7.95$
		$p < .01$
Comparison of creative (N = 30) and control (N = 30) subjects on selected responses to a sleep questionnaire.		
<i>Questions</i>		
(3) How creative do you feel you are?		
<i>Options</i>		
	<i>Creatives</i>	<i>Controls</i>
(a) very little	1	3
(b) somewhat	0	6
(c) average	8	13
(d) above average	13	5
(e) quite creative	8	3
		$\chi^2 = 14.02$
		$p < .01$
(4) Do you usually have difficulties sleeping?		
(a) Yes	7	6
(b) No	23	24
		$\chi^2 = .10$
		$p = \text{n.s.}$

Only for question 4 were the responses of the two groups not significantly different. In both groups, approximately one-fifth of the subjects indicated sleeping difficulties. An analysis of the descriptive comments given also indicated no differences, with approximately half the commenting subjects in both groups indicating external reasons, such as noisy neighbors or the heat for their sleeping difficulties, and half more psychodynamic reasons — worries, or a troublesome relationship.

STUDY III
Subjects and
Procedures

For this study we obtained the cooperation of 40 adults. Twenty were engaged in creative professions such as architect (N = 5), musician (N = 3), sculptor (N = 2), novelist (N = 2) and research scientist (N = 3). Each of these individuals had been nominated as creative by various judges, such as the faculty of the School of Architecture or art gallery owners. A control group of twenty adults not engaged in self-evident creative occupations — officer, accountant — was also formed. The two groups were equated in age (\bar{X} s of 39.2 and 40.3 respectively), in sex (14 males and 6 females in each group), and in college education — 19 in each group had completed a college degree and 6 in each group had advanced degrees.

Each individual was requested to keep a dream diary for a week. A total of 137 dream protocols was obtained. From this a random sample of 70 dreams, 35 from each group, were selected for study. Each dream was scored independently and blindly by three judges on the following dimensions:

- (a) Regressive dream content. This is a nominal scale developed by Vogel, Foulkes and Trosman (1966). Each dream protocol is judged to be either nonregressive in that the content is plausible, realistic, coherent and undistorted, or is judged to be regressive if the protocol involves at least one of six criteria including single, isolated images, incomplete scenes, bizarre or distorted images and dissociation of thought and image.
- (b) Dream distortion. This is a six-point ordinal scale designed to assess the degree to which the dream report departs from waking experience. The scale was developed by H. Zepelin and is described in Winget & Kramer (1979).
- (c) Visual Mentation Scale. This is a subscale from the Chicago Sleep Mentation Scales (Rechtschaffen et al., 1971; cited in Winget & Kramer, 1979). The scale is a simple four-point rating scale ranging from very visual to not at all visual.

Scores were assigned dream protocols reflecting the modal value for regressive dream content and median values for the other two scales. Inter-judge agreement was above 80 percent in all cases.

The dreams of creative subjects were judged to contain significantly more regressive dream content (40 percent vs. 17 percent respectively, $z = 3.12$, $p < .001$), more dream distortion (\bar{X} s of 3.6 vs. 1.7, $t = 12.05$, $p < .001$) and more visual mentation (\bar{X} s of 3.6 vs. 1.9, $t = 6.27$, $p < .001$). For the first two scales, regressive dream content and dream distortion, the results are not surprising since these scales closely parallel the Auld et al. (1968) primary process thinking scale. For all 70 dream protocols, the correlation between PPT and regressive dream content was .59, between PPT and dream distortion .73 and between regressive dream content and dream distortion .48. The magnitude of these coefficients questions the independence of these variables and further research is needed to determine the degree of communality between these various scales. Vividness of visualization has been linked to creativity in a variety of ways (e.g., Huxley, 1962; Khatena, 1975; McWhinnie, 1965), and despite the simplicity of the Visual Mentation Scale, the results are in line with the hypothesized relationship.

In general then, the results provide empirical support for a link between creativity and sleep-dreams both in college samples whose creative achievement is highly potential, as well as in a sample of adults where the criteria of creativity, while not rigorously defined, has met the crucible of real life achievement.

Much additional work needs to be done, with more stringently defined criteria of creativity and with more rigorous methodology. The above findings, however, are highly promising and suggest the usefulness of studying the interactive aspects of creativity and sleep-dreams.

- REFERENCES
- ALLISON, T. & CICHETTI, D. Sleep in mammals: ecological and constitutional correlates. *Science*, 1976, 194, 732-734.
- ANASTASI, A. & SCHAEFER, C. The Franck drawing completion test as a measure of creativity. *Journal of Genetic Psychology*, 1971, 119, 3-12.
- ASERINSKY, E. & KLEITMAN, N. Regularly occurring periods of eye motility and concomitant phenomena during sleep. *Science*, 1953, 118, 273-274.
- AULD, F., GOLDENBERG, G. M. & WEISS, J. V. Measurement of primary-process thinking in dream reports. *Journal of Personality and Social Psychology*, 1968, 8, 418-426.
- BARRON, F. *Artists in the making*. NYC: Seminar Press, 1972.
- BARRON, F. & WELSH, G. S. Artistic perception as a possible factor in personality style: its measurement by a figure preference test. *Journal of Psychology*, 1952, 33, 199-203.

Creativity, Sleep and Primary Process Thinking in Dreams

- BEITTEL, K. R. Factor analysis of three dimensions of the art judgment complex: criteria, art objects, and judges. *Journal of Experimental Education*. 1963, 32, 167-173.
- DOMINO, G. Maternal personality correlates of sons' creativity. *Journal of Consulting and Clinical Psychology*, 1969, 33, 180-183.
- DOMINO, G. Identification of potentially creative persons from the adjective check list. *Journal of Consulting and Clinical Psychology*, 1970, 35, 48-51.
- DOMINO, G. Primary process thinking in dream reports as related to creative achievement. *Journal of Consulting and Clinical Psychology*, 1976, 44, 929-932.
- DOMINO, G. Homosexuality and creativity. *Journal of Homosexuality*, 1977, 2, 261-267.
- DOMINO, G. Attitudes towards dreams, sex differences, and creativity. *Journal of Creative Behavior*, 1982.
- DREYDAHL, J. E. & CATTELL, R. B. Personality and creativity in artists and writers. *Journal of Clinical Psychology*, 1958, 14, 107-111.
- FITZGERALD, E. T. Measurement of openness to experience. *Journal of Personality and Social Psychology*, 1966, 4, 655-663.
- GHISELIN, B. (ed.). *The creative process*. NYC: Mentor, 1955.
- GOUGH, H. G. *Manual for the California psychological inventory* (rev. ed.). Palo Alto, CA: Consulting Psychologists Press, 1960.
- GOUGH, H. G. & HEILBRUN, A. B. Jr. *Manual for the adjective check list*. Palo Alto, CA: Consulting Psychologists Press, 1965.
- GUILFORD, J. P. Creativity. *American Psychologist*, 1950, 5, 444-454.
- GUILFORD, J. P. A psychometric approach to creativity. In Anderson, H. H. (ed.). *Creativity in childhood and adolescence*. Palo Alto, CA: Science and Behavior Books, 1965.
- HUXLEY, A. Visionary experience. In Nielson, G. S. (ed.), *Clinical psychology*. Copenhagen: Munksgaard, 1962.
- JOUVET, M. Cholinergic mechanisms and sleep. In Waser, P. G. (ed.), *Cholinergic mechanisms*. NYC: Raven Press, 1975.
- KHATENA, J. Vividness of imagery and creative self-perceptions. *Gifted Child Quarterly*, 1975, 19, 33-37.
- KUBIE, L. S. *Neurotic distortion of the creative process*. Lawrence: University of Kansas Press, 1958.
- MacKINNON, D. W. Creativity in architects. In *The creative person*. Berkeley: Institute of Personality Assessment and Research, 1961.
- MACKLER, B. & SHONTZ, F. C. Lifestyle and creativity: an empirical investigation. *Perceptual and Motor Skills*, 1965, 20, 873-896.
- MALTZMAN, I. On the training of originality. *Psychological Review*, 1960, 67, 229-242.
- MASLOW, A. H. Creativity in self-actualizing people. In Anderson, H. (ed.), *Creativity and its cultivation*. NYC: Harper, 1959.
- McWHINNIE, H. J. A review of some research on aesthetic measure and perceptual choice. *Studies in Art Education*, 1965, 6, 34-41.
- MEDNICK, S. A. The associative basis of the creative process. *Psychological Review*, 1962, 69, 220-232.
- MICHAEL, W. B. *Teaching for creative endeavor*. Bloomington, IN: Indiana University Press, 1968.
- OLTON, R. M. Experimental studies of incubation: searching for the elusive. *Journal of Creative Behavior*, 1979, 13, 9-22.

(Continued on Page 55)

- MAY, R. *The courage to create*. NYC: Norton, 1975.
- RASKIN, R. N. Narcissism and creativity: are they related? *Psychological Reports*, 1980, 46 (2), 55-60.
- RASKIN, R. N. & HALL, C. S. The narcissistic personality inventory: alternate form reliability and further evidence of construct validity. *Journal of Personality Assessment*, 1981, 45 (2), 159-162.
- ROSE, G. J. Narcissistic fusion states and creativity. In Kanzer, M. (ed.), *The unconscious today: essays in honor of Max Schur*. NYC: International Universities Press, 1971.
- SALZMAN, L. *The obsessive personality*. NYC: Jason Aronson, 1973.
-

Robert Solomon.

Address: Diamond Bar Mental Health Associates, 1930 South Brea Canyon Road, Suite C-200, Diamond Bar, California 91765.

Creativity, Sleep and Primary Process Thinking in Dreams

(Continued from Page 46)

- RECHTSCHAFFEN, A. The psychophysiology of mental activity during sleep. In McGuigan, J. & Schoonover, R. A. (eds.), *The psychophysiology of thinking*. NYC: Academic Press, 1973.
- RHYNE, J. *The Gestalt art experience*. Monterey, CA: Brooks-Cole, 1973.
- ROGERS, C. R. Toward a theory of creativity. In Parnes, S. J. & Harding, H. H. (eds.), *A source book for creative thinking*. NYC: Charles Scribners, 1962.
- ROSNER, S. & ABT, L. *The creative experience*. NYC: Dell, 1970.
- ROSSMAN, J. *Industrial creativity*. New Hyde Park, NY: University Books, 1964.
- TAYLOR, I. A. The nature of the creative process. In Smith, P. (ed.), *Creativity*. NYC: Hastings House, 1959.
- VOGEL, G., FOULKES, D. & TROSMAN, H. Ego functions and dreaming during sleep onset. *Archives of General Psychiatry*, 1966, 14, 238-248.
- WEISBERG, P. S. & SPRINGER, K. J. Environmental factors in creative function. *Archives of General Psychiatry*, 1961, 5, 554-564.
- WILLIAMS, R., KARACAN, I., & HURSCH, C. *EEG of human sleep*. NYC: Wiley, 1974.
- WINGET, C. & KRAMER, M. *Dimensions of dreams*. Gainesville, FL: University Presses of Florida, 1979.
-

Ingrid Sladeczek, Department of Psychology.

Address: University of Arizona, Tucson, Arizona 85721.

George Domino, Department of Psychology.

Address: University of Arizona, Tucson, Arizona 85721.