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**WE DO NOT DREAM OF THE 3 R'S:
IMPLICATIONS FOR THE NATURE OF DREAMING MENTATION**

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Running Head: No dream of 3 Rs

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Summary: This report examines the extent to which dream recall which involves the "3 R's" (reading, writing, and arithmetic). Two separate studies were done. In the first study, two scorers rated, on a blind basis, a total of 400 written dream reports, available from five previous studies. There was perfect agreement between the two scorers. They agreed that there were no instances of reading, none of writing, and one instance of probable calculating in the 456 dreams.

The second study was a questionnaire survey. Complete responses were obtained from 240 frequent dreamers (who reported remembering a mean of seven dreams per week). The study examined in two ways the frequency of the "3 R's" in their recalled dreams. First, in answer to direct questions as to how frequently they dreamt about each activity, over 90% of the respondents reported that they "never" or "hardly ever" dreamt about each of four activities: reading, writing, typing, and calculating. In answers to other questions, this group reported spending a mean of six hours per day engaged in these activities. Secondly, responses as to the relative prominence of six activities (walking; writing; talking with friends; reading; sexual activity; typing) in dreaming versus waking produced two clear groupings of activities. "Walking", "talking with friends", and "sexual activity" were each rated almost as prominent in dreaming as in waking whereas the second group consisting of "writing", "reading", and "typing" were rated as far more prominent in waking than in dreaming. The two activity groups differed at $p < .0001$.

Thus, the 3 R's appear to occur very infrequently in dreams. These findings are placed in a theoretical frame which suggests that dreaming (compared to waking) deals very little with serial activities characterized by "input — rapid-processing — output" in which the neural nets

function in a feed-forward mode. Rather, dreaming may be characterized by relatively broad or loose connection making in which the nets function more in an autoassociative mode.

Introduction

There is a widespread view that we can dream about everything and anything, that dreaming uses and recombines the entire contents of our memory systems. Thus, Jung says, "Dreams may give expression to ineluctable truths, to philosophical pronouncement, illusions, wild fantasies, memories, plans, anticipations, irrational experiences, even telepathic visions, and heaven knows what besides." (Jung, 1933). A modern biological view that dreaming involves random activation of material stored in the forebrain by brainstem activity (Hobson, McCarley, 1977) would also suggest that everything in our memory storage should appear in dreaming and that those of us with a lot of memories of reading, writing, etc. should certainly have dreams about such activities. Likewise, the related view that dreams represent excess daytime material (junk) being discarded by the computer-like mind (Crick, Mitchison, 1983)) would suggest that everything we experience and remember which has no great importance should appear in our dreams — and thus our dreams should be full, for instance, of material we have read in newspapers and magazines.

Any exceptions to the rule of "everything appears in dreams" may be helpful in elucidating the nature of dreaming mentation. The present study was designed to look into such a possible exception: anecdotally it appears that reading, writing and arithmetic (the "3 R's") — common activities in our waking life — play a very minor role in our dreams.

More specifically, this study derives from a contemporary theory of dreaming (Hartmann,

1996; 1998) briefly summarized as follows: The mind can be seen as a complex net or (network of nets) — consisting of a large number of simple units with varying connection weights between the units, which can be modeled roughly by connectionist net models as pioneered by McLelland and Rumelhart (1986). All that can happen during waking or during sleep is that activation flows along the net, portions of the net are lit up and connections are made, strengthened, or weakened. However, there is a difference between dreaming and waking: In waking connections are made in a more-or-less direct, linear, serial fashion, remaining relatively close to pathways running from sensory input to motor output. In dreaming the net is not constrained in this way and connections are made in a broader, less serial and more parallel fashion, ranging farther from any connections to input and output. In this sense, dreaming involves the less structured or less "tightly woven" portions of the net farther from input-output paths. Another less spatial way of picturing the difference is to consider the two basic types of "connectionist nets" that have been modeled — feed-forward nets and auto-associative nets (Figure 1). The suggestion is that in waking the net functions in a relatively more feed-forward fashion, whereas in dreaming the net acts in a more auto-associative fashion. The theory then goes on to discuss that the broad connections are by no means random but are guided by the dominant emotional concern of the dreamer (Hartmann, 1998).

On this model, then, relatively straightforward serial activities with rapid input-output processing and a feed-forward form of processing, would be more consonant with the waking rather than the dreaming functioning of the net. For professionals, students, and white-collar workers, the activities of reading, writing or typing, and calculating take up a good deal of waking time, and are probably the clearest examples of activities involving rapid, serial, focused,

feed-forward processing; therefore the model suggests that these might be relatively lacking in dreams.

This is, in fact, consistent with an impression I have had in looking over a large number of my own dreams as well as laboratory and home dreams from a number of research studies. It is also consistent with a statement by Stephen LaBerge that lucid dreamers trying to read in their dreams have great difficulty in reading more than a word or two (LaBerge, 1985).

There is limited research work in the literature on the occurrence of reading, writing and arithmetic in dreams. Calvin Hall and his associates, in a number of studies involving content analysis of dreams, have reported on the frequency of various settings and activities in dreams (Hall, Van de Castle, 1966). Though they do not discuss the 3 R's specifically they have two categories that might include them. Under "settings," they describe, "vocational settings," as a rare setting for dreams, which in a sample of 1000 dreams (500 male, 500 female) occurred in 4.8% of men's dreams, and 5.2% of women's dreams. Under "activities," they also have a subtype called "visual activities" which they define as including "a large number of words denoting visual activities...see, notice, read, watch, peek, glance, view, inspect, and distinguish." Their results indicate that overall 11.8% of male dreams and 12.4% of female dreams included such visual activities. Unfortunately, both the settings and activities categories are much broader than dreaming specifically of the 3 R's, which are not investigated in themselves. Calvin Hall does provide one further hint. In a summary article reviewing his studies (Hall, 1951), he states that "such common waking activities as typing, sewing, ironing, or fixing things were not represented at all in these 1000 dreams." Strauch and Meier (1996) have collected and analyzed the content of 500 laboratory dreams as well as a large number of dreams collected at

home. These authors make no mention of the 3 R's, nor do they mention activity and occupation categories which might include them.

In this study the frequency of the 3 R's in dreams was investigated in two separate ways. One involved a direct "content analysis" type of examination of actual written dreams from several different studies. This has the advantage of being objective, and gives an opportunity to check inter-rater reliability between scorers. On the other hand, it is time consuming and difficult to rate more than a few hundred dreams in this way. Furthermore, it is possible that a great portion of dreaming may not appear in written reports, since the dreamer is pressed for time. Thus, it is possible that dreamers tend to write down only the most vivid or outstanding or unusual aspects of their dreams, and perhaps ordinary activities such as reading or writing might occur but simply not be mentioned in a typical written dream report.

Thus the question was examined in a second way, using a questionnaire sent to a large number of good dream recallers, who were asked about whether they recall any 3 R activities in their dreams. This method is less objective, since one does not know exactly how many dreams or which dreams are being recalled and examined, but in a sense it casts a wider net: each of these dreamers might very well be able to recall many 10s or 100s of dreams, be able to review them, and be able to consider whether any reading, writing, etc. was done, even if the reading and writing had not played a very prominent role in any dream.

Study 1: We obtained written dream reports from a number of different settings. In this study, a total of 456 dreams from five different studies were examined: 100 dreams from 100 male students made available by William Domhoff on-line (Schneider, A., Domhoff, G.W.,

1998); 67 laboratory dreams from 67 subjects, made available by Roussy (Roussy, et al., 1996); 68 dreams written down as part of an evaluation of 68 patients at a sleep disorder center (Hartmann, et al., 1998); 80 dreams from a recent student sample consisting of one “most recent dream” and one “dream that stands out” from each of 40 students (Kunzendorf, et al., 1997); and 141 written dreams from 115 students from a recent unpublished study by the author and associates. Except for the first group of dreams all samples were about half male and half female.

Each dream was read independently by two scorers (intelligent professionals and students, with no specific training in this task) who were given a sheet with three columns for scoring asking them to score any instance of 1) reading or 2) writing word-for-word — more than two or three words, or 3) calculating or arithmetic. Specifically, the scorers were given the following instructions: for reading, “Does the dream contain any instance of reading (a book, document, letter, etc.) which includes more than one or two actual words?... Do not count simply seeing a sign with one or two words such as “No Exit” or “Dream Wonderland”; for writing, “Does the report contain any instance of writing, typing or word processing a series of words—more than two words...Do not count writing or painting a brief sign. Do not count, for instance, “I was painting a sign that seemed to say Bach-fiends”; and for calculating, “Any detailed description of doing an arithmetic problem, algebra problem, geometry problem or any more complex calculation in the dream.”

Study 2: This was a questionnaire survey, sent to a group of good dream-recallers. A brief questionnaire, consisting of a single sheet printed on both sides was mailed to all members of the Association for the Study of Dreams (ASD) residing in the USA; it turned out there were

exactly 400 such members whose addresses were available at the time of the mailing. The questionnaire included two major questions about dreams. First, the respondent was asked to estimate on a 5-point scale how frequently he or she recalled engaging in certain activities (reading, writing, typing, calculating) in dreams, and then asked how much waking time was spent per day on each of these activities. Second, the respondent was asked to estimate in turn the relative prominence of six activities — walking, writing, talking with friends, reading, sexual activity, and typing — in dreams as opposed to waking life. The three control items (walking, talking with friends, and sexual activity) were chosen as activities which were quite different from the 3 R's but which also differed greatly from each other — in order to allow comparisons not only between the 3 R's and the three other activities but also within the activity-groups which might help elucidate the findings.

The questionnaire also included questions about respondents' age, sex, and dream recall frequency. The data on the first question were simply tabulated and expressed as percentages; there are no statistical comparisons in these data. On the question of relative prominence of the six activities, the data representing six scores for each of the respondents were analyzed by pairwise t-tests.

Results

Study 1: There was exact agreement between the two scorers on all 456 dreams, so there was no need for statistical measure of inter-rater correlations. Both scorers agreed that in the entire series, there were zero instances of reading, zero instances of writing or typing, and one instance of calculating. On the single instance of calculating in the dream series, both scorers did

score yes, but both placed a question mark and expressed some uncertainty as to whether it was definitely calculating. The relevant line in the dream read simply, "I was at my desk doing my math homework, when ..." It is not certain whether calculations were actually done, or whether the dreamer simply sat at a desk with some math-related material in front of her.

Study 2: 240 persons (60%) returned the questionnaire by the pre-established cut-off date, two months after the questionnaire had been sent out. The respondents were 68% female and 32% male with a mean age of 48 ± 5 years. They were frequent dream recallers, as expected, reporting a recall of 6.8 ± 5.8 dreams per week.

Table 1 presents the results on the first question, tabulating the frequency in dreams of the four activities: reading, writing, typing, and calculating, as well as the amount of time spent on the same activities during waking. The results are quite similar across all four: For each about 90% or more of respondents (84%, 92%, 92%, 95%) answered that they dreamt either "never" or "hardly ever" about it. Yet these subjects spent a great deal of their waking time on these activities; according to their reports they spent 150 ± 94 minutes per day reading, 106 ± 87 minutes per day writing, 98 ± 97 minutes per day typing, and 23 ± 29 minutes per day calculating. Overall they spent a mean of 377 minutes per day (over six hours) engaged in these four activities.

Table 2 presents the results on relative prominence of six activities in dreaming and waking. It is clear that the six activities fall into two distinct groups. One group, consisting of "walking", "talking with friends", and "sexual activity", are all rated very similarly (means of 2.9, 3.1, and 3.4) where 3 is "slightly more prominent in waking" and 4 is "equally prominent in waking and dreaming." The second group, consisting of "writing", "reading", and "typing" is

rated as far more prominent in waking than in dreaming. The two groups differ from each other at highly significant levels ($p < .0001$); the three members within a group do not differ from each other at levels of $p < .01$.

Discussion

Overall, the results of the two parts of this study confirm the impression from the preliminary test mentioned in the introduction: we dream very little, or at least recall very little dreaming, about reading, writing, typing, and calculating.

I believe the ASD group is an especially appropriate group for this study, with characteristics that would tend to favor the null hypothesis (disproving the hypothesis of the study). First of all, they are extremely good dream recallers, reporting an average of almost seven dreams per week. Second, they are very interested in their dreams; they do not only recall dreams in the morning (as many persons do, rapidly forgetting them again), but tend to write their dreams down, think about them, and share them with others — so that the members of this group have a great many more past dreams available to think about while answering the questionnaire than does the average person. For these reasons, if one asks, "Do you ever dream about X?", where X can be any item of interest to the questioner (I have heard the question asked about "dying", "angels", and some everyday items including "shoes"), this group is far more likely than most to give positive answers. Finally, the ethos of the group is very positive towards dreams and there is a general sense that dreams are "capable of anything". Thus, these subjects had to overcome a certain amount of resistance in stating that, come to think of it, they had never or almost never dreamt about the 3 R's. I spoke with six members of the group on an informal

basis several months after they had taken the questionnaire and all of them mentioned that indeed, on thinking about it, they had never or almost never dreamt about reading, writing, and arithmetic, but that this was quite surprising to them; they had thought that they dreamt about everything. All these factors would make it especially difficult to obtain, in this group, the results actually found. Thus overall the results of the questionnaire study (study 2) supports the results of the content analyses (study 1) supporting the anecdotal impression that indeed we dream very little of the 3 R's.

In retrospect it might have been best, for the sake of completeness, to include "calculating" in the second major question of the questionnaire as well as the first. It was not included since on the basis of a few preliminary inquiries it appeared that many people spent very little time calculating in their waking lives; thus in considering "calculating" they would have been asked to compare two quantities close to zero (calculating in waking, and calculating in dreaming) — a difficult task which could lead to erratic results.

A definite improvement in the study would have been to obtain written material about thoughts or waking reveries which could have been compared with the dream material in study 1. An effort was made to obtain such material in several of the data sets but was unfortunately unsuccessful, so this sort of direct comparison of dreaming versus waking thought material is not available.

The present results are compatible with, but certainly do not prove the "broader, less serial connections farther from input-output" view of dreaming proposed in the introduction. The findings are not compatible with the view that we only dream about important emotional activities and not about dull activities, since the activity "walking" was scored as high as the

presumably more emotional "sexual activity" and much higher than the 3 R's. Also in a general sense I believe that these results are difficult to reconcile with the views discussed in the introduction — that we dream about absolutely everything, that dreams are random activation of material stored in the forebrain or that dreams include especially unimportant material we are trying to discard every night. All three of these theories would predict a considerable amount of 3Rs content in the dreams of these subjects.

There are a number of ways of explaining these results, but I believe all the explanations are to a certain extent related. The results could be explained as indicating that we dream little of "cognitive" activities; that we dream of phylogenetically or ontogenetically old activities rather than recently acquired skills; that we dream little of highly structured activities; that we dream little of "overlearned" or "automatized" skills (though this does not truly explain the results since walking is also overlearned); or perhaps that we are not capable of focusing on small details in our dreams.

All of these more specific explanations are compatible with the broad view that dreaming neglects the direct, rapid processing, feed-forward, highly structured portion of the nets in favor of the less structured regions.

Overall, these results strongly suggest that we dream very little of the 3 R's compared to other activities we engage in during the daytime. It needs to be kept in mind that this study examined only nighttime dreaming versus waking, and did not investigate daydreaming or reverie. It is possible that the results are not entirely restricted to dreaming and that "more dreamlike" waking states involving imagery might have been scored somewhat similarly to dreaming.

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Table 1**Number of Respondents Giving Each Answer**

	<u>Reading</u>	<u>Writing</u>	<u>Typing</u>	<u>Calculating</u>
Never	114	130	178	173
Hardly ever	87	85	46	52
I remember a number of times	30	13	9	10
Frequently	7	5	4	0
All the time (in most of my dreams)	1	1	0	1
Time spent per day on the activity (minutes)	150 ± 94	106 ± 87	98 ± 97	23 ± 29

Table 2

Relative prominence of six activities in waking and dreaming (X± S.D) in 240 respondents:

<u>WALKING*</u>	<u>TALKING WITH FRIENDS*</u>	<u>SEXUAL ACTIVITY*</u>
2.9 ± 1.4	3.1 ± 1.3	3.4 ± 1.7
<u>WRITING**</u>	<u>READING**</u>	<u>TYPING**</u>
1.4 ± 0.8	1.4 ± 0.8	1.4 ± 1.0

Each variable marked ** differed significantly from each variable marked * by pairwise t-tests ($p < .0001$). There were no significant differences between variables within the two groupings (* and **). There was no correlation between sex or age and any of these six variables.