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THE EFFECTS OF CIGARETTE-WITHDRAWAL AND A RELATED VERBAL STIMULUS ON REM SLEEP AND DREAMING

City University of New York PH.D. 1980

THE EFFECTS OF CIGARETTE-WITHDRAWAL AND A RELATED VERBAL STIMULUS ON REM SLEEP AND DREAMING

by

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A dissertation submitted to the Graduate faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

June 1980

This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction of the dissertation requirement for the Degree of Doctor of Philosophy.

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Abstract

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by

Horace W. Batson

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The effects of Cigarette-Withdrawal (or Thirst) and a verbally related stimulus on dream reports were investigated. In our first condition, Baseline dreams were elicited from Subjects. In our second counterbalanced condition, Subjects were cigarette-deprived for 24 hours, and during their laboratory sleep period a cigarette-related message was delivered to Subjects during REMPs (i.e., Phasic and Tonic). In a variation of the second night, the same participants were fluid-deprived for 24 hours, and then fed a salty meal prior to going to bed; dream report collection and thirst message administration were similar to our cigarette condition.

For the control conditions or awakenings, Subjects were not deprived of food, water, or cigarettes; mentation report collection was not preceded by a verbally related stimulus. It was found that:

1. Thirst content in dreams was not maximized in the Fluid-Deprivation condition beyond the level of the control situation;
2. Thirst-related dream content was more frequent in the Thirst-

Stimulus, than Thirst-No-Stimulus condition, but not more than the control condition;

3. Cigarette content in dreams was not maximized in the Cigarette Withdrawal condition beyond the level of the control situation;

4. Cigarette-related dream content was more frequent in the Cigarette-Withdrawal-Tonic-Stimulus than the Cigarette-Withdrawal-Tonic-No-Stimulus condition;

4. Class 2 Minimum Hostility was more frequent in the Cigarette-Withdrawal than the Fluid-Deprivation condition, but not for control;

6. Neither Thirst nor Cigarette-Withdrawal increased the frequency of oral-derivative dream themes;

7. Dream themes seemed to have bearing on intensity of postsleep cigarette need. Subjects with gratifying dreams (i.e., positive themes of eating, drinking, and/or cigarette-withdrawal symptoms) smoked less cigarettes following sleep than non-gratified Subjects;

8. Cigarette-Withdrawal and Thirst, in the presence of the auditory stimulus, increased the amount of REM Phasic activity. There tended to be more words in the: Thirst-Phasic-Stimulus than Baseline-Phasic condition; Thirst-Phasic-Stimulus, than Thirst-Tonic-Stimulus, and Cigarette-Withdrawal-Phasic-Stimulus, than No-Stimulus counterpart situation. Moreover, there were more words from Phasic than Tonic dreams.

The findings of the present investigation were related to Baldridge and co-workers, and Kales and associates' study which

indicated that a "so-called" acquired drive of cigarette-need did not significantly modify dream content. It was suggested that criteria used to determine incorporation were too stringent, and did not allow for a wide range of cognitive representatives appearing in the dream--from direct (i.e., cigarette smoking) to indirect (i.e., irritability, impatience, coughing, etc.). The verbal stimulus in conjunction with either cigarette- or water-need maximized dream modification. The author hypothesized that the deprivation procedures served, in Freud's terms, as an "excitatory process" which became bound by Subjects' screening mechanisms, which resulted in less thirst- or cigarette-related material than control conditions.

ACKNOWLEDGMENTS

I would like to devote this dissertation to my deceased father, Herbert Batson. He instilled in me his life's driving force, and an insatiable need to-get-the-job-done--at all costs. Moreover, all throughout the running of my study, dad's principle of "Get up early, do all your work, and go back to sleep" motivated me to persevere, even when times were rough. I am sorry that he is not alive to share in the joy of the completion of my thesis.

There are many people, who, over the years, have contributed towards my completing this work--I am indebted to all of them; several deserve a special note of thanks.

In particular, I want to thank Steve Ellman, my mentor, for guidance and support he has given me through the years. My thanks to Arthur Arkin for introducing me to the realm of other possibilities, which was extremely useful, not only for understanding my thesis results, but also for life. I thank Sol Steiner for teaching me principles of accurate biomedical recording.

John Antrobus deserves special thanks for the many nights and days we discussed both the literature and varied laboratory techniques. I'd like to thank Rich Bodnar for his analysis of my EEGs, and his suggestions for analyzing the data. I wish to thank the many people who at one time worked on my "lab team." Also, my heartfelt appreciation to Ray Pass for the many hours he spent

assisting me with the statistical analyses of my data.

A special commendation goes to both Mr. Ronald Medford of Bendiner & Schlesinger, Inc., for the Thin Layer Chromatography of the urine specimens, and to Dr. Peter Hill of the American Health Foundation's Naylor Dana Institute for Disease Prevention, for his radioimmunoassay of the nicotine samples.

Endless praise goes to Mr. Christopher Kelly of the New York Times' Systems Support Communications Department, for his assistance in photocopying the many pages of my thesis, and for our 3 a.m. telephone conversations. Thanks goes to Miss Nurith Schwarzbaum and Mrs. Shirley Finley for typing my manuscript. Also, thanks to my two raters, Mr. Joseph Karp and Mr. Richard Gershman.

In closing I would like to applaud the two women in my life, who never once lost faith in my ability to get-the-job-done--my mother, Mrs. Lila Batson, and my wife, Sandra Samaniego Batson. Truer words have never been said than that without their help, support, and love, this thesis would not be!

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CHAPTER I

INTRODUCTION

> O nobly-born, whatever fearful and terrifying visions thou mayst see, recognize them to be thine own thought-forms.
>
> The Tibetan Book of the Dead

Rapid Eye Movement (REM) Awakening Technique and Dreams

Throughout recorded history man has been intensely bewildered and fascinated with the phenomenon of dreaming. Diamond (1963) has given evidence that primitive civilizations descended into the caves and slept on their ancestors' tombs or on the skins of sacrificed animals in hopes of receiving healing dreams.

Many of the early studies commenting on the significance of dreams fall short of a thorough examination of the sources of these night reveries. It was not until the seminal work of Freud (1900) that the scientific community better understood the possible factors influencing the dream-work. His formulation that "visual images constituted the principal component of our dreams" was consistent with the pre-Aserinsky and Kleitman observation that the eyes are not stationary during sleep. It was Freud's assumption that the dream represents a wish fulfillment and its manifest content is a disguised fulfillment of a repressed (unconscious) wish. Recently, this position has been critically reviewed by several investigators (Dement, 1964;

Foulkes, 1964; Trosman, 1963).

Although these early views of dreams spurred further thought, they did not use technology of the new sleep research. Aserinsky and Kleitman (1953; 1955) reported the first electrographic study examining ocular motility and incidental sleep phenomena. They utilized one 10 year old boy, 24 adult males, and 2 adult females as subjects (Ss) in several sets of sleep experiments. Subjects were monitored for eye movements, recorded as an electro-oculogram (EOG); brain potentials, recorded as an electroencephalogram (EEG); heart action currents, recorded as an electrocardiograph (EKG); respiration and body motility. During the course of the night the Ss' EEG pattern was highlighted by cyclical periods of low voltage fast waves, accompanied by binocularly synchronous rapid eye movements (REMs). Ss awakened during these rapid eye movement periods (REMPs) experienced a high frequency of dream recall, whereas mentation reports elicited during non-REM (NREM) sleep resulted in a decline in Ss' memory of their dreams. Later investigations (Dement, 1955; Dement & Kleitman, 1957; Dement & Wolpert, 1958) observed the relation between REMPs and dream recall. Dream reports collected during these periods were found to result in approximately an 80% chance of recall.

These early studies served heuristic purposes for the eager scientific audience; however, for the new sleep research to flourish a relationship between some "public physiological" and psychological state had to be demonstrated.

Tonic-Phasic Dichotomy and
Associated Mental Content

It was commonly believed that sleep was a homogeneous state, characterized by a relative condition of inactivity. The earliest observation opposing this widely held view was made by Aserinsky and Kleitman (1953). These investigators monitored sleeping subjects, and were struck by a series of binocularly, synchronous eye movements and a low voltage fast EEG emitted in conjunction with other physiological alterations. Equally important was their finding that when Ss were awakened during these REMPs, a high incidence of dream recall was obtained, whereas awakenings made in the absence of this ocular motility elicited few dream reports. On the basis of this pattern of eye activity these episodes later became called rapid eye movement periods (REMPs) and the remainder of sleep, non-REM periods (Dement & Kleitman, 1957). Aserinsky and Kleitman (1953; 1955) and Dement (1955) noted that physiological parameters distinguishing REM from NREM sleep, independent of eye movements, were: low voltage EEG; elevated heart and respiration rate. Recent investigation (Aserinsky, 1965; Snyder, Hobson, & Goldfrank, 1963; Snyder, Hobson, Morrison, & Goldfrank, 1964) further accentuated this apparent dichotomy.

A strong argument for a REM-NREM distinction stemmed from Dement's (1960) classic dream deprivation experiment. His study demonstrated that the suppression of REM sleep resulted in a partial recovery or rebound of the seeming REM loss, accrued from the deprivation procedure. The assumption that these REM deprived Ss had REM rebound and not NREM recovery was evidence of a need-fulfilling function of REM sleep. Evi-

dence from the aforementioned studies, along with neuroanatomical data from animal research (Jouvet, 1962; Jouvet, Dechaum, & Michel, 1960; Jouvet & Jouvet, 1965) heavily supported a two-state model of sleep.

The above Tonic-Phasic distinctions were limited to the REMP; however, later research documented the occurrence of phasic variations during NREM sleep as well. In humans, variability has been observed in vaginal blood flow (Cohen & Shapiro, 1970), penile tumescence (Fisher, Gross, & Zuch, 1965; Karacan & Snyder, 1966), respiration (Hobson, Goldfrank, & Snyder, 1965), and vasoconstriction (Johnson & Karpen, 1968). Also, ocular motility has been noted within NREM sleep (Jacobs, Feldman, & Bender, 1971). In the cat, changes in brain temperature have been reported during slow wave sleep (Rechtschaffen, Cornwell, & Zimmerman, 1955), and a limited degree of ponto-geniculo-occipital (PGO) spike activity occurring outside of the neurophysiological specifications of REM sleep (Dement, 1965 ; Michel, Jeannerod, Mouret, Rechtscahffen, & Jouvet, 1964; Thomas & Benoit, 1967). Not only was this monophasic sharp wave (PGO spike) active throughout the visual system during REM sleep (Bizzi & Brook, 1963; Michel et al., 1964; Mikiten, Niebyl, & Hendley, 1961; Mouret, Jeannerod, & Jouvet, 1963), and was present in the pontine region cited by lesion studies as necessary for REM sleep, but the spiking occurred continuously throughout NREM sleep and frequently anticipated REM sleep onset by 30-40 sec (Michel et al., 1964) of intensified activity. This PGO activity seemed destined to play a leading role in subsequent studies attempting to elucidate intrasleep tonic-phasic processes.

Although there has been an increasing amount of evidence

challenging the notion of sleep as a unitary phenomenon, at the very least, the earlier research clarified a REM-NREM differentiation. A fundamental reorientation began with Moruzzi's (1963, 1965) tonic-phasic classification of REM sleep. He concluded from studying the cat's physiology that REM sleep existed as a state with cyclical periods of sustained tonic activity followed by the episodic emission of other types of neurophysiological events. The implication of Moruzzi's (1963) observation is that along tonic definitions, REM-NREM distinctions are largely quantitative and not qualitative; furthermore, the superimposition of the within-REM phasic events are profoundly different than its tonic background. Moruzzi's tonic-phasic dichotomy is supported principally from the results of pharmacological intervention (Delorme, Jeannerod, & Jouvet, 1965; Dement, Zarcone, Ferguson, Cohen, Pivik, & Barchas, 1969 ; Ferguson, Cohen, Henriksen, McGarr, Mitchell, Hoty, Barchas, & Dement, 1969); behavioral manipulations (Aserinsky, 1967; Dement, 1969; Dement et al., 1969 ; Ferguson et al., 1968, 1969); and lesioning studies (Jouvet & Delorme, 1965; Morrison & Pompeiano, 1970; Pompeiano, 1967).

In a remarkable demonstration of the lesioning effect, the bilateral ablation of the nucleus locus coeruleus eliminated the tonic muscular inhibition of REM sleep resulting in an intact PGO spiking, and ocular motility (Jouvet & Delorem, 1965). However, following the destruction of the medial and descending vestibular nuclei, the integrated bursts of PGO spiking, eye movements, momentary EMG and reflex inhibition, and the autonomic variations were absent in REM sleep (Morrison & Pompeiano, 1970; Pompeiano, 1967). The observation that the only

signs of phasic activity subsequent to the above lesion were infrequent occurrences of separated PGO spikes and eye movements not only was important for the distinction between tonic and phasic events, but was also relevant to Moruzzi's second formulation that the prevalent phasic activity might spring from a single, common generator.

In humans, investigators depended on eye movement as the criterion to detect phasic from non-phasic periods in REM sleep; sometimes other physiological indices were conjunctively utilized (Foulkes & Pope, 1973; Watson, 1972). This line of inquiry tended to concern itself with discrete microphysiological events and associated phenomenological experience. The challenge posed to the new sleep research was to determine the dimensions expressed by the tonic-phasic dichotomy.

A significant increase in the following variables was obtained when mentation reports were collected subsequent to phasic activity: (1) hostility (Pivik, 1971; Watson, 1972), (2) movement (Bossinelli, Cicogna, & Molinari, 1973), and (3) self-participation (Bossinelli et al., 1973). However, these awakenings resulted in less conceptual thoughtlike material (Bossinelli et al, 1973; Foulkes & Pope, 1973; Molinari & Foulkes, 1969; Pivik, 1971). The classification of mentation reports as being primary visual experiences (PVE) or as secondary cognitive elaborations (SCE) facilitated the detection of REM phasic and tonic arousals (Molinari & Foulkes, 1969). Reports were scored for PVE when the final experience in the dream consisted of "thoughtless" imagery (e.g., watching a clock), and for SCE when the final experience demonstrated active conceptualization or verbalization (e.g., watching a clock, but considering the actual time; or thinking

about time without any associated imagery). REM phasic reports were characterized by PVE, while mentation from REM tonic and NREM (i.e., ascending Stage 2, and sleep onset Stages 1 and 2) awakening was associated with SCE. The within-REM results were replicated (Foulkes & Pope, 1973) with the additional finding that subjects concurred about the presence of SCE-type material, if specifically asked, following their spontaneous reports (Foulkes & Pope, 1973; Medoff & Foulkes, 1972). The data suggested that the presence or absence of phasic activity is not a strong predictor of the hallucinatory (Molinari & Foulkes, 1969; Pivik, 1971; Pivik et al., 1969), emotional quality of mentation (Pivik, 1971), or felt bodily presence or subjective depth of sleep (Molinari & Foulkes, 1969; Pivik, 1971). Moreover, there is also a poor correlation between visual imagery and phasic events; however, there are impressive preliminary results from an examination of auditory imagery and phasic activity--in the auditory system (Roffwarg, Adrien, Herman, Lamstein, Pessah, Spiro, & Bowe-Anders, 1973).

Phasic states consisting of EEG sawtooth waves or 2-3 Hz notched waves generally preceding eye movement bursts (Berger, Olley, & Oswald, 1962), in the absence of eye movement activity, and periorbital integrated potentials (PIPs)[1], with and without REMs, have interesting types of associated mental content upon awakening. Sawtooth awakenings have a PVE rating similar to a REM phasic report, but it is more discontinuous with respect to the preceding content (Foulkes & Pope, 1973).

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[1]Electrically measurable phasic eye muscle events in man.

Subjects rate the last experience in PIP and PIP-REM conditions as being significantly more bizarre, more often than in the control awakenings. Furthermore, both phasic experiences are more discontinuous and bizarre compared to the control situation.

The discovery of sporadic occurrences of PGO spiking during NREM sleep in the cat prompted the search for a physiological analogue in humans, along with the hope that associated with it might be a demonstrable change in elicited dream narratives.

The K complexes are highly visible during Stage 2 sleep and by definition are absent from REM sleep (Rechtschaffen & Kales, 1968). The distribution of this electrographic activity before the REMP (Dement, 1967) and its response to experimental manipulation (Pivik & Dement, 1968) suggest that it might represent PGO activity. Pivik et al. (1969) document that elevated K complex frequencies (determined on the basis of pre-awakening 3-min. counts) were related to either the absence of recall or to recall of the most dreamlike quality; however, the lowest rates of K complexes were associated with "conceptual mentation," both mundane and bizarre, and perceptual mentation of a non-hallucinatory quality (p. 215). Weisz (1972) studied mentation reports following awakenings during Stage 2 after a single K complex or sleep spindle; he found no significant differences between the two types of conditions on the following variables: (1) SCE, (2) PVE, (3) distortion, and (4) active participation. More recently (Antrobus, Ezrachi, & Arkin, 1973), negative results were obtained (between a dreamlike rating on several scales and incidence of K

complexes) in a study of Stage 2 awakenings after REM and following sleep onset.

Rechtschaffen et al. (1972a, 1972b) investigated Stage 2 awakenings made under four conditions: (1) control, no PIPs or tonic periorbital EMG activity for 1 min.; (2) phasic-tonic (P-T); (3) tonic, no PIPs; and (4) phasic (P), 3-5 sec. of PIPs alone.

Both experiments shared the same finding that, relative to control conditions, there was an increased probability of recall under P-T conditions and that phasic reports (P and P-T) were longer and more highly distorted. In another study (Pivik, 1971) auditory imagery and hostility variables facilitated the discrimination between phasic (transient inhibition of the spinal monosynaptic H reflect) and tonic (absence of such inhibition for at least 2 min.).

In awakenings made in all NREM sleep stages, except sleep onset Stage 1, surprisingly, it was determined that recall in NREM Stages 3 and 4 was enhanced under phasic conditions. Furthermore, NREM Stages 3 and 4 tonic and REM and Stage 2 phasic awakenings were characterized by an enhancement of visual imagery content, movement, dreamlike fantasy ratings, and hallucinatory quality. However, NREM Stages 3 and 4 phasic and REM and Stage 2 tonic arousals had an increase in its thoughtlike quality with Stage 4 phasic awakenings receiving the greatest percentage of such ratings.

Organization of Dream Modification Studies

The literature is replete with experiments attempting to influence

dreams by presenting a vast array of stimuli to sleeping subjects; however, these early investigations were done prior to the advent of electrographic technology. The difficulty with these pioneering works is that the anecdotal quality of the inquiries make the conclusions far removed from scientific scrutiny. Poor controls, small sample sizes, and an over-reliance on recalled dreams contributed to the methodological shortsights of these beginning explorations. Freud (1900; 1953), and more recently Ramsey (1953), provide us with an excellent review of the dream modification studies predating the REM awakening technique of Aserinsky and Kleitman (1953; 1955).

In order to reliably test the efficacy of experimental manipulations on dreaming this author intends to review the topic of dream modification efforts current with polygraphic technology. The development of the subject will be along the following course:

1. The effects of intrasleep variables on dream content
2. The effects of presleep manipulations on dream reports
    a. Activity
    b. Hypnotic and Post-hypnotic suggestions
    c. Visual Stimulation
    d. Stress
    e. Verbal Input
    f. Biological Function - Drive Frustration
    g. Cigarette Withdrawal

Dream Modification Studies

The earliest study attempting to answer the question of the

modifiability of dreams which utilized the REM awakening technique of Aserinsky and Kleitman (1953; 1955) was conducted by Dement and Wolpert (1958). These investigators exposed 12 Ss to one of the following stimuli, which were presented during REMPs: (1) a 1000 Hz tone, (2) a series of light flashes, or (3) a spray of water on the skin. These stimuli were usually administered at a subwaking threshold level. It was reported that out of 98 experimental tests, 42% (14 of 33 following the water spray), 23% (7 of 30 after the light stimulation), and 9% (3 out of 35 following tone) was directly incroporated into the dreams. These researchers concluded that none of the variables were particularly significant in influencing the mentation reports.

Rechtschaffen and Foulkes (1965) taped open the eyes of 7 Ss, and of these 3 had their eyes chemically dilated. While monitoring these Ss' EEGs, the investigators exposed the following objects to them during both REMPs and NREMPs: a book, a black X, a moving handkerchief, a coffee pot, and a "do not disturb" sign. Mentation reports were collected from REM and NREM. These authors determined that there was no demonstration of incorporation--thus, negative support for the hypothesis that dream images are a result of retinal stimulation.

Foulkes et al. (1969), using 5 subjects between the ages of 4 and 4 1/2, administered one of the following stimuli during each REMP on one experimental night: (1) drops of water, (2) puffs of air, (3) puffs of cotton, and (4) an emery board. It seemed that one of the Ss incorporated the cotton into her dream in three out of four episodes. Recently, Foulkes and Shepherd (1972) conducted a study

similar to the design of Foulkes et al. (1969). This time, however, there were 30 Ss, 16 of whom were 9-10 years, and 14 were 3-4 years of age. The stimuli used were: a cotton puff lightly placed on the face, an induced limb movement, and a water spray to the face. They were then awakened 5-15 sec. after this manipulation, during both REM and NREM, for dream reports. The water spray had the greatest amount of incorporation, which is remarkably similar to the results obtained by Dement and Wolpert (1958). Corresponding findings were reported by Baldridge et al. (1965) in their preliminary observations of the effects of thermal manipulations on the sleep experience. They achieved incorporations in approximately 255 of their test situations, which again is consistent with Dement and Wolpert's (1958) data.

Koulack (1969) performed a fascinating study by administering a percutaneous electrical shock to the median nerve of both wrists of 10 male Ss during REMPs on five different conditions, in order to modify dream content. The experimental schedule consisted of the following: (1) no stimulation and awakening S 3 min. after the first REMP, (2) shock at first REMP and wake-up call 30 sec. afterwards, (3) stimulus presentation at first REMP and awakening after 3 min., and (4) shock 3 min. after the first REMP had terminated for 3 min. and awakening postponed for 3 min. following stimulus cessation. Either the left or right wrist was stimulated at least once in each condition, and the order was randomly generated. Contrary to predictions, there was no increase in the appearance of the self in the dream, and the effects of the stimulus were not greatest at the onset

of the REMP. The findings suggested "the possibility of the transformation of specific effects to the other in the dream with stimulation" (Koulack, 1969). Moreover, it was noted that the shock tended to become indirectly incorporated into mentation reports. In another study concerned with the effects of the body stimulation on the dream experience, Gardner et al. (1973) observed natural sleep behavior. These investigators concluded from a sample of nine Ss that there was a significant correlation between actual body movements during REMPs and upper and lower limb movements in the elicited dreams. Dement and Wolpert (1958) were not only interested in the effects of the tone, spray, and series of lights on dream content; they were concerned about the relationship between eye movements and body motility with respect to the sleep experience. These investigators noted that the body movements seemed to be related to the end of a dream sequence, and the direction of the last observed eye movement (preceding the experimental awakening) corresponded to the dreamer's last reported eye fixation. In addition, it was determined that ocular activity was associated with active dreams, while ocular quiescence was associated with passive dreams.

Fisher (1966) observed the concomitant effects of nocturnal penile tumescence (NPT) on dreaming. This researcher tested six Ss in the laboratory for a total of 15 nights in which they were awakened during REMPs, at the following stages of NPT: initial flaccid period, after abrupt tumescence, during sustained maximal erection, or after rapid abrupt detumescence. It appeared that detumescence was associated with anxiety, and tumescence with some erotic dream themes.

Hitherto the author has focused on experimental attempts to modify primarily REM mentation. There are several references to NREM manipulation efforts in the literature, the earliest of which is the study by Dement and Wolpert (1958). These investigators concluded that even with stimulus administration, no NREM mentation reports could be obtained, that is, Ss reported little, if any, dream content from this sleep stage. Although there has not been any systematic examination of intrasleep variables on NREM mentation, a few researchers (Rechtschaffen et al., 1963; Rechtschaffen & Foulkes, 1965; Foulkes, 1966) have reported successful incorporations.

As one analyzes the studies of the effects of stimulation during sleep, it appears that the results are far from conclusive. Even with the landmark investigation of Dement and Wolpert (1958), the findings suggested that experimental manipulation did not substantially modify the dream narrative. However, of the three variables utilized (i.e., light, tone, and water spray), the water had the greatest impact. It might well be the case that the water stimulus was effective because Ss were thirsty. Bokert (1968) concluded in his study of the effects of thirst on dream reports that "thirst content in the dreams was especially frequent in the late REM periods than in early dreams." A control for this condition would necessitate the collection of pre- and post-sleep thirst ratings, which would better help us to understand the role of thirst in expediting the water stimulus incroporation.

Difficulty in influencing the dreamwork during REM sleep might also be accounted for by the fact that Ss are selectively inattentive to the stimulus because of their intense involvement with their

dreams; incorporation might be increased by presenting such stimulation during an ocular quiescent REMP. A word about stimulus threshold factors: Goodenough et al. (1965a; 1965b), Rechtschaffen, Hauri, and Zeitlin (1966) suggested that there should be some concordance between the awakening threshold of the stimulus and the initial intensity of the presentation. This issue has not been discussed thoroughly as of yet; however, it could account for the low levels of reported stimulus incorporations shared by many investagations. Arkin and Antrobus (1978) recommended that to better understand the role of external stimuli on the sleep experience "parametric studies of the effects of stimulus intensity, stimulus modality, and familiarity or history of experience with the stimulus are called for."

The Effects of Pre-Sleep Manipulation on Dreams

The Role of Activity on the Sleep Experience

Orr et al. (1968) had seven Ss awaken themselves from sleep at a preselected time while in the laboratory. Subjects were instructed to awaken anywhere from 250-350 min. after sleep onset. Four of the Ss were able to awaken within 16 min. of the critical period. Then six REM reports were collected, and several contained references to time.

The relationship between presleep mentation and REM mentation was studied by Baekeland, Resch, and Katz (1968). Twenty-seven subjects were asked to free-associate intermittently for one-half hour, following which their productions were tape recorded. It was concluded

from an analysis of the REM reports that the dreams related to the free-association content. Also, the experimental Ss had more dreams with unpleasant and laboratory themes than control subjects. Hauri (1970) examined three different kinds of activity and its effect on dream content. Ss were instructed to: (1) exercise for six hours, (2) study for six hours, or (3) relax for six hours--each on a different night. The results from a REM and NREM mentation report analysis suggested that following exercise Ss had a decrement in dream content about physical activities; after studying, a decrease in thinking and problem solving content. However, there was an increase in the amount of social interaction per character.

In an effort to understand the role of a personally relevant psychological concern on dream reports, Cartwright (1974) studied 17 college students. Each S was interviewed to determine a psychologically relevant topic. Once this was established, the subject was then asked to repeat a target word (related to conflict area) up until he drifted off to sleep. Dream reports collected during REMPs indicated that the target word was represented in the dream, but other characters possessed the dreamer's ascribed qualities, and not the dreamer.

In brief, it appears that activity or specific tasks can influence nocturnal mentation. This supports Freud's (1900) formulation that day residue is a principal catalyst for the formation of dreams. The most powerful test of this hypothesis was conducted by Cartwright (1974) in her determination that intrapsychic conflict was readily

incorporated into the dream; however, in most cases it was transformed.

Hypnotic and Post-Hypnotic Suggestion and Dreams

There is an abundance of literature on the topic of hypnosis and dreaming; nonetheless, most of the studies were done prior to the advent of electrographic recording. Tart (1965), and more recently Walker and Johnson (1974), provide us with an excellent review of the work done during this era.

Stoyva (1961) administered standard hypnotic induction procedures to 16 highly hypnotizable Ss. During the trance, they were instructed to dream of specific topics, following which (while asleep) dream reports were elicited from Stages REM, 2, 3, and 4. Their results suggested that hypnosis indeed increased the probability that Ss would dream of the target topic. The following two studies examining the role of hypnosis and its effect on dreaming were conducted by Tart (1964) and Tart and Dick (1970). In the former, 10 Ss on the high end of the hypnotizable scale were given presleep posthypnotic suggestions to dream about an anxiety provoking topic, with the dreamer as the central figure. Out of 38 REMP dream reports collected at different periods into REM, 50% of the Ss were judged to not have incorporated the suggestion, but the remainder had demonstrated varying levels of dream manipulation. The investigator concluded that the suggestion seemed to facilitate dream control. In the latter study, Tart and Dick (1970) carried out a well designed study utilizing 13 highly hypnotizable Ss, all given a posthypnotic presleep suggestion to dream about a story they heard prior to retiring for bed. Two

different stimuli were employed on a two-night schedule--one night in counterbalanced order. Ss were awakened for dream reports 5-10 min. into REM. Judges unaware of the conditions of the study scored half of the dream reports against the wrong stimulus, half against the correct one. Out of 78 mentation reports, 64% had incorporations directly related to the stimulus, 12.5% incidentally related, and 21% unrelated to the suggestion. It was concluded that the posthypnotic suggestion had a significant effect on the dream content; however, other nonhypnotic techniques are capable of demonstrating a similar influence. In a complicated 2 x 3 factorial experiment using 77 Ss, Barber, Walker, and Hahn (1973) posthypnotically instructed 50% of their sample to dream about President Kennedy's death, and the nonhypnotized remainder were given the same suggestion. Each S was placed in one of the following experimental paradigms: (1) authoritative suggestion wording, (2) permissive, and (3) no suggestion. Mentation reports were collected from each REMP, and at least once from NREM 45 min. after the completion of the previous REMP. It appeared that the presleep suggestion altered the dreams of approximately 25% of the Ss, regardless of whether hypnosis was used. Moreover, the investigators reported that the suggestion had the greatest effect when presented authoritatively to hypnotized Ss, and permissively to nonhypnotized Ss. Torda (1975) studied the effects of anxiety and anger on 10 college students' dream reports. Anxiety and anger were generated posthypnotically by telling Ss that they will feel afraid or angry in their dreams. Subjects' EEGs were monitored in the labo-

ratory for five nights. Hypnosis was used during the second, third, and fourth presleep period. On the fifth night Ss were shown the subincision film used by Witkin and Lewis (1965) prior to retiring. The results indicated that the endogenous affects modified the content of concurrent dreams in both conditions.

From a review of the studies of the effects of posthypnotic suggestions on dream content, one concludes that there are a number of methodological problems preventing an adequate assessment of the observations. Walker and Johnson (1974) provide us with an excellent account of the presenting problems of current research efforts. To be sure, there does appear to be evidence that hypnosis can facilitate dream control when personality variables are considered.

The Effect of Visual Stimulation on Dream Reports

In an interesting study, Shevrin and Fisher (1967) showed, tachistoscopically, drawings of a fountain pen in close temporal relation to a knee, to 10 female Ss. These pictures were exposed to Ss before lights out, and immediately following the presentation, samples of waking thought along with free associated material were obtained from subjects. Mentation reports elicited from REMPs and NREMPs supported the prediction that REM reports would contain greater evidence of primary process, and Stage 2 (NREM) greater evidence of secondary process, when compared to one another.

Focusing on a different form of presleep stimulation, Cartwright et al. (1969) studied 10 male Ss in the laboratory for five consecutive nights. The experimental protocol demanded that awakenings of

Ss be made, and dream reports collected from all REMPS on one night, without viewing the pornographic film, prior to sleep, and the other night, with the presleep stimulation. The Ss in the erotic stimulation condition experienced a decline in their ability to recall dreams. The number of characters per dream decreased; however, the total number of two-person dreams increased. Also, the symbolic representation of the film was enhanced in the no-stimulation condition. While employing an aggressive (violent) and a comedy film, Foulkes and Rechtschaffen (1964) sought to influence dream reports of 24 Ss, 11 of whom were female. Ss slept in the laboratory for two counterbalanced nights, then an adaptation period. Either the violent or comedy film was shown on the experimental nights. Dreams were elicited from REM and NREM. It appeared that dreams following the violent films were longer, more imaginative, dynamic, and emotional than after the comedy film; however, in none of the conditions were dream reports more violent. It is both surprising and confusing that Foulkes et al. (1967) obtained different findings in a study with a similar design. Subjects were 32 boys, 16 of whom were approximately 7 1/2 years of age, and 16 were approximately 11 1/4 years old. As a presleep condition, Ss were either shown a violent Western or a baseball film, in counterbalanced order. Ss were awakened from REM sleep for dream reports on both experimental and control nights. It seemed that presleep viewing of the Western reduced dream intensity and hostile-unpleasant content. Also, it appeared that there were more dreams with wild animals following the Western compared to the baseball film.

Oddly enough, there was a higher incidence of "bad" dreams following the baseball, rather than the Western film.

Through the use of an anxiety provoking presleep experience, Witkin (1969) and Witkin and Lewis (1967) endeavored to alter the sleep experience of 28 male Ss. These investigators utilized a five night design comprised of one adaptation night, and one night for viewing films of human birth, human subincision, and a neutral film. Following this procedure, Ss were administered psychological suggestions for altering bodily feelings. Subjects were awakened from REM sleep for mentation reports, and were asked for more detail about their night experiences on the following morning. As for the specific incorporation effects, the stimulus appeared in distorted form for all conditions. Ss rated their dreams following stressful films as more anxiety provoking than those after neutral films. Unfortunately, the results of this study are still being processed; therefore, an adequate evaluation of the conclusions is not possible.

Karacan et al. (1966) was interested in the effects of varying presleep visualization experiences, not only on dream narratives, but also on nocturnal penile tumescence (NPT). Sixteen male Ss spent six nights in the laboratory for EEG, EOG, EMG, and NPT monitoring. Following an adaptation and a baseline night, each S saw (across four nights) two highly charged (emotionally stressful) and two neutral films--one per night. No difference was observed in the total amount of anxiety themes from REM mentation among nights, but detumescence was present concomitantly with any anxiety, regardless of the film

condition. In another study from the same laboratory, Goodenough et al. (1975) obtained positive results using a similar design. It should be noted that these investigators separated Ss into those evidencing anxiety while viewing the stressful film, and those who did not. Respiration was monitored during trials to facilitate the prediction as to which Ss would most likely incorporate the emotionally charged presleep film into their dreams. An analysis of REM mentation reports suggested that the stressful presleep experience did increase dream anxiety for those Ss demonstrating anxiety during the initial screening of the film. Also, there was REM respiratory irregularity associated with the stressful presleep film.

DeKoninck and Koulack (1975) tested the hypothesis that the dreamwork expedites the mastery of stressful experiences, by having Ss sleep in the laboratory for three consecutive nights. On the third night, half of the Ss were presented part of a sound track of a stress inducing film during REM sleep at each subwaking threshold, while the other half received no stimulation. Each group saw the film prior to lights out. The results indicated that Ss' dreams in the film-sound condition contained more incorporations of film trace elements than those of the film-alone Ss. Another fascinating aspect of this study was that control Ss that saw the film twice, but were kept awake for eight hours, tended to be more anxious at the second presentation than Ss that slept during the interval--thus, supporting the mastery hypothesis. At any rate, the authors cautioned that the results are not clear cut.

In summary, the results from studies of the effects of presleep visual experiences on dreams are suggestive; therefore, no definitive conclusions can be reached as of yet. Apparently, presleep manipulations succumb to varying, unpredicted levels of dream distortion as a function of the primary process. This necessitates future research efforts to better predict the nature of incorporation and to stipulate the conditions under which it occurs.

The Role of Stressful Experiences on Mentation Reports

The effects of social isolation on subsequent dream reports has been systematically studied by Wood (1962). This investigator experimented with five Ss who spent five nights in the laboratory. The second day was spent totally alone, following which Ss slept at the laboratory and were awakened for dream reports. In addition to REM time increasing to as much as 60% above baseline, there was less REM phasic activity subsequent to social isolation. REM dream reports tended to depict physical inactivity involving groups of people standing around, socializing. Furthermore, mentation reports reflected more self involvement and fewer settings compared to baseline dreams, which is suggestive of a compensatory function of dreams. A similar study examining the effects of affective-cognitive deficits on REM mentation was conducted by Baekeland (1971). The REMP reports of two groups of Ss with different kinds of presleep experiences were scored for laboratory references, overt experimenter references, pleasantness and unpleasantness of content, self representation of

the dreamer in his dreams, and dream recall. Group I included 17 Ss who were not exposed to any presleep experience (control). The other group (27 Ss) underwent a 30 min. presleep association period in an anxiety provoking, partial sensory-deprivation condition, where Ss' attention was focused on the laboratory procedures. It was determined from REM narratives that Ss in Group II had more dreams related to the laboratory, more unpleasant content, and less recalled material compared to Group I. The investigator concluded that cognitive style was a determinant of dream content.

The following two studies are important because they are the first attempts to experimentally examine the effects of naturalistic stressful experiences on sleep mentation. Breger, Hunter, and Lane (1971) utilized six college volunteers and divided them into an experimental group (composed of two male and two female Ss) and a control group (composed of one male and one female). Each spent five nights in the laboratory--one adaptation and four baseline nights. On all baseline conditions, Ss were awakened from REMPs for dream reports. Subsequent to the initial mentation report collection period, Ss participated in a therapy or "sensitivity" group. This group met for two hours nightly, four sessions per week, for a total of three weeks. During the second and third week, each S served as the focus of the group's attention for two consecutive sessions. Following these focal sessions, each Ss spent the night in the laboratory, and was awakened for REM mentation reports. The results indicated that material exposed during the stressful group sessions were represented

in the dreams, according to each S's personality style. However, incorporation in the dreams was typically indirect, symbolic, and derivative. In contrast, control Ss' dreams had an increase in pleasant themes with successful outcomes. In a related study, Breger et al. (1971) researched the influence of patients' anticipation of surgery on their dreams. Five Ss, all under the age of 65 and scheduled for major surgery, had their REM dreams collected on four consecutive nights prior to their operation, and during three relatively less stressful post-operative days; unfortunately, only two Ss had an adaptation night. A control group consisted of the same two Ss that were used in the aforementioned study. Analyses of dream reports indicated that there were many instances of incorporated stress, both directly and symbolically. The quality of such incorporations were related to the patients' typical coping style, and to his personal associations to surgery.

Studies of the effects of stress on subsequent dream content suggest that stimulus incorporation and representation tends to be indirect and symbolic. The particular style of dreamwork transformation is remarkabley consistent with the dreamers' unique coping mechanisms, and to his personal associations to the presleep stimulus.

The Effects of Verbal Input on the Sleep Experience

As noted throughout this paper, stimulus transformation seems to be a common observation among researchers; however, Berger (1963), in his monumental examination of the effects of meaningful verbal stimuli on dreams, determined some rules of various distortions. By

utilizing 8 Ss, composed of four males and four females, the experimenter assessed and derived personal names that were highly significant or neutral and had them tape recorded. Ss spent 4-6 nights in the laboratory, and at the onset of each REMP a randomly selected name was presented to Ss for 5-10 minutes. Subsequent to the stimulus administration, Ss were awakened for mentation reports. Out of 89 dreams, it was concluded that 48 (54%) had a definite connection to the target name. There was no discernible difference between the highly relevant and the neutral stimulus. The investigator observed that the names tended to be transformed in one of the following categories: (1) assonance, (2) association, (3) direct, and (4) representation. A modification of Berger's experimental strategy was exercised by Castaldo and Holzman (1967, 1969). Nineteen Ss were used in both the original study and its replication. In the experimental condition, 5 min. after REMP onset Ss were presented tape recorded messages of words spoken by them at some previous time during the laboratory session. In contrast, the control group consisted of administering a tape recording of another person's voice which was matched for sex, age, intonation, and the same words spoken in same conditions. Stimuli were delivered at subwaking threshold level, sufficient to produce EEG evidence of registration, but not intense enough to awaken Ss. Following this presentation, each S was awakened for mentation reports, then a period of free association was elicited. The investigators concluded that when the Ss' own voice was utilized, dreams tended to depict the S as being more active,

assertive, and independent than Ss' dreams elicited in the control condition, which portrayed the Ss as passive and unassertive.

The following two studies differed from the above mentioned works in that the experimental stimulus was administered in both REM and NREM. In the first investigation (Castaldo & Shevrin, 1970), the following stimuli were presented to 10 Ss during Stage 2 and REM sleep: pen, knee, ink, paper, and other specially selected stimuli. The words used in this study were similar to those in Castaldo and Holzman (1967, 1969), and Shevrin and Fisher (1967). The intensity of the stimulus was enough to evoke EEG stimulus registration signs, but not sufficient to awaken Ss. It was determined, from an analysis of dream reports, that Stage 2 mentation narratives had a greater amount of words conceptually related to the stimulus word on experimental nights, compared to the control condition--no REM incorporations were observed.

Findings similar to Berger (1963) were obtained by Lasaga and Lasaga (1973). Although this study was concerned with short term memory during sleep, there were occasions to observe examples of incorporation. Eight female Ss were played tape recorded messages of words, phrases, and numbers during Stages 2, 3, 4, and REM. Following the stimulus administration, Ss were awakened for dream reports. The investigators concluded that there were instances where the stimulus was directly incorporated, substituted to a word similar in sound and length as the original stimulus, and completely distorted.

In review, it appears that verbal stimulation can influence not

only REM but also NREM mentation. As delineated by Berger (1963), incorporations tend to occur in one of the following forms: (1) assonance, (2) association, (3) direct, and (4) representation. These findings could partially account for the relatively small portion of significant dream transformations observed as a function of any calculated stimulus administration.

Biological Function and Its Frustration and Dream Reports

Swanson and Foulkes (1968) published findings on the effect of the menstruation cycle on dream content. Mentation reports were retrieved from four Ss, during REM sleep, for 11 consecutive weeks, one night each week, and then narratives were analyzed according to the phase of the menstruation cycle (i.e., menses, post-menses, post-ovulation, and pre-menses). The results indicated that self-reported dream unpleasantness was greatest during both menses and periods of waking depression. Ratings of dream sexuality and hostility suggested maximal sexual content during menses, and periods of self-reported low waking desire, and greatest hostility during menses.

Dement and Wolpert (1958) tested the effects of thirst on dream reports of three Ss. Each S was deprived of all fluids for 24 hours or more on five different nights prior to retiring for bed. While under laboratory conditions, Ss were awakened from REMPs for mentation reports. A total of 15 dreams were elicited during this study. These investigators concluded that the reports had no aspect of the stimulus incorporated. Several dreams appeared to be entirely unrelated to

the thirst condition, and five reports seemed incidentally related to thirst. The authors concluded that the somatic drive (i.e., thirst) did not influence mentation reports. Unfortunately, the small sample size, limited number of dream reports, lack of a control group, and stringent criteria for determining incorporation make the results tentative and misleading (Bokert, 1968).

Different findings were reported by Baldridge et al., (1965, 1966). In some Ss, following 24 hours of food deprivation, elicited dreams from REMPs contained references to food, whereas other Ss under the same experimental condition had dreams with anger depicted.

Bokert (1968) investigated the effects of thirst and a related verbal stimulus on dream reports in Ss under three conditions. In one, Ss were deprived of food and fluids and given a salty meal prior to sleep. This procedure was repeated in a second condition during which a verbal stimulus, the phrase "a cool delicious drink of water," was presented to Ss during REMPs. In a control condition, Ss were not deprived of food and fluids, but were given a non-salty meal. It was found that: (1) thirst content in dreams occurred more often in the two Thirst conditions than in the control situation, (2) thirst content was more frequent in late REMP dreams than in earlier ones, (3) the verbal stimulus resulted in a significant subject variation; subjects who appeared to incorporate part of the verbal message had a greater amount of additional thirst content in their dreams than Ss who did not incorporate the stimulus; the former Ss also had more thirst-related dream content in the Thirst condition

with accompanying stimulation than in the Thirst-No-Stimulus condition, (4) the Thirst-No-Stimulus situation increased the amount of REM activity and may have augmented the length of mentation reports, (5) food content in dreams occurred more frequently in the Thirst-No-Stimulus than the Control condition; the increase in food content was associated with a tendency for postsleep hunger to be greater in the former condition, (6) oral-derivative content in dreams was not increased in conditions, (7) dream content appeared to be related to the level of postsleep thirst; Ss reporting gratifying dreams (i.e., themes of drinking and/or eating) drank less and rated themselves as less thirsty following sleep than subjects reporting non-gratifying dreams (i.e., no themes of drinking and/or eating).

Results of the studies investigating the effect of biological functions and its frustrations on the sleep experience suggests that there can be significant stimulus incorporations. The observation of such incorporations is maximized when researchers select flexible criteria in order to detect trace elements of the biological variable. Moreover, derivative forms of the stimulus might be predicted.

Cigarette-Withdrawal and Dream Content

In contrast to the study of biological drives and their frustration on dreams, the following two investigations attempted to influence dream narratives by depriving smokers of their cigarettes. In the first study, Baldridge et al. (1965) sought to determine what needs or functions were served by cigarette smoking. They employed Ss who volunteered to abstain from smoking for five days, following

which mentation reports were collected. Dreams were elicited on two nights prior to smoking cessation and on two nights following cigarette withdrawal. The researchers observed that the dreams of the first night reflected anxiety and confusion; the second, themes of food and escape; the third, themes of being restrained or watched (and only one reference to food); fifth night, dreams were calmer, and reflected concern about leaving the experiment. It was concluded that there were no dreams of smoking on any laboratory night; however, there were experimental references. It seemed that being deprived of cigarettes was of minor importance when compared to other aspects of the study.

Although Kales, Allen, Preston, Tjian-Ling, and Kales (1970) were concerned with changes in REM sleep and dreaming following cigarette smoking and its interruption, there was occasion to observe Ss' spontaneous dream reports. Seven Ss were monitored continuously for EEG, EMG, and EKG for 9-11 nights; all Ss were cigarette smokers, with a reported intake of 2-3 packs daily. The first four nights, followed days that Ss smoked their usual amount; however, on the fifth day Ss abstained from smoking so that nights 5-9 represented withdrawal nights. Two subjects spent a 10th night, and another two, an 11th night, in order to observe the effects of an extended withdrawal period. The outstanding finding was that there was a "modest" increase in the percentage and absolute amount of REM sleep on withdrawal, as opposed to baseline nights. This REMP increment was concomitant with Ss' spontaneous reports of increased dreaming, and also

an increase in the intensity of the dream narrative. Several Ss reported unpleasant dreams. One subject reported increased dreaming, but described them as calmer during withdrawal than on cigarette nights.

The aforementioned studies are in certain respects similar. Neither of the investigations observed cigarette themes, in any of their Ss' dreams, following cigarette withdrawal. However, both experiments documented that Ss' spontaneous or elicited mentation reports during deprivation reflected some degree of unpleasantness or anxiety. Several factors make it difficult to compare the results of Baldridge et al. (1968) with those of Kales et al. (1970). First, the former researcher does not indicate, in his preliminary observations, how much his Ss smoked. It is difficult to adequately evaluate and compare these studies without having controlled for amount smoked. Kales et al. (1970) relied on spontaneous dream reports; therefore, it is unclear if the mentation reports are from REM or NREM. Both experiments are limited by not utilizing a clearly defined, objective criterion for cigarette abstinence. It might seem odd that there were no cigarette themes in dream reports following withdrawal. It is conceivable that, as was the case in Dement and Wolpert's (1958) study of the effect of thirst on dreams, that the criteria for scoring cigarette themes were too stringent.

The criteria for scoring thirst themes in Bokert's (1968) study consisted of words related to thirst sensations, thirst satisfiers, foods high in water content, water in its natural state (e.g., snow, rain, ice), activities associated with thirst, places related to

thirst, persons associated with thirst, and inanimate objects associated with thirst. It is likely that cigarette themes, in cigarette deprived Ss, might be detectable if the scoring criteria is designed similarly to Bokert's thirst checklist. Moreover, if we look for unpleasant, anxious themes, in the dreams, as observed by Baldridge et al. (1968) and Kales et al. (1970), the probability for discerning trace elements of the cigarette withdrawal effects will be maximized.

Aim of the Present Experiment

This study was derived from Bokert's (1968) investigation of the effects of thirst and a related verbal stimulus on dream reports. His objective was to determine whether a somatic need (thirst) and a related exteroceptive message (i.e., the phrase "a cool delicious drink of water") could modify mentation reports. The present research is a variation of the abovementioned work in that we not only seek to determine a thirst effect, but also whether cigarette-withdrawal and a related verbal message can modify dream content. Let us now turn to a consideration of the unique features of our study vis-a-vis Bokert's.

In Bokert's experimental design the following conditions were utilized, in counterbalanced order: (1) Thirst-Stimulus (i.e., the phrase, "a cool delicious drink of water"), (2) Thirst-No-Stimulus, and (3) Sated. His message was first presented (during all REMPs except the first) at the beginning of the REMP at approximately the time of the second eye movement burst (i.e., REM Phasic). This

phrase was then reintroduced every 27 sec. for a period of 10 min., after which the S was awakened for a mentation report. Dream reports were also elicited from Ss during REM Phasic in both the Thirst-No-Stimulus and Sated conditions.

Our study employed the following nights, in counterbalanced order: (1) Baseline, (2) Thirst: divided into one REM Tonic and one REM Phasic dream report with Stimulus (i.e., "a cool delicious drink of water"), and one REM Tonic and one REM Phasic dream report without Stimulus, and (3) Cigarette-Withdrawal: divided into one REM Tonic and one REM Phasic dream report with Stimulus (i.e., "a soothing relaxing smoke"), and one REM Tonic and one REM Phasic dream report without Stimulus. Similar to Bokert (for a REM Phasic report) each of our messages were first administered at the beginning of the REMP at approximately the time of the second eye movement burst. The phrase was then reintroduced every 27 sec. for 10 min., following which Ss were awakened for a mentation report. However, for a REM Tonic dream report, each of our messages were presented at approximately the first 30 sec. interval of ocular quiescence occurring 1-5 min. following a rapid eye movement. This phrase was then reintroduced every 27 sec. for approximately 1-2 min. after which Ss were awakened for a dream report.

In order to facilitate our assessment of the incorporation of the experimental phrase (i.e., "a soothing relaxing smoke") and its related deprivation state, namely, cigarette-withdrawal, in the dreams, criteria which allowed for the possibility of a variety of

types of symbolic representations were utilized. Our objective was to determine: (1) whether a "so-called" acquired (i.e.. cigarette need) could manipulate dream content, and (2) if cigarette-related dream themes could be maximized with an exteroceptive verbally related message presented to cigarette-deprived individuals.

There are several implications for the proposed field of research, one of which is a better understanding of the processes underlying dream formation, and the further elucidation of the role of need states, particularly as they influence dream content. It is clear that depriving people of fluids manipulates a need state; however, it is not clear if cigarette withdrawal constitutes something analogous to a need state, as suggested by many authors (Fenichel, 1945; Guilford, 1966; Horn, 1969; Wynder, Kaufman, & Lesser, 1967). Also, the present investigation allows us the opportunity to look at a so-called "acquired need" versus a biological need state (i.e., water deprivation).

Hypotheses

The following are the experimental hypotheses which will be tested:

1. Dream reports of subjects will contain a greater amount of thirst-related content, following the arousal of thirst, than in the control condition
2. Dream reports will contain a greater amount of thirst-related content in conditions where a thirst-related auditory stimulus is presented to thirsty Ss during sleep, than in control and

no-stimulus conditions

3. Dream reports will contain a greater amount of cigarette-related content following cigarette withdrawal than in a control condition
4. Dream reports will contain a greater amount of cigarette-related content in conditions where a cigarette-related auditory stimulus is presented to cigarette deprived subjects during sleep, than in control and no-stimulus conditions.
5. Ss' dreams will contain more themes of hostility on cigarette withdrawal nights, as compared to thirst or control conditions.

Experimental Design

The design of this study is based on the Latin Square principle, using a complete set of sequences (Grant, 1948). In this format, all combinations of the three variables taken three at a time are utilized.

		CONDITIONS		
SUBJECTS	ADAPTATION	1	2	3
1,2,3		A	B	C
4,5,6		B	A	C
7,8,9		A	C	B
10,11,12		C	B	A
13,14,15		B	C	A
16,17,18,19,20		C	A	B

A: Baseline Condition (no stimulus)

SCHEMATIC:

NREM (tonic)

NREM (phasic)

REM (phasic)

REM (tonic)

REM (tonic)

REM (phasic)

B: Experimental Condition (cigarette-withdrawal and 3 stimulus presentations)

SCHEMATIC:

NREM (tonic) stimulus

NREM (phasic)

REM (tonic) stimulus

REM (phasic)

REM (phasic) stimulus

REM (tonic)

C: Experimental Condition (food and water deprivation and 3 stimulus presentations)

SCHEMATIC:

NREM (phasic) stimulus

NREM (tonic)

REM (phasic)

REM (tonic) stimulus

REM (tonic)

REM (phasic) stimulus

CHAPTER II

METHOD

Subjects

Ss were 20 males from various professional and/or academic backgrounds, ranging in age from 16 to 40 years. These Ss responded to the following ad which was placed in the New York City newspaper, The Village Voice :

BE IN TOUCH WITH THE 1/3 OF YOUR LIFE SPENT IN SLEEP!

RECALL DREAMS! SLEEP LAB

In order to participate in the study Ss had to meet the following criteria:

1. Be at least 16 years of age, and not more than 40
2. Have a recall frequency of at least two dreams per week
3. No medical or psychological problems
4. Should be English speaking
5. Must smoke at least one pack of cigarettes daily.

Subjects were all night sleepers and each agreed to be paid $35 for their participation in the study.

Experimental and Control Conditions

Procedure. Each S had one adaptation night of uninterrupted, unrecorded sleep, one baseline night (BL) of interrupted, recorded sleep (control), Experimental (Exp.) night 1, consisting of food and fluid

deprivation, and Experimental (Exp.) night 2, consisting of cigarette-withdrawal.

Adaptation nights are a way of reducing the variability of BL nights and eliminating the "first night effect." During this night, Ss were prepared for the experiment in the same way as they were prepared on any other night. The BL night was run to get a sample of Ss' mentation reports (e.g., two from Stage 2 and four from REM, phasic and tonic) as a control condition. For this study, each S served as his own control.

On Exp. night 1, thirst was induced by instructing Ss to abstain from fluids and foods after 8 a.m. up until they reported to the laboratory. After arriving, they were fed a salty, spicy, spaghetti meal. This meal had been reported to be effective in inducing thirst (Klein, 1954). Subjects were informed that the purpose of the experiment was to increase their dream recall by manipulating certain physiological conditions, namely, food and fluid intake. They understood that occasionally during the course of the night dream reports would be elicited. If Ss asked for water on Exp. night 1, they were told that it might interfere with the positive outcome of the study. It was added that Zen practitioners describe an increase in their level of awareness with food and water abstinence, and our hope was that there would be a ripple effect influencing greater dream recall.

The subwaking threshold tape recorded verbal message, "a cool delicious drink of water" was presented to Ss once in Stage 2 and

twice in REM (phasic and tonic). The message was played through a loudspeaker located in the Ss' room. For a Stage 2 administration, the stimulus was presented with the occurrence of sleep spindles or K complexes. Sleep spindles are bursts of synchronized waves of 12-14 cycles per sec., with an amplitude of 20-40 microvolts. A K complex is an evoked potential with an amplitude of 75 microvolts. The phrase was then reintroduced every 27 sec. for a period of 10 min., after which the Ss was awakened for a mentation report.

For a REMP presentation the stimulus was played at approximately the time of the second rapid eye movement burst, and repeated every 27 sec. for 10 min. However, if it was a REM tonic condition, the stimulus was presented with the onset of a low EMG, SEM, (slow eye movement) low voltage mixed EEG, or sawtooth waves, and no REMS for at least 30 sec. prior to collecting a dream report. The message was reintroduced every 27 sec. for 10 min., after which S was awakened for a mentation report.

In order to avoid waking the S with the stimulus, the tape recorded message was first set close to zero and then slowly increased in decibel level until it evoked an alpha burst (i.e., EEG wave approximately 9-11 cps, and 40-60 micorvolts in amplitude). This EEG activity was considered to be indicative of stimulus registration. The message intensity remained the same for as long as brief alpha continued to be emitted, unless the S habituated to the stimulus, in which case the volume was increased. If the subject showed signs of arousal, either by movement of alpha prior to or at the time of

message administration the decibel level was returned to zero. The same procedure applied if the S was awakened by the continuous stimulus. The phrase was replayed when the EEG returned to either Stage 2 or Stage 1 REM sleep.

For Exp. night 2, cigarette withdrawal was induced by instructing Ss to abstain from smoking anything. This was considered necessary because most of the Ss admitted to smoking marihuana at least once per week. Subjects were asked not to smoke from 8 a.m. on the morning following their laboratory night until the next morning. All Ss in both experimental conditions were required to report to the laboratory three hours before lights out. This stipulation was particularly important for the cigarette-withdrawal night because if a S smoked during the day, three hours of close supervision at the lab would ensure a significant period of abstinence.

Urine samples were collected on Baseline and Cigarette-Withdrawal nights, and a radioimmunoassay was conducted on the specimens to determine if Ss smoked. Ss were informed that they had to stop smoking for Exp. night 2 because Lambiase and Serra (1957) demonstrated that cigarette smoking decreases the amplitude of alpha and increases its frequency. The Experimenter explained to Ss that smoking made it difficult to score sleep onset. If Ss asked to smoke they were told that they could do so after the night was over. On this night (i.e., Exp. night 2) the subwaking-threshold tape recorded verbal stimulus, "a soothing relaxing smoke," was presented in the same manner as for Exp. night 1. On both the adaptation and the BL night, there was no stimulus input, nor were Ss deprived of anything prior to reporting

to the laboratory.

In summary, after the adaptation night, the three conditions were presented in the following counterbalanced order:

A. Baseline

B. Cigarette-Withdrawal plus auditory stimulus

C. Thirst plus auditory stimulus

Equipment. Sleep was monitored on three of the four laboratory nights on a Beckman, 8 channel type "R" DWO polygraph, running at a paper speed of 10 mm/sec. Two of the channels were used to record EEG from the parietal and occipital regions. For EOG, one channel each was used for the left eye, right eye, and for bipolar recordings. One channel was used for the EMG, and another for the EKG trace. With the exception of the bipolar recordings for the eyes, all EEGs and EOGs were referred to neutral electrodes placed on each ear lobe and connected to form a common terminal. The EKG was monitored by placing electrodes above Ss' right and left clavicle. A baseline of 60 bpm was adjusted for each S. Dream reports were recorded on a tape recorder. Communication between E and S was via an intercom system with speaker placement in the Ss' room next to the bed and in the Experimenter's room alongside the polygraph. The auditory stimulus was played through a second tape recorder.

Technique of Mentation Report Elicitation

The S was awakened from either NREM or REM by the sound of the E calling: "(first name of S), wake up!" every 1 second at a sound intensity of 80 db. S could terminate the call by responding that

he was awake. E then proceeds to interview S by reading aloud the following series of questions:

1. Tell me everything that was going through your mind before you were awakened.
2. Any more detail to this?
3. How vivid and clear was the sleep experience you just described?
4. What feelings were you aware of in the course of this sleep experience?
5. To what extent did this sleep experience feel like it was really happening?
6. Analyze your sleep experience.

Upon completion, E says, "Thank you, you may go back to sleep."

Dependent Variables for Dreams

Water content in dreams. This assessment was determined by two trained judges who were unaware (blind) of the conditions under which the dreams were obtained. They scored the mentation reports for thirst, food, or orality references. It was hypothesized that dreams would contain a greater amount of thirst related content following the arousal of thirst, than in a control condition.

Cigarette content in dreams. The same judges scored dreams for cigarette themes, or cigarette-derivative themes (i.e., food, cigarette-withdrawal symptoms, orality, or hostility) in order to evaluate the effects of cigarette-withdrawal on dream content. It was predicted that Ss' dreams would contain more cigarette-related themes following the arousal of a cigarette need than a control condition.

The effects of auditory stimulation on dreams. Judges assessed the incidence of incorporation of either experimental message in the dreams--by references to the stimulus words or related dream content. It was predicted that dream reports would have more thirst-related or cigarette-related content in conditions where verbally related stimuli were presented to thirsty or cigarette deprived Ss, as compared to control, no-stimulus conditions.

Thirst and Cigarette-Need Ratings

Typically, a subject reported to the laboratory approximately at 8 p.m., and prior to going to bed each S would complete a disguised thirst and cigarette-need scale. He was instructed to rate himself on a seven point scale on how tired, warm, cold, hungry, thirsty, nauseous, need to urinate, need for movement, need for cigarette, need for sleep, and need for visual stimulation. This same scale was administered in the morning.

Cigarette Measurement

Since only a few subjects requested water on the morning following the thirst activation, fluid intake was not recorded. However, for both mornings and nights Ss' cigarette butts were kept for measurement to determine intake. Additionally, as reported earlier in this section, a radioimmunoassay was performed on Ss' urine samples (BL and cigarette night) to corroborate abstinance.

CHAPTER III

RESULTS

The results section will be divided into the following subdivisions:

A

-- The Thirst Effect

-- Thirst Manipulation of Dreams

-- Effect of the Auditory Thirst Message on Dreams

B

-- The Cigarette-Withdrawal Effect

-- Cigarette-Withdrawal Manipulation of Dreams

-- Effect of the Auditory Cigarette Message on Dreams

C

-- The Effects of Cigarette-Withdrawal or Thirst on REM Activity and Length of Mentation Report

-- Derivative Oral Content in Dreams

-- The Effect of Cigarette-Withdrawal or Thirst on Hostility in Dreams

-- Gratifying and Non-Gratifying Dreams in the Thirst or Cigarette-Withdrawal Conditions

A

The Thirst Effect

The analyses presented in this section were based on the assumption that all Ss were thirsty. We assessed water-need by obtaining Ss' pre- and post-sleep thirst ratings. Each S rated his thirst on a 7 point scale (see Appendix A). Subjective water-need ratings were determined by averaging the ratings of all Ss in each condition. The Friedman two-way analysis of variance was utilized to study differences in presleep thirst ratings among nights. For the Baseline, Cigarette-Withdrawal and Fluid-Deprivation conditions Ss' presleep thirst scores were matched and ranked; we then tested to determine if the samples were drawn from the same population. Table 1 shows the mean ranks of thirst scores for all conditions, along with the results of the analysis.

TABLE 1

FRIEDMAN TWO-WAY ANALYSIS OF VARIANCE OF MEAN RANKS OF PRESLEEP THIRST SCORES FOR BASELINE, CIGARETTE-WITHDRAWAL, AND FLUID-DEPRIVATION NIGHTS

	Baseline Thirst	Cigarette-Withdrawal Thirst	Fluid-Deprivation Thirst
Mean Ranks	1.60	1.65	2.75

Cases	X^2 (Chi-Square)	v	p
20	16.900	2	0.000*

The Friedman two-way analysis of variance demonstrates that Ss'

mean presleep thirst ratings were unequal (i.e., from different populations): $X^2 = 16.900$, $v = 2$, $p < .01$. Next, we used the Wilcoxon matched-pairs signed-ranks test to determine the direction of the within-pair differences, or the night that presleep thirst ratings were greatest (i.e., the night that Ss were thirstiest). Table 2 gives the mean ranks of thirst scores, the signs of all pair differences, and the results of the analysis.

TABLE 2

a

WILCOXON MATCHED-PAIRS SIGNED-RANK OF PRE-SLEEP THIRST SCORES BETWEEN BASELINE AND FLUID-DEPRIVATION CONDITIONS

Cases	Ties	1 -Ranks Mean	17 +Ranks Mean	Z	2 Tailed P
20	2	3.50	9.85	-3.571	0.000*

b

WILCOXON MATCHED-PAIRS SIGNED-RANKS OF PRE-SLEEP THIRST SCORES BETWEEN CIGARETTE-WITHDRAWAL AND FLUID-DEPRIVATION CONDITIONS

Cases	Ties	0 -Ranks Mean	14 +Ranks Mean	Z	2 Tailed P
20	6	0.00	7.50	-3.296	0.001*

The Wilcoxon test suggests that Ss rated themselves thirstier on the Fluid-Deprivation than the Cigarette-Withdrawal or Baseline Conditions.

To summarize: (1) Ss' presleep thirst ratings for Baseline, Cigarette-Withdrawal, and Fluid-Deprivation conditions were significantly different, and (2) Ss rated themselves thirstier on the Fluid-Deprivation than the Baseline or Cigarette-Withdrawal conditions.

Thirst Manipulation of Dreams

As mentioned above, Ss rated themselves as thirstier on the Fluid-Deprivation, as compared to Baseline or Cigarette-Withdrawal, conditions; this suggested that thirst was indeed activated by our experimental procedure. A fundamental issue addressed by this study was: Did thirst modify dream content? Our first hypothesis predicted that dreams would contain a greater amount of thirst-related content in the Fluid-Deprivation (Thirst) than the Baseline condition. The second hypothesis predicted more thirst-related content in the Thirst-Stimulus as opposed to the Thirst-No-Stimulus condition. In order for us to test these predictions, two judges unfamiliar with the aims and conditions of this experiment were instructed to use Bokert's (1968) checklist to identify and score any references to thirst in the dreams. Bokert's thirst-related checklist was divided into: (1) Thirst sensation words, (2) Thirst satisfier words, (3) Activities or Behaviors associated with thirst, etc. (see Appendix B for checklist). The judges' interscorer reliability was .96. (See Appendix B). The averaged ratings of the two judges were used to obtain the proportion of thirst words in total response to each dream in order to control for dream length. The proportions were then transformed to radians (see Appendix C). An analysis of

variance was computed on the frequency of thirst-related words in mentation reports for the Baseline, Cigarette-Withdrawal, Thirst, No-Stimulus conditions. Furthermore, the data was analyzed in two different ways: (1) Responses to E's first request[2], and (2) Responses to all six requests (e.g., "Tell me everything that was going through your mind before you were awakened," "Any more detail to this?", etc.) (see Appendix D for Experimental protocol). This analysis pertains only to dream reports elicited when no stimulus was played to Ss; from each condition we obtained reports from both Phasic[3] and Tonic[4] parts of the REMP. Table 3 presents the basis statistical design to analyze the experimental effect.

TABLE 3

MODEL OF ANALYSIS OF VARIANCE FOR EXPERIMENTAL EFFECT

		No Stimulus	
	Baseline	Cigarette-Withdrawal	Thirst
Phasic			
Tonic			

Table 4 shows the means of the frequency of thirst (6) words from condition, along with the results of the analysis of variance.

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[2]Throughout this paper, this investigator will refer to responses to first request by: (1); all six: (6).

[3]Phasic aspects are defined as the occurrence of two or more rapid eye movements within a 4 sec. interval, while S is in REM sleep for at least 7, and not more than 10, min.

[4]Tonic aspects are defined as the first occurrence of a 30 sec. interval of ocular quiescence (i.e., no rapid eye movements) following at least 1, and not more than 5, min. of REM sleep.

TABLE 4

MEAN FREQUENCIES OF DREAMS' THIRST (6) THEMES
FOR ALL CONDITIONS

		No-Stimulus	
	Baseline	Cigarette-Withdrawal	Thirst
Phasic Mean	.092	.046	.015
Tonic Mean	.054	-.031	.049

ANALYSIS OF VARIANCE OF THIRST (6) THEMES IN DREAMS
FROM NO-STIMULUS BASELINE, CIGARETTE-WITHDRAWAL,
THIRST, PHASIC AND TONIC CONDITIONS

Source	Sum of Squares	DF	Mean Square	F	P
Night	.077	2	.039	2.149	.133
Night x Unit	.612	34	.018	--	--
Activity	.019	1	.019	1.393	.255
Activity x Unit	.236	17	.014	--	--
Night x Activity	.057	2	.029	3.651*	.040*
Night x Activity x Unit	.211	27	.008	--	
Unit	1.154	17	.009		
Total	1.368	100	.014		

*p $<$.05

We failed to demonstrate that thirst-related dream content was greater in the Thirst than the Baseline condition, but a significant interaction effect was found between Night x Activity (i.e., Phasic or Tonic), $F = 3.65$, $v = 2$, $p < .05$. This significant finding applied to thirst (6) references.

The Duncan multiple range test (used to carry out all pairwise compairsons among means) pointed to more thirst (6) dream references from Baseline - REM Phasic than Thirst-REM Phasic condition, $p < .05$.

To review: This investigation failed to show that when no message was played to Ss, they had more thirst-related dream content in the Fluid-Deprivation than the Baseline condition. Surprisingly, it was determined that, in the absence of stimulation, there were more thirst (6) themes in Baseline-REM Phasic than Thirst-REM Phasic conditions.

Effect of the Auditory Thirst Message on Dreams

The data demonstrated that Ss' dreams did not contain more water references in the Fluid-Deprivation than the Baseline night. We then concerned ourselves with the question: Would the verbally related auditory message, "a cool delicious drink of water" influence mentation reports? Our second hypothesis predicted more dream thirst content when a thirst-related auditory stimulus was presented to thirsty Ss, than in the No-Stimulus condition. An analysis of variance was calculated on the frequency of thirst-related words in dream narratives for the Cigarette-Withdrawal, Fluid-Deprivation (Thirst) - Stimulus

On and Off conditions.[5] This analysis was limited to dream reports obtained when the stimulus was both on and off; from each condition we elicited reports from both Phasic and Tonic aspects of REM sleep. Table 5 gives the basic statistical design to analyze the experimental effect.

TABLE 5

MODEL OF ANALYSIS OF VARIANCE FOR EXPERIMENTAL EFFECT

	Cigarette-Withdrawal		Thirst	
	Stimulus		Stimulus	
	On	Off	On	Off
Phasic				
Tonic				

Table 6 presents the means of the frequency of water themes (6) from each condition, and the results of the analysis of variance. This study failed to demonstrate significantly more water themes (1) in the Thirst-Stimulus than the Thirst-No-Stimulus condition; however, there were more water themes (6) when the message was played, in both the Thirst and Cigarette-Withdrawal conditions.

In brief, Ss' dreams did not contain more water themes (1) in the Thirst-Stimulus as compared to the Thirst-No-Stimulus condition, but there were significantly more water themes (6) in both the Thirst and Cigarette-Withdrawal-Stimulus condition.

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[5]This section will only report the results for thirst words in the Fluid-Deprivation Stimulus On and Off conditions, leaving the cigarette data for the section on Cigarette-Withdrawal effects.

TABLE 6

MEANS OF THE FREQUENCY OF WATER THEMES (6) FROM THE CIGARETTE-WITHDRAWAL, THIRST, PHASIC AND TONIC - STIMULUS ON AND OFF CONDITIONS, ALONG WITH THE RESULTS OF THE ANALYSIS OF VARIANCE

a. Tonic

	Stimulus Mean	
	On	Off
CW*	.047	.008
FD**	.088	.052

b. Phasic

	Stimulus Mean	
	On	Off
CW	.035	.049
FD	.091	-.029

c.

	Mean	
	Tonic	Phasic
On	.067	.063
Off	.030	.010

d.

	Stimulus Mean	
	On	Off
CW	.041	.028
FD	.089	.011

Source	SS	DF	MS	F	P
Night	.008	1	.008	.725	
Night x Unit	.178	16	.011	--	.050***
Stimcond	.070	1	.070	4.534***	
Stimco x Unit	.246	16	.015	--	
Activity	.005	1	.005	.219	
Activity x Unit	.372	16	.023	--	
Night x Stimco	.036	1	.036	1.619	
Night x Stimco x Unit	.353	16	.022	--	
Night x Activity	.024	1	.024	1.298	
Night x Activity x Unit	.302	16	.091	--	
Stimco x Activity	.002	1	.002	.181	
Stimco x Activity x Unit	.186	16	.012	--	
Night x Stimco x Activity	.040	1	.040	2.884	
Night x Stimco x Acti x Unit	.167	12	.014	--	
Unit	.204	16	.013	--	
Total	2.193	131	.017		

*Cigarette-Withdrawal
**Fluid-Deprivation
***$p < .05$

B

The Cigarette-Withdrawal Effect

Just as it was important for Ss in our Thirst conditions to have been truly in "need" of water, so too was it critical that Ss in our Cigarette-Withdrawal group be needy of cigarettes: such a state was fundamental to forthcoming analyses. This experimenter evaluated cigarette-need by means of two independent measures--one subjective (i.e., pre- and post-sleep cigarette-need ratings), the other objective, namely, nicotine analysis (elicited from Ss before going to bed on Baseline and Cigarette-Withdrawal nights). Each is discussed below.

Ss rated their cigarette-need on a 7 point scale (see Appendix A). Subjective need ratings were determined by averaging the ratings of all Ss in each condition. The Friedman two-way analysis of variance was employed to study differences in presleep cigarette-need ratings, among nights. Presleep need scores for all Ss were matched and ranked for the Baseline, Cigarette-Withdrawal, and Fluid-Deprivation (Thirst) conditions; we then tested to determine if the samples were drawn from the same population. Table 7 gives the mean ranks of cigarette-need scores for all conditions, together with the results of the analysis.

The Friedman two-way analysis of variance demonstrated that Ss' mean presleep cigarette-need ratings were not the same. The Wilcoxon test was utilized to determine the direction of the within-pair differences, or the night that presleep cigarette-need ratings were greatest (i.e., the night Ss needed cigarettes the most).

Table 8 shows the mean ranks of cigarette-need scores, the sign of all pair-differences and the results of the analysis.

TABLE 7

FRIEDMAN TWO-WAY ANALYSIS OF MEAN RANKS OF PRESLEEP CIGARETTE-NEED SCORES FOR BASELINE, CIGARETTE-WITHDRAWAL, AND FLUID-DEPRIVATION NIGHTS

	Baseline Cigarette-Need	Cigarette-Withdrawal Cigarette-Need	Fluid-Deprivation Cigarette-Need
Mean Ranks	1.35	2.70	1.95

Cases	X^2 (Chi-Square)	v	p
20	18.000	2	0.000*

*p < .01

TABLE 8

a

WILCOXON MATCHED-PAIRS SIGNED-RANKS OF PRE-SLEEP CIGARETTE-NEED SCORES BETWEEN BASELINE AND CIGARETTE-WITHDRAWAL CONDITIONS

Cases	Ties	1 -Ranks Mean	17 +Ranks Mean	Z	2 Tailed P
20	1	7.50	10.14	-3.521	0.000*

b

WILCOXON MATCHED-PAIRS SIGNED-RANKS OF PRE-SLEEP CIGARETTE-NEED SCORES BETWEEN FLUID-DEPRIVATION AND CIGARETTE-WITHDRAWAL CONDITIONS

Cases	Ties	14 -Ranks Mean	3 + Ranks Mean	Z	2 Tailed P
20	3	9.21	8.00	-2.485	0.013*

*p < .01

The Wilcoxon test indicated that Ss rated themselves as more "needy" of cigarettes on the Cigarette-Withdrawal than the Fluid-Deprivation or Baseline conditions.

Our second determination of Ss' cigarette-need was evaluated by a radioimmunoassay[6] for nicotine content of 10 cc of urine that Ss submitted prior to retiring to bed on both the Baseline and Cigarette-Withdrawal nights.

We used a t test for correlated data to assess whether the Cigarette-Withdrawal condition affected nicotine content levels significantly from the Baseline night. Table 9 presents Ss' mean values of nicotine content in nanograms (ng), together with the results of the analysis.

TABLE 9

MEAN VALUES OF NICOTINE CONTENT FOR SUBJECTS IN BASELINE AND CIGARETTE-WITHDRAWAL CONDITIONS AND t TEST RESULTS

	Baseline Nicotine (ng)	Cigarette-Withdrawal Nicotine (ng)
Mean	376.00	205.54
t_{crit} at .05, v = 19, 1 Tailed = 1.729		
t_{obs} = 1.88*		

*$p < .05$

[6]Dr. Peter Hill of the American Health Foundation's Naylor Dana Institute for Disease Prevention analyzed the nicotine specimens.

The t test suggested that the means were unequal, or were drawn from different populations, $t = 1.88$, $v = 19$, $p < .05$.

To recapitulate: (1) Ss' presleep cigarette-need ratings for Baseline, Cigarette-Withdrawal and Fluid-Deprivation conditions were significantly different, (2) Ss rated themselves as more needy of cigarettes on the Cigarette-Withdrawal than the Baseline or Fluid-Deprivation night, and (3) Ss' nicotine levels were significantly lower on the Cigarette-Withdrawal than the Baseline night.

Cigarette-Withdrawal Manipulation of Dreams

The data supported our assumption that Ss under the cigarette condition were needy of cigarettes. This study next compared the cigarette-need factor with Bokert's positive results from the Fluid-Deprivation effect. The third hypothesis predicted that dreams would contain more cigarette-related themes, following Cigarette-Withdrawal, than the Baseline condition. Our fourth prediction was that dreams would have more cigarette-derivative content when Ss were cigarette-deprived and presented an auditory need related message, compared to the No-Stimulus group. The same two judges who scored dreams for thirst references were instructed to score mentation reports for cigarette-derivative themes, based on Guildord's (1966) observation of male subjects' self-reported symptoms and behaviors during the first five days of cigarette-withdrawal. Such symptoms were: insomnia, anxiety, fatigue, nervousness, unstable temper, impatience, etc. (see Appendix B for Checklist). The judges' interscorer reliability was determined to be .95 (see Appendix B). Similar to the assessment of

thirst words, the judges' averaged ratings were used to obtain the proportion of cigarette themes in total response to each dream report, to control for dream length. The proportions were then transformed to radians (see Appendix D). An analysis of variance was computed on the frequency of cigarette references in mentation reports for Baseline, Cigarette-Withdrawal, Fluid-Deprivation (Thirst) - No-Stimulus conditions. As mentioned in the Thirst section, this analysis was also restricted to dreams elicited when no message was played to Ss; from each condition we obtained reports from both Phasic and Tonic divisions of the REMP. Data were analyzed in the same manner as in the Thirst section. Table 10 shows the basic statistical design to analyze the experimental effect.

TABLE 10

MODEL OF ANALYSIS OF VARIANCE FOR EXPERIMENTAL EFFECT

		No-Stimulus	
	Baseline	Cigarette-Withdrawal	Thirst
Phasic			
Tonic			

We failed to demonstrate that dreams would contain more cigarette themes in the absence of stimulation in the Cigarette-Withdrawal than the Baseline condition.

Effect of the Auditory Cigarette Message on Dreams

Our results indicated that cigarette-deprived subjects did not dream of smoking more than they did in the Baseline condition. Following this discovery, we then considered the impact of such a stimulus as the phrase "a soothing relaxing smoke" on REM mentation reports. The fourth hypothesis predicted that Ss needy of cigarettes, and presented the cigarette-need-related message, would have more dream cigarette references when compared to a No-Stimulus condition. An analysis of variance was computed on the frequency of cigarette themes, in dream reports, for the Cigarette-Withdrawal, Fluid-Deprivation (Thirst) - Stimulus On and Off conditions.[7] This analysis was limited to dream narratives obtained when the message was both on and off; we elicited reports from both Phasic and Tonic parts of REM sleep. Table 11 shows the basic statistical design to analyze the experimental effect.

TABLE 11

MODEL OF ANALYSIS OF VARIANCE FOR EXPERIMENTAL EFFECT

	Cigarette-Withdrawal		Thirst	
	Stimulus		Stimulus	
	On	Off	On	Off
Phasic				
Tonic				

[7]This section will only report findings for cigarette words in the Cigarette-Withdrawal, Stimulus On and Off conditions.

Table 12 gives the means of the frequency of cigarette-derivative themes (6) from each condition, and the results of the analysis of variance.

We failed to demonstrate significantly more cigarette themes (1) in the Cigarette-Withdrawal-Stimulus than the Cigarette-Withdrawal No-Stimulus condition; however, we did find a significant Night (i.e., Cigarette-Withdrawal or Fluid-Deprivation) by Stimulus condition by Activity (i.e., Phasic or Tonic) interaction effect, $F = 8.709$, $v = 1$, $p < .05$. The Duncan test pointed out that there were more cigarette-derivative themes (6) in the Cigarette-Withdrawal-Stimulus-Tonic, than the Cigarette-Withdrawal-No-Stimulus-Tonic condition, $p < .05$.

In summary: Ss' dreams did not contain more cigarette references (1) in the Cigarette-Withdrawal-Stimulus, than the Cigarette-Withdrawal-No-Stimulus condition, but it was determined that there were more cigarette themes (6) in the Cigarette-Withdrawal-Stimulus-Tonic, as opposed to the Cigarette-Withdrawal-No-Stimulus-Tonic condition.

C

The Effects of Cigarette-Withdrawal or Thirst on REM Activity and Length of Mentation Reports

It was observed that when Ss were thirsty and then presented a need-related subawakening threshold stimulus, aspects of the stimulation were incroporated in the dream (when all responses to questions were considered). Would the deprivation also affect physiological

TABLE 12

MEANS OF THE FREQUENCY OF CIGARETTE-DERIVATIVE THEMES (6) FROM THE CIGARETTE-WITHDRAWAL, THIRST, PHASIC AND TONIC - STIMULUS ON AND OFF CONDITIONS, ALONG WITH THE RESULTS OF THE ANALYSIS OF VARIANCE

a. Tonic

	Stimulus Mean	
	On	Off
CW*	.415	.336
T**	.340	.360

b. Phasic

	Stimulus Mean	
	On	Off
CW	.372	.345
T	.345	.250

c.

	Mean	
	Tonic	Phasic
On	.377	.358
Off	.348	.298

d.

	Stimulus Mean	
	On	Off
CW	.394	.341
T	.342	.305

Source	SS	DF	MS	F	P
Night	.065	1	.065	2.535	
Night x Unit	.410	16	.026	--	
Stimcond	.069	1	.069	3.607	
Stimco x Unit	.307	16	.019	--	
Activity	.041	1	.041	3.592	
Activity x Unit	.184	16	.011	--	
Night x Stimco	.002	1	.002	.118	
Night x Stimco x Unit	.276	16	.017	--	
Night x Activi	.011	1	.011	.544	
Night x Activi x Unit	.310	16	.019	--	
Stimco x Activi	.008	1	.008	.400	
Stimco x Activi x Unit	.330	16	.021	--	
Night x Stimco x Activi	.059	1	.059	8.709***	
Night x Stimco x Activi x Unit	.082	12	.007	--	
Unit	1.022	16	.064	--	
Total	3.175	131	.024		

* Cigarette-Withdrawal
** Thirst
*** $p < .05$

concomitants of dreaming? Bokert (1968) tested Fisher's (1965) hypothesis that an increased drive-state must result in an increment in total dream time and in REM activity. His investigation determined that thirst increased REM activity, but only when thirst was unaccompanied by auditory stimulation. We pursued these same possibilities for both the Thirst and Cigarette-Withdrawal conditions, following the guidelines posited by Bokert (1968, p. 44). Each REMP was scored[8] for the amount of REMs[9] in the record, to determine the amount of REM Phasic activity for all conditions. A ratio was computed of all 3 sec. intervals with REMS, over all 3 sec. intervals in the REMP. (This procedure was applied to both Phasic and Tonic - Stimulus On and Off conditions.) A high ratio suggested a high degree of REM Phasic events. Time of night was controlled for in each condition. Table 13 presents the REM activity ratios for the Baseline, Cigarette-Withdrawal, Thirst, No-Stimulus - Phasic and Tonic conditions, together with the results of the analysis of variance.

The analysis of variance of REM activity ratios for the Baseline, Cigarette-Withdrawal, Thirst, No-Stimulus, Phasic and Tonic conditions failed to reach significance; however, we did demonstrate a significant Night by Activity interaction effect, $F = 11.706$, $v = 2$, $p < .05$.

Table 14 shows the REM activity ratios for the deprivation,

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[8]An independent researcher, Dr. Richard Bodnar, scored the EEGs.

[9]Since this experiment examined REM Phasic and REM Tonic mentation reports, ratios were determined for REM activity in each condition.

TABLE 13

MEAN REM ACTIVITY RATIOS FOR THE BASELINE, CIGARETTE-WITHDRAWAL, THIRST, NO-STIMULUS - PHASIC AND TONIC CONDITIONS, AND THE RESULTS OF THE ANALYSIS OF VARIANCE

		No-Stimulus	
	Baseline Mean	Cigarette-Withdrawal Mean	Thirst Mean
Phasic	.48	.26	.37
Tonic	.41	.44	.38

Source	SS	v	MS	F	P
Night	.036	2	.018	.332	
Night x Unit	.324	6	.054	--	
Activity	.010	1	.010	.341	
Activity x Unit	.084	3	.028	--	
Night x Activity	.063	2	.031	11.706*	.009*
Night x Activity x Unit	.016	6	.003	--	
Unit	.135	3	.045	--	
Total	.668	23	.029		

*p $<$.05

TABLE 14

MEAN REM ACTIVITY RATIOS FOR THE DEPRIVATION, STIMULUS-ON AND OFF CONDITIONS, ALONG WITH THE RESULTS OF THE ANALYSIS OF VARIANCE

a. Stimulus On

	Mean	
	Phasic	Tonic
CW*	.477	.437
T**	.470	.425

b. Stimulus Off

	Mean	
	Phasic	Tonic
CW	.260	.437
T	.372	.382

c.

	Mean	
	On	Off
Phasic	.474	.316
Tonic	.431	.410

ANALYSIS OF VARIANCE OF REM ACTIVITY RATIOS FROM THE DEPRIVATION, STIMULUS-ON AND OFF CONDITIONS

Source	SS	v	MS	F	P
Typede	.001	1	.001	.007	
Typede x Unit	.289	3	.096	--	
Activity	.005	1	.005	.195	
Activi x Unit	.081	3	.027	--	
Stimcond	.064	1	.064	1113.823*	.002
Stimco x Unit	.002	3	.001	--	
Typede x Activi	.015	1	.015	1.659	
Typede x Activi x Unit	.169	3	.056	--	
Activi x Stimco	.037	1	.037	.456	
Activi x Stimco x Unit	.244	3	.081	--	
Typede x Activi x Stimco	.013	1	.013	.730	
Typede x Activi x Stimco x Unit	.054	3	.018	--	
Unit	.194	3	.065	--	
Total	1.197	31	.039		

*$p < .05$

Stimulus-On and Off conditions, along with the results of the analysis of variance. The results indicated that there was more REM Phasic activity on both the Cigarette-Withdrawal and Fluid-Deprivation - Stimulus than in the No-Stimulus condition, $F = 113.823$, $v = 1$, $p < .05$.

To review: The analysis of variance demonstrated that without stimulation, there was no difference in the amount of REM Phasic activity for Ss in the Baseline, Cigarette-Withdrawal, Thirst, Phasic-Tonic conditions. However, we did find more REM Phasic events in the: (1) Baseline-Phasic, than Cigarette-Withdrawal-Phasic condition; (2) Baseline-Phasic than Thirst-Phasic condition; and (3) Thirst-Phasic, than Cigarette-Withdrawal-Phasic condition. Furthermore, it was determined that there were more Phasic events with stimulation than without it, when we compared the amount of REM activity for both Stimulus On and Off conditions.

The assumption that an aroused need might also influence the length of the dream narrative was also explored. An analysis of variance suggested that, without stimulation, there were no differences in the mean number of words for the Baseline, Cigarette-Withdrawal, Thirst, Phasic and Tonic conditions. Table 15 presents the mean number of words (1) for the Baseline (i.e., no stimulus), Cigarette-Withdrawal, Thirst, Phasic, and Tonic - Stimulus conditions, together with the results of the analysis of variance.

The analysis of variance indicated that, in the presence of stimulation, there were no differences in the amount of words (1)

TABLE 15

MEAN NUMBER OF WORDS (1) FOR THE BASELINE, CIGARETTE-WITHDRAWAL, THIRST PHASIC AND TONIC - STIMULUS CONDITIONS, ALONG WITH THE RESULTS OF THE ANALYSIS OF VARIANCE

	Phasic Mean	Tonic Mean	
Baseline	60.800	87.337	
Cigarette	99.858	40.700	Stimulus
Thirst	123.300	65.300	

Source	SS	DF	MS	F	P
Night	13342.324	2	6671.160	1.295	
Night x Unit	195724.875	38	5150.914	--	
Activity	27373.461	1	27373.461	3.994*	0.008*
Activity x Unit	57824.953	19	3043.418	--	
Night x Activity	48305.473	2	24152.734	5.616*	0.008*
Night x Activity x Unit	146225.563	34	4300.750	--	
Unit	369813.375	19	19463.859	--	
Total	858619.938	115	7466.258		

*$p < .05$

among conditions, but there was a significant Activity (i.e., Phasic - Tonic) effect, $F = 8.994$, $v = 1$, $p < .05$., and Night by Activity interaction effect, $F = 5.616$, $v = 2$, $p < .05$. The Duncan test pointed out that there were more words (1) in the : (1) Thirst-Phasic-Stimulus, than Baseline-Phasic condition, $p < .01$, (2), Thirst-Phasic-Stimulus, than Thirst-Tonic-Stimulus, $p < .01$, and (3) Cigarette-Withdrawal-Phasic-Stimulus, than Cigarette-Withdrawal-Tonic-Stimulation condition, $p < .01$.

Table 16 gives the mean number of words (6) for the Baseline (i.e., no stimulus), Cigarette-Withdrawal, Thirst, Phasic, and Tonic - Stimulus condition; together with the results of the analysis of variance. The analysis of variance suggests that, with stimulation, there were no differences in the amount of words (6) among conditions, but Activity did achieve significance, $F = 13.045$, $v = 1$, $p < .05$, (i.e., more words (6) in Phasic than Tonic).

Table 17 describes the mean number of words (1) for the Cigarette-Withdrawal, Thirst, Phasic and Tonic - Stimulus On and Off condition, along with the results of the analysis of variance. The analysis of variance demonstrates that there were no differences in the amount of words (1) among deprivation nights, regardless of the stimulus; however, we did find that there were more words (1) in Phasic than Tonic, $F = 6.611$, $v = 1$, $p < .05$. The stimulus did not prove to be effective in any case.

Table 18 delineates the mean number of words (6) for the Baseline, Cigarette-Withdrawal, Thirst, Phasic and Tonic - Stimulus

TABLE 16

MEAN NUMBER OF WORDS (6) FOR THE BASELINE, CIGARETTE-WITHDRAWAL, THIRST, PHASIC AND TONIC - STIMULUS CONDITIONS, ALONG WITH THE RESULTS OF THE ANALYSIS OF VARIANCE

	Phasic Mean	Tonic Mean
Baseline	216.150	224.150
Cigarette	241.037	150.600
Thirst	249.850	164.750

Source	SS	DF	MS	F	P
Night	11852.949	2	5926.473	.311	
Night x Unit	724846.625	38	19074.910	--	
Activity	93561.375	1	93561.375	13.045*	.002*
Activity x Unit	136273.250	19	7172.223	--	
Night x Activity	61285.852	2	30642.926	--	
Night x Activity x Unit	343437.938	34	10101.113	--	
Unit	1216071.000	19	64003.734	--	
Total	2587326.000	115	22498.484		

*$p < .05$

TABLE 17

MEAN NUMBER OF WORDS (1) FOR THE CIGARETTE-WITHDRAWAL, THIRST, PHASIC AND TONIC - STIMULUS ON AND OFF CONDITIONS, AND THE RESULTS OF THE ANALYSIS OF VARIANCE

a. Phasic

	Stimulus Mean	
	On	Off
CW*	105.765	82.176
T**	135.588	91.314

b. Tonic

	Stimulus Mean	
	On	Off
CW	44.235	91.257
T	68.706	60.118

Source	SS	DF	MS	F	P
Night	2215.883	1	2215.883	.414	
Night x Unit	85641.563	16	5352.598	--	
Stimcond	1840.406	1	1840.406	.357	
Stimco x Unit	82421.125	16	5151.320	--	
Activity	48149.145	1	48149.145	6.611***	.021***
Activity x Unit	116538.875	16	7283.680	--	
Night x Stimco	12369.898	1	12369.898	.864	
Night x Stimco x Unit	229071.750	16	14316.984	--	
Night x Activi	4424.387	1	4424.387	1.199	
Night x Activi x Unit	59054.141	16	3690.884	--	
Stimco x Activi	24010.164	1	24010.164	3.258	
Stimco x Activi x Unit	117915.688	16	7369.730	--	
Night x Stimco x Activi	2591.799	1	2591.799	.505	
Night x Stimco x Activi x Unit	61557.875	12	5129.820	--	
Unit	405706.500	16	25356.656	--	
Total	1253505.000	131	9568.738	--	

*Cigarette-Withdrawal
**Thirst
***$p < .05$

TABLE 18

MEAN NUMBER OF WORDS (6) AND ANALYSIS OF VARIANCE FOR THE CIGARETTE-WITHDRAWAL, THIRST, PHASIC, AND TONIC - STIMULUS ON AND OFF CONDITIONS

a. Phasic

	Stimulus Mean	
	On	Off
CW*	238.059	206.235
T**	257.647	254.741

b. Tonic

	Stimulus Mean	
	On	Off
CW	145.000	206.728
T	177.059	159.353

Source	SS	DF	MS	F	P
Night	5858.660	1	5858.660	.223	
Night x Unit	420487.000	16	26280.438	--	
Stimcond	172.966	1	172.966	.023	
Stimco x Unit	121211.313	16	7575.707	--	
Activity	152935.875	1	152935.875	11.608***	.004***
Activi x Unit	210804.313	16	13175.270	--	
Night x Stimco	5480.914	1	5480.914	.209	
Night x Stimco x Unit	418626.250	16	26164.141	--	
Night x Activi	14688.238	1	14688.238	.864	
Night x Activi x Unit	272146.000	16	17009.125	--	
Stimco x Activi	13269.410	1	13269.410	1.431	
Stimco x Activi x Unit	148350.625	16	9271.914	--	
Night x Stimco x Activi	24823.016	1	24823.016	4.723	
Night x Stimco x Activi x Unit	63071.176	12	5255.930	--	
Unit	1160598.000	16	72537.375	--	
Total	3032519.000	131	23149.000		

*Cigarette-Withdrawal
**Tonic
***$p < .05$

On and Off conditions, along with the results of the analysis of variance.

The analysis of variance suggests that there were no differences in the amount of words (6) among the Cigarette-Withdrawal and Thirst conditions, regardless of the message, but it was determined that, although (in this case) the stimulus was ineffectual, more words (6) were in Phasic than Tonic, $F = 11.608$, $v = 1$, $p < .05$.

In brief: When we examined the mean number of words (1) for the Baseline, Cigarette-Withdrawal, Thirst, Phasic and Tonic - Stimulus conditions, no differences were found among nights. However, it was determined that there were more words (1) in the: (1) Thirst-Phasic-Stimulus, than Baseline-Phasic condition; (2) Thirst-Phasic-Stimulus, than Thirst-Tonic-Stimulus; and (3) Cigarette-Withdrawal-Phasic-Stimulus, than Cigarette-Withdrawal-Tonic-Stimulation condition. There was no difference in the amount of words (6) among conditions, but Phasic had more than Tonic, regardless of stimulation. Also, there were no differences in the amount of words (both for the first and all requests) among deprivation conditions, when we compared Stimulus On and Off instances; but, irrespective of the stimulus, there were more words in Phasic than Tonic condition.

Derivative Oral Content in Dreams

Up to this time, we have evaluated the transformation of dream content, with respect to themes closely allied to the cigarette and water need. As Bokert (1968) hypothesized about the state of Fluid-Deprivation, it might also be suggested that the Cigarette-Withdrawal

condition activated non-physiological, psychodynamic concerns (as well as the physiological ones)--in particular, oral needs. Moreover, one would predict that mentation reports would be modified, as a result of such needs. To test this possibility, our same two judges scored dream narratives for the presence of derivative oral content, by using Bokert's (1968) oral scale, which was derived from Glover (1958) and Fenichel (1945). Such themes as giving or receiving, buying, helping, neglecting, etc., were considered to have been oral-derivative themes (see Appendix E). Also, Sheppard's (1969) orality scale was utilized. With her instrument, such themes as talking, shopping, any use of mouth, etc., were examples of orally-based motives (see Appendix E). The interscorer reliability for Bokert's scale was .90, Sheppard's, .95 (see Appendix C). The analysis of variance for both Bokert's and Sheppard's scales failed to find any difference in oral-derivative references among the Baseline, Cigarette-Withdrawal, Thirst, No-Stimulus, Phasic, and Tonic conditions.

It is important to state that the assessment of orality in the dream reports was based on oral-need themes. The notion of orality has conventionally consisted of references to food and drink. However, in this study themes of drinking were used in the evaluation of water-need; therefore, they were not included in this particular oral content measurement. If one assessed orality in dreams by the amount of food or drink themes, it was clear that neither the Thirst nor the Cigarette-Withdrawal-No-Stimulus conditions resulted in more "oral" references, but there were more oral (i.e., water) themes for

both deprivation states, when a need-related auditory message was administered to Ss (see Table 6). The analysis of variance for food content failed to reach significance for any condition.

In summary: Oral-derivative themes did not increase under the Thirst or Cigarette-Withdrawal conditions. However, we did observe an increase in "oral" content in mentation reports, as it is traditionally measured (i.e., drink themes) in both deprivation conditions--but only in the presence of a need-related message.

The Effect of Cigarette-Withdrawal or Thirst on Hostility in Dreams

Applying the same logic that led us to hypothesize the activation of the non-physiological, psychodynamic processes of orality accruing from water or cigarette deprivation, it was predicted that hostility would be aroused in dream content. This affect should be demonstrable in the mentation reports, as a direct consequence of the need state. Sheppard (1968) defines hostility as:

> a motivational factor derived from the factor of aggression emanating from the adrenal hormone-sympathetic nervous system complex and identifiable in the dream by imagery of destruction, disruption, or malfunction of some kind and/or degree. The hostility may be represented by destructive behavior, inimical interpersonal relationships, disintegration of mind, matter or concepts, or by unpleasant sensations. The hostility may occur in the form of action: 'John stabbled Billy,' in the form of disagreeable states or maladies: 'She was sick in bed,' in the form of characters: 'A robber came into the house,' or in the form of the scene: 'The building was dilapidated.' Hostility may occur spontaneously in the dream or as a response to frustration, deprivation or feelings of inferiority, amd may be expressed as the emotions of hate, rage, anger, anxiety, or panic.

The same two judges rated the dream narratives to determine the incidence of hostility, which was subdivided into the following

categories:

1. Class 8 = Maximum Hostility (e.g., death or destruction)
2. Class 5 = Medium Hostility (e.g., recoverable injury or damage)
3. Class 2 = Minimum Hostility (e.g., social slights or malfunctions).

An interscorer reliability was obtained for each category; they were respectively: .92, .95, and .96 (see Appendix F). Our fifth hypothesis predicted that Ss' dreams would contain more themes of hostility on Cigarette-Withdrawal than Thirst or Baseline conditions. The analysis of variance for Hostility (Classes 8, 5, and 2) for the Cigarette-Withdrawal, Thirst, Baseline, No-Stimulus, Phasic and Tonic conditions failed to reach significance. Table 19 shows the means of Class 2 Hostility (6) content for the Cigarette-Withdrawal, Thirst, Phasic and Tonic - Stimulus On and Off conditions, along with the results of the analysis of variance. The analysis of variance for Hostility (Classes 8 and 5) for both deprivation conditions (Stimulus On and Off) failed to reach significance, but Class 2 Hostility (6) content was more evident in the Cigarette-Withdrawal than Thirst condition, regardless of the stimulus; $F = 5.518$, $v =$ $p < .05$.

To review: We did not demonstrate our hypothesis that Ss' dreams (without stimulation) would contain more hostility (i.e., Classes 8, 5, or 2) on the Cigarette-Withdrawal than Baseline or Thirst night; however, more Class 2 dream Hostility (6) was found in the Cigarette-Withdrawal than Thirst condition, irrespective of the message.

TABLE 19

MEANS OF CLASS 2 HOSTILITY (6) CONTENT FOR THE CIGARETTE-WITHDRAWAL, THIRST, PHASIC AND TONIC - STIMULUS ON AND OFF CONDITIONS, AND THE RESULTS OF THE ANALYSIS OF VARIANCE

a. Tonic

	Stimulus Mean	
	On	Off
CW*	.121	.124
T**	.072	.088

b. Phasic

	Stimulus Mean	
	On	Off
CW	.139	.144
T	.092	.050

c.

	Tonic	Phasic
CW	.122	.142
T	.080	.071

d.

	Stimulus Mean	
	On	Off
CW	.130	.134
T	.082	.069

Source	SS	DF	MS	F	P
Night	.109	1	.109	5.518***	.032***
Night x Unit	.315	16	.020	--	
Stimcond	.001	1	.001	.018	
Stimco x Unit	.615	16	.038	--	
Activity	.001	1	.001	.067	
Activi x Unit	.237	16	.015	--	
Night x Stimco	.003	1	.003	.081	
Night x Stimco x Unit	.518	16	.032	--	
Night x Activi	.007	1	.007	.242	
Night x Activi x Unit	.431	16	.027	--	
Stimco x Activi	.006	1	.006	.363	
Stimco x Activi x Unit	.284	16	.018	--	
Night x Stimco x Activi	.008	1	.008	.809	
Night x Stimco x Activi x Unit	.117	12	.010	--	
Unit	.457	16	.029	--	
Total	3.107	131	.024		

*Cigarette-Withdrawal
** Thirst
***$p < .05$

Gratifying and Non-Gratifying Dreams in the Thirst or Cigarette-Withdrawal Condition

The abovementioned analyses dealt with the relevance of Thirst and Cigarette-Withdrawal on mentation and other correlates of dreaming. This course of our inquiry sought to determine whether specific dream content had some quantifiable impact on the intensity of either the water-or cigarette-need, following sleep. That is, would a dream featuring themes of drinking, smoking (or some derivative), in conjunction with positive feelings, be followed by a reduction of the respective need, upon awakening? To evaluate this, the same two judges rated dreams as either gratifying or non-gratifying.

For the Thirst condition, the following dreams were scored as gratifying: "It was a beautiful day, I saw people in the restaurant drinking wine, and they seemed to enjoy it; The little boy really liked eating his ice cream." Non-gratifying dreams were: "On the table was a sugar bowl and a teapot, which fell on the cat," "I hated talking with him," "I ate the cereal, but the milk was spoiled and tasted awful."

In the Cigarette condition, the following dreams were scored as gratifying: "I saw a girl smoking a cigarette and she seemed to find it pleasing," "I was listening to Bach--it was my favorite," "We were having an argument, following which we became friends." Non-gratifying dreams were: "It seemed that my memory was failing me," "I felt nervous," "I was coughing my head off," "I was smoking marihuana that made me feel paranoid--it was scary." An interscorer reliability of .96 was obtained from judges' ratings (see Appendix G).

All Ss who reported a dream with consummatory and/or positive feeling themes were categorized as gratified, although they might also have given at least one dream with a non-gratifying theme on the same night. Ss reporting dreams with food, drink, or smoking content represented negatively were scored as non-gratified Ss. Table 20 presents the means of the frequency of dream gratification (6) for the Cigarette-Withdrawal, Thirst, Stimulus On and Off conditions, together with the results of the analysis of variance.

The analysis of variance for gratification themes (1) in the deprivation, Phasic and Tonic - Stimulus On and Off conditions failed to reach significance; however, we did obtain a Stimulus by Activity interaction effect for gratification themes (6): $F = 4.612$, $v = 1$, $p < .05$. The Duncan test demonstrated that there were more gratifying themes (6) in the Phasic-No-Stimulus, than Tonic-No-Stimulus condition, regardless of the deprivation procedure, $p < .05$.

The aforementioned analyses incorporated Ss with both gratifying and non-gratifying dreams. We then employed those Ss who only had gratifying themes to assess its effect on post-sleep thirst ratings. Table 21 shows the pre- and post-sleep thirst ratings, along with the post-sleep thirst ratings' correlation with only gratifying dreams. The correlations between gratifying dreams and post-sleep thirst ratings failed to reach significance. Thus, we did not replicate Bokert's positive findings that Ss reporting gratifying dreams rated themselves as feeling less thirsty than non-gratified Ss.

TABLE 20

MEANS OF THE FREQUENCY OF DREAM GRATIFICATION THEMES (6) FOR THE CIGARETTE-WITHDRAWAL, THIRST, PHASIC AND TONIC - STIMULUS ON AND OFF CONDITIONS, AND THE RESULTS OF THE ANALYSIS OF VARIANCE

a. Tonic

	Stimulus Mean	
	On	Off
CW*	.035	.010
T**	.047	.000

b. Phasic

	Stimulus Mean	
	On	Off
CW	.044	.040
T	.028	.082

c.

	Mean	
	Tonic	Phasic
On	.041	.036
Off	.005	.061

d.

	Mean	
	Tonic	Phasic
CW	.023	.042
T	.024	.055

e.

	Stimulus Mean	
	On	Off
CW	.040	.025
T	.038	.041

Source	SS	DF	MS	F	P
Night	.002	1	.002	.596	
Night x Unit	.045	16	.003	--	
Stimcond	.001	1	.001	.247	
Stimco x Unit	.066	16	.004	--	
Activity	.022	1	.022	3.833	
Activi x Unit	.093	16	.006	--	
Night x Stimco	.003	1	.003	.207	
Night x Stimco x Unit	.208	16	.013	--	
Night x Activi	.001	1	.001	.116	
Night x Activi x Unit	.187	16	.012	--	
Stimco x Activi	.032	1	.032	4.612***	.048***
Stimco x Activi x Unit	.110	16	.007	--	
Night x Stimco x Activi	.014	1	.014	2.525	
Night x Stimco x Activi x Unit	.065	12	.005	--	
Unit	.218	16	.014	--	
Total	1.066	131	.008		

*Cigarette-Withdrawal
**Thirst
***$p < .05$

TABLE 21

PRE- AND POST-SLEEP THIRST RATINGS, AND POST-SLEEP THIRST RATINGS' CORRELATION WITH GRATIFYING DREAMS FOR THIRST AND BASELINE CONDITIONS

	Pre-Sleep $\bar{X}$	Post-Sleep $\bar{X}$	r	p
Thirst (12 Ss)	5.25	3.92	-.16	n.s.
Baseline (14 Ss)	3.36	4.36	-.41	n.s.

Table 22 gives the pre- and post-sleep cigarette-need ratings' correlation with gratifying dreams.

TABLE 22

PRE- AND POST-SLEEP CIGARETTE-NEED RATINGS, AND POST-SLEEP CIGARETTE-NEED RATINGS' CORRELATION WITH GRATIFYING DREAMS FOR THE CIGARETTE-WITHDRAWAL AND BASELINE CONDITIONS

	Pre-Sleep $\bar{X}$	Post-Sleep $\bar{X}$	r	p
Cigarette (14 Ss)	4.80	3.30	-.46	n.s.
Baseline (18 Ss)	2.30	3.20	-.22	n.s.

The correlation between gratifying dreams and post-sleep cigarette-need failed to reach significance. We tested the assumption that cigarette intake might be affected by gratifying dreams. Table 23 presents the mean cigarette length (millimeters) for pre- and post-sleep for the Cigarette-Withdrawal, Thirst and Baseline conditions.

TABLE 23

PRE- AND POST-SLEEP MEAN CIGARETTE LENGTH IN MILLIMETERS FOR CIGARETTE-WITHDRAWAL, THIRST, AND BASELINE CONDITIONS

	Mean Pre-Sleep Length	Mean Post-Sleep Length
Cigarette-Withdrawal	18.94	42.71
Thirst	182.36	52.65
Baseline	126.19	41.99

Table 24 gives the post-sleep cigarette length correlation with gratifying dreams for all conditions.

TABLE 24

POST-SLEEP CIGARETTE-LENGTH CORRELATION WITH GRATIFYING DREAMS FOR ALL CONDITIONS

	r	p
Cigarette-Withdrawal	-.59	$<.05$
Thirst	+.32	n.s.
Baseline	-.14	n.s.

Table 25 presents the pre- and post-sleep cigarette intake cirrelation with gratifying dreams for the Cigarette-Withdrawal, Thirst, and Baseline condition.

TABLE 25

PRE- AND POST-SLEEP CIGARETTE-INTAKE CORRELATION WITH GRATIFYING DREAMS FOR ALL CONDITIONS

	Pre-Sleep $\overline{X}$	Post-Sleep $\overline{X}$	r	p
Cigarette	.35	.75	-.57	.05
Thirst	2.90	.85	+.28	n.s.
Baseline	1.85	.70	-.16	n.s.

We obtained a significant negative correlation between Ss' gratifying dreams, and: (1) post-sleep cigarette-intake, $r = -.57$, $p < .05$, and (2) post-sleep cigare-te length, $r = -.59$, $p < .05$.

Our results suggest that cigarette-deprived Ss, whose dreams contain gratifying themes, did not rate themselves as less needy of cigarettes, than non-gratified Ss; however, they tended to smoke less, and their cigarette length was less than that of their non-gratified counterparts.

CHAPTER IV

DISCUSSION

The Thirst and Cigarette-Withdrawal Effect

The Thirst Effect

Subjects' presleep water need ratings were greater on the Fluid-Deprivation than the Baseline or Cigarette-Withdrawal condition, which suggests that individuals were thirstier on the Thirst as opposed to the other nights.

Before continuing our discussion of the Thirst effect, a word about its evaluation. The precise measurement of a Thirst condition is no small feat, especially when one considers that both the conceptualization and the operational definition of the state are critical factors. It is a commonly held view that thirst results from the withdrawal of fluid from the cells within the body. The present investigation employed the behavioral measure of a subjective water-need rating, which has its limitations. Therefore, in the absence of an objective determination of the Thirst effect, our evaluation represents the best possible approximation. Notwithstanding the difficulties involved with the precise assessment of the Thirst effect, we can conclude that thirst was activated in our subjects. We will now discuss in detail the Cigarette-Withdrawal effect.

The Cigarette-Withdrawal Effect

The present study demonstrated the following: (1) Ss' presleep cigarette-need ratings were greater on the Cigarette-Withdrawal than the Baseline or Fluid-Deprivation condition, and (2) the radioimmunoassay of Ss' urine specimens (from Baseline and Cigarette-Withdrawal nights) indicated significantly lower nicotine levels in our experimental than the Baseline group.

The operationalization of the Cigarette-Withdrawal condition is a difficult task. This is probably due to the fact that its evaluation (like the Thirst effect) depended upon how one conceptualized cigarette-need, what units of behavior were observed, and what measurements were used. Most researchers would perhaps concur that cigarette-need involves some degree of abstinence from cigarettes, with the eventual reduction of the pharmacological components of both the particulate and gaseous elements in cigarettes from within the organism's body. The evaluation of this condition varies in relation to the measures used in its assessment. This study utilized one subjective (i.e., presleep cigarette-need rating), and another, objective (i.e., nicotine analysis) measure, Considering that Ss' presleep cigarette-need ratings were greater on the Cigarette-Withdrawal than the Baseline or Fluid-Deprivation situation, along with out finding that a biochemical measure (i.e., nicotine) associated with cigarette smoking was lower on the Cigarette-Withdrawal than the Baseline condition, strongly suggests that individuals were needy of cigarettes. It is quite conceivable that had we used a different objective measure for

Cigarette-Withdrawal (e.g., cotinine[9]), this investigation might have obtained an even stronger effect.

This study will next discuss the effects of Thirst on dreams, followed by a similar consideration of the Cigarette-Withdrawal effect on mentation reports.

The Thirst and Cigarette-Withdrawal Manipulation of Dreams

The Thirst Manipulation

We hypothesized that dreams would contain a greater amount of thirst-related content in the (1) Fluid-Deprivation, than in the Baseline condition, and (2) Thirst-Stimulus, than the Thirst-No-Stimulus and Baseline condition. We failed to demonstrate our first prediction. Ironically, more thirst related content (6) was found in the Baseline-REM Phasic than the Thirst-REM Phasic condition. Our second hypothesis was partially supported (see Table 6).

The fact that we were unable to substantiate the first prediction and found more thirst words (6) in the Baseline-REM Phasic than in the Thirst-REM Phasic condition, leads us to the following determination: Assuming that Bokert's finding of more thirst words in the Thirst than the Sated condition is the true state of affairs, the power of the present study (based on our sample size and difference between conditions) of replicating Bokert is .10. It is likely that the low power is a result of this study utilizing a Baseline instead of a Sated condition, and could be maximized by: (1) using similar conditions as Bokert, (2) increasing N, (3) increasing alpha, or (4) looking

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[9]A metabolite of nicotine, with a half-life equal to 30 hours

for a larger Effect Size. Also, it is conceivable that, in our Ss, the Fluid-Deprivation procedure served, in Freud's (1900) terms, as an "excitatory process" which then became bound by their preconscious--thus making it powerless to act as a disturbance. Subjects in the Baseline condition are not threatened by thirst; therefore, they feel comfortable in dreaming about water related topics, as well as others.

One can account for Bokert's (1968) finding of more thirst related content in dreams from the Thirst-No-Stimulus and Thirst-Stimulus than the Sated condition by understanding that Ss in the latter group are neither thirsty nor hungry; therefore, the representation of those needs in their dreams is inhibited.

The abovementioned findings are evidence that the Thirst condition (in the absence of a stimulation) did modify dreams, however, in the direction of limiting its frequency of water themes, unlike our baseline condition. This state of affairs was reversed, and we did find more thirst words (6) when an exteroceptive need related message was delivered to Ss. Our results partially explain the failure of previous investigations to clearly demonstrate that a somatic need could manipulate dreams. This researcher concurs with Bokert's conclusion that results of studies prior to 1953 cannot be accepted since they predated the REM awakening technique; thus, we are not convinced that mentation reports were elicited in close temporal proximity to the actual periods of dreaming. However, Dement and Wolpert (1958b) used the revolutionary REM awakening procedure and found (similar to us) that dreams were not significantly influenced by thirst. We

mentioned earlier that this study has several methodological shortcomings, one of which is its lack of power, that is, the use of only three Ss, who reported 15 dreams, and another deficiency was the absence of a control group. But, more critical to the problem of demonstrating that a somatic need can modify dreams is the issue of criteria. Dement and Wolpert's criteria of thirstiness and drinking are too stringent, and consequently were not met by their Ss. It should be noted that in the present study only a few dreams directly depicted characters drinking fluid. A still smaller number of dreams had Ss feeling thirsty. It is likely that Dement and Wolpert would have observed dream themes of drinking or thirstiness had they collected a greater number of mentation reports from the thirst condition. However, too much should not be expected since even our study did not find a large number of dreams directly describing Ss engaged in drinking or as feeling thirsty. Similar to Bokert's findings, this study found that the most frequent references to thirst were thirst-related objects, or satisfiers such as coffee, milk, orange juice, etc. There were also numerous references to water in one of its natural states such as rain, ice, lakes, etc. Unfortunately, Dement and Wolpert did not consider the presence of thirst related objects as a relatively direct expression of the thirst in dream content. This issue of the representation of the need state in the dream will be discussed in a later section. Let us now turn to a consideration of the Cigarette-Withdrawal Manipulation.

The Cigarette-Withdrawal Manipulation

It was predicted that dreams would contain more cigarette related themes: (1) following Cigarette-Withdrawal than the Baseline condition, and (2) when Ss are cigarette-deprived and presented an auditory message compared to the No-Stimulus group. We failed to demonstrate our first hypothesis. As for our second prediction, we did not find more cigarette themes (1) in the Cigarette-Withdrawal-Stimulus than the Cigarette-Withdrawal-No-Stimulus condition; however, we did find more cigarette-derivative themes (6) in the Cigarette-Withdrawal-Stimulus-Tonic than the Cigarette-Withdrawal-No-Stimulus-Tonic condition (see Table 12). The findings that Ss' presleep cigarette-need ratings were greatest on the Cigarette-Withdrawal than the Baseline or Fluid-Deprivation condition, together with the demonstration of the second prediction, provide convincing evidence that cigarette-need modified dream narratives. The negative finding for our first prediction was probably a result of at least two events. First, since Bokert did not utilize a Cigarette-Withdrawal condition we cannot rightfully use his Thirst study as a standard. However, if we do, the power of finding more cigarette words in the Cigarette-Withdrawal than the Baseline condition is (like our Thirst findings) .10. Power might be increased by utilizing a Sated group, increasing N, increasing alpha, or looking for a larger Effect Size. Second, the condition of cigarette deprivation constituted a situation comparable to the Thirst condition--a dire need state. The Cigarette-Withdrawal procedure (similar to the Fluid-Deprivation) could have served as an "excitatory process" which eventuated in its neutralization by the

preconscious, making it powerless to act as a disturbance.

Preceding a discussion of the specific finding of more cigarette themes (6) in the Cigarette-Withdrawal-Stimulus-Tonic than its No-Stimulus counterpart condition, a word about response arousal thresholds during sleep.

Investigations of animal (Pompeiano, 1970) and human (Price & Kremen, 1980) intrasleep arousal thresholds indicate: (1) a stimulus intensity which was not sufficient to arouse an organism when applied during a large train of ocular movements was effective in arousing the animal if administered 10-20 sec. following REMs, and (2) the average response threshold values suggests that REM Tonic values were significantly lower than both REM Phasic and NREM--two values, while the latter two did not differ from each other. It was hypothesized that "phasic activation, itself associated with central nervous system (CNS) excitatory and inhibitory processes attenuate or interface with impulse transmission at crucial points between stimulus reception and response output" (Pompeiano, 1967, 1970; Pivik, McCarley, & Hobson, 1977).

Clearly, the abovementioned formulation of the possible mechanisms underlying the differential arousal thresholds of sleep might account for our Ss' dreams containing more cigarette words (6) in the Cigarette-Withdrawal-Tonic, as opposed to the Phasic, condition, but how do we understand the differences between the Cigarette-Withdrawal-Stimulus-Tonic, and its No-Stimulus counterpart?

It is conceivable that the finding of more cigarette themes (6) in the Cigarette-Withdrawal-Stimulus-Tonic than its No-Stimulus

counterpart condition resulted from the following: (1) Ss' active cigarette-need state, (2) the secondary cognitive elaborations (SCE) associated with REM Tonic mentation reports, and (3) the need-related exteroceptive stimulation. The message, "a soothing relaxing smoke," probably facilitated the expression of the participants' cigarette-need as an "active thought" (SCE) rather than a primary visual experience (PVE), and the Tonic aspect of REM sleep acted as the vehicle for such a representation. Our theory is consistent with the failure to observe cigarette themes (with or without stimulus) to be incorporated in REM Phasic dream narratives.

Since we deomonstrated more cigarette themes (6) in the Cigarette-Withdrawal-Stimulus-Tonic than its No-Stimulus condition, why had previous studies not clearly demonstrated that a nonsomatic need (i.e., cigarette-need) could manipulate dream content? Unfortunately, there is a dearth of research on the effects of cigarette deprivation on dreams; however, the only two investigations to date will now be reviewed.

Baldridge et al. (1968) investigated the effects of the cessation of smoking on drean content. The results of their study can be rejected because: (1) the authors did not describe how, when, or how many mentation reports were elicited, (2) they did not mention any subjective or objective measure of their Ss' cigarette deprivation, and (3) their criteria for cigarette themes were too stringent.

The preliminary investigation of changes in REM sleep and dreaming following cigarette smoking and its abstincence by Kales et al. (1970) precludes a detailed analysis. However, they did

observed (incidentally) some Ss' spontaneous dream reports following deprivation. Several Ss reported unpleasant dream content. Neither cigarettes nor smoking themes were cited by these authors as evident. The difficulties inherent with this study are: (1) a reliance on Ss' spontaneous dream reports, and (2) no subjective or objective measure of cigarette deprivation.

It is apparent that the aforementioned researchers' implied criteria--that smoking dreams be manifested by dream themes of cigarettes or smoking--were clearly not met by their Ss. A minority of the dreams in this study contained direct references to dream characters engaged in cigarette smoking, or expressing such a need. The most frequent descriptions were of cigarette withdrawal symptoms such as loss, anxiety, impatience, anger, and hostility. As Dement and Wolpert failed to consider thirst related objects in dream content, so, too, did Baldridge and Kales' laboratory neglect to incorporate cigarette derivative themes into their criteria for determining a direct expression of the cigarette need. The author will now consider the issue of the dream-work representation or interpretation of the need state in the sleep reverie.

Cognitive and Affective Representation of the Need State in Dreams

Psychoanalytic Background

Theorists of the psychoanalytic school have posited that human needs have a wide range of need satisfiers, some of varying importance. In Rapaport's (1943) primary action model, when needs are stimulated the organism seeks to re-establish its balance, and this restoration

is intimately involved with the presence of needed objects. Therefore, according to this model, action is always directed towards a need satisfier. Rapaport further speculates that the hallucinated image of needed objects plays a critical role in the infant's primary cognitive experience. According to this theory, when the need is activated in the absence of the appropriate satisfying object, a hallucinatory representation of the object, in conjunction with a need satisfaction experience, is evoked. The need's stimulation, in turn, activates the memory trace of a previous experience of satisfaction, and this memory (provided that the hallucinatory vividness is enhanced) can become incorporated into the dream's imagery. Rapaport's position is that any memory of a prior experience that is juxtaposed to the need satisfaction becomes activated and organized around the need whenever it is stimulated. All memories associated with the need are thought of as its representation, in particular those images which are need satisfying objects. They are important due to their previous association with the need. A dream image, or rather, a hallucinated memory of (in our study) tea, or irritability, can be understood to have been activated by the water or cigarette need, and are representative of the need. It is not necessary nor fruitful to presume that an active thirst or cigarette deprivation condition will result in the direct representation of "drinking" or "smoking" in the dream. Rapaport suggests in his thesis that an aroused need activates a wide range of cognitive representatives. Let us direct our attention to the oral derivative representation in dreams of our deprivation procedures.

Derivative Oral Content in Dreams

The position has been taken that any dream symbol has several meanings, more than one referent. Hence, a thirst or cigarette related image in dream content may suggest the presence of other needs, as well as the water or cigarette need. This experience of deprivation may have psychological and physiological consequences for our Ss. The oral-derivative checklist and the orality scale were used to evaluate oral needs which might have been stimulated by the deprivation procedures. This experiment did not find oral content, as it is psychodynamically conceptualized (i.e., giving, receiving, buying, etc.), to be significantly activated as a result of either the thirst or cigarette deprived states. However, we did find (as reported earlier) that orality as it is conventionally described (i.e., drinking related themes) was maximized, at least in the presence of the auditory message (i.e., thirst or cigarette, for both the Thirst- and Cigarette-Withdrawal conditions) (see Table 6). Considering that our oral-derivative checklist and the orality scale both failed to reach significance, one finds it difficult to definitively state that oral-derivative needs were activated in this investigation. It is conceivable that the fluid or cigarette wish was symbolized by such content as rain, or perspiration, respectively, suggesting that both needs were intertwined with activated oral concerns, which prompted distortion. There is, however, no convincing evidence for this assumption. The question that might next be asked is, "In what other manner could the fluid or cigarette need be indirectly represented?"

Hostility in Dreams

In Rapaport's theoretical formulation, as previously discussed, the aroused need not only can activate a wide range of cognitive representatives, but also it is conceivable that an affective representation might also be stimulated. It is well documented that cigarette smokers undergoing withdrawal often become anxious, hostile, angry, irritable, etc. (Guilford, 1966; Knapp et al., 1963, Larson & Silvette, 1968; The Surgeon General's Report [Advisory Committee to the Surgeon General of the Public Health Service], 1964). Our fifth prediction was that Ss' dreams would contain more hostility on the Cigarette-Withdrawal than the Thirst or Baseline condition. Sheppard's (1969) hostility scale (i.e., Hostility Classes 8,5, and 2) was used to assess the hostile expressions of both the cigarette and fluid need, which was hypothesized to have been activated as a result of the deprivation situations. We failed to demonstrate that individuals' dreams (without stimulation) would contain more hostility on the Cigarette-Withdrawal than the Baseline or Thirst condition; however, we did find that regardless of the message there was more Class 2 Minimum Hostility on the Cigarette-Withdrawal than Thirst night (see Table 18). The fact that we were unable to demonstrate our fifth hypothesis was probably a result of the special relationship which oftentimes accrues between the subject and the Experimenter. Typically, in the laboratory, a close emotional tie develops between all participants (i.e., E and S). This can make it difficult for both the Experimenter and subject to express negative feelings (especially to each other). Our demonstration of more minimal, or

Class 2 Hostility, in dreams on the Cigarette-Withdrawal than the Thirst situation suggests that even with the "special relationship" that we discussed, individuals deprived of cigarettes or fluid express more Class 2 Hostility in dreams in the former than the Thirst condition.

The findings of this study intimates that a possible function of smoking is to reduce minimal hostility found in dream narratives. This mood change might have implications for smokers' daytime behavioral and emotional set. The individual's persistent use of cigarettes could be viewed as a way to regulate feelings. Moreover, any and all experiences[10] preceding, surrounding, and perhaps following need satisfaction (i.e., smoking) are associated with the cigarette need, thus becoming activated when the need (urge) to smoke is stimulated. Now that we have addressed several representations of either the fluid or cigarette need in dreams, we will consider the effect of the auditory messages on mentation reports.

The Role of the Auditory Message on Mentation Reports

Since we have discussed the manipulation of dreams by somatic and possibly non-somatic needs, let us examine the impact of both the Thirst and Cigarette Message on dream modification, following which there will be a review of the findings.

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[10]Of course, these experiences associated with the need might be pharmacological, tactile, psychological, behavioral, etc.

The Thirst Message

It was predicted that there would be more dream thirst content when a thirst related exteroceptive message was administered to thirsty Ss than when individuals were not presented such stimulation. We determined that water themes (1) were not maximized, but water themes (6) were increased in the Thirst-Stimulus condition (see Table 6).

The Cigarette Message

We hypothesized that subjects needy of cigarettes and presented the cigarette-need related message would have more dream cigarette references than the No-Stimulus group. It was found that Ss' dreams did not contain more cigarette themes (1) in the Cigarette-Withdrawal-Stimulus than the Cigarette-Withdrawal-No-Stimulus situation, but we did determine that there were more cigarette themes (6) in the Cigarette-Withdrawal-Stimulus-Tonic, than the Cigarette-Withdrawal-No-Stimulus-Tonic condition (see Table 11).

Theoretical Rationale

In view of our positive findings for both the Thirst and Cigarette Stimulus, how do we account for Bokert's failure to ascertain that thirst content was maximized during the Thirst-Stimulus condition? In the present study, two separate analyses of dream reports were performed, namely, for the first and for all responses to the experimenter requests. It should be pointed out that this investigation, too, obtained negative results for both the thirst and cigarette message, but this was true when only responses for the first request

were evaluated. Had Bokert utilized a separate request analysis (i.e., responses for the first, and all requests), he might have increased the likelihood of demonstrating a significant stimulus effect. The finding of more cigarette themes (6) in the Cigarette-Withdrawal-Stimulus-Tonic than the Cigarette-Withdrawal-No-Stimulus-Tonic condition (as delineated in the section on the Cigarette-Withdrawal Manipulation) suggests that: Ss' active cigarette-need state, the secondary cognitive elaborations associated with REM Tonic mentation reports, and/or the need-related message together facilitated incorporation of the stimulus in the Tonic aspect of REM sleep.

Our observation that participants who incorporated aspects of either the thirst or cigarette message had more dream thirst or cigarette related themes than the no-message cohort, suggests a function served by the exteroceptive stimulation. A need-related subwaking threshold message could supply specific cognitive structures for a need-related motive which was present in the dream. It is reasonable to assume that the message has a synergistic effect on pre-existing (sometimes dormant), fluid or cigarette need experiences which would serve, in Freud's (1900) coinage, as "representatives" for the fluid or cigarette motive in the dream. At any rate (based on findings), the necessary preconditions for a successful dream manipulation by an external stimulus appear to be:

1. Meaningful stimuli (used in the design of the message) that are associated with the organism's current need-state

2. An independent activation of a need-state that will provide a pre-existing ideational framework for the need-related stimulus
3. The intermittent presentation (e.g., every 27 sec.) of the need-related exteroceptive message.

If our guidelines for dream manipulation by an external stimulus are correct, we may better appreciate the findings of some earlier studies that attempted to modify dreams with an external stimulus. For example, Dement and Wolpert (1958b) concluded that their external stimuli were not particularly effective in manipulating dreams. Their frequency of incorporation might have been augmented if stimuli with a greater cognitive and emotional significance for Ss were utilized. Rechtschaffen and Foulkes (1965) determined that their book, black X, moving handkerchief, coffee pot, and "do not disturb" sign failed to affect dream content. Again, had the stimuli been more relevant for the subjects' current need-state or cognitive set, incorporation might have been maximized. On balance, Berger (1963) demonstrated a significant dream transformation, probably a result of the meaningful quality of the stimuli utilized (i.e., personal names). More critical, however, for the present is the failure of the personally significant names, in Berger's study, to be incroporated more frequently in dreams than the neutral names. This finding negates our assumption that stimuli associated with an emotional state or need ought to be selected for incorporation. It is possible, however, that the emotional context, linked to the personally relevant names, may not have been active at the time these names were delivered to

Ss, and this would account for their minor impact.

Following the discussion of the role of the auditory message on dream formation, it is quite tempting to ask, what are the effects of "Good" (i.e., gratifying), and "Bad" (i.e., non-gratifying) dreams on postsleep thirst or cigarette need. But, prior to such a discussion we will first explore conscious wishes and their impact on dream content.

The Role of Conscious Wishes in Dreams

Considering that Ss employed in this study were adults, we cannot conclude that our findings (i.e., fluid or cigarette deprived Ss dream of either thirst or cigarette-need satisfying objects) is a direct test of the wish fulfillment theory.

Our findings suggest that conscious wishes based upon somatic or non-somatic needs are also fulfilled in dreams. Support for this statement comes from two converging sources of evidence. The first is that the fluid- or cigarette-need is elaborated in the dream, in the context of a fluid or cigarette motivated stream of thought. Both its direction and sense of urgency suggest that it is a motive-seeking fulfillment in its own right. Additional support for our assumption comes from this investigation's findings concerning gratifying dreams (which is discussed in the next section). If dreams of need-satisfying experiences are only disguises for unconscious wishes, why should gratifying dreams reduce postsleep cigarette consumption? That cigarette intake was less following those dreams intimates that conscious wishes can be fulfilled in dreams, and this

fulfillment can result in a partial or temporary inhibition of need intensity. This is a complicated issue; therefore, to more fully understand its ramifications and the problems it raises, let us examine the nature of gratifying and non-gratifying dreams observed in this investigation.

Gratifying and Non-Gratifying Dreams

For the purpose of this discussion, let us take it for granted that one of the many functions of a dream is to fulfill a wish. It has been observed that in some of our Ss' dreams the wish to satisfy the dreamer's thirst or cigarette need was fulfilled. Some of these dreams contained explicit or implicit references to either drinking or smoking. In most of the thirst- or cigarette-related dreams, however, the fluid- or cigarette-need was not fulfilled. The dreamer attempted to satisfy the need, but failed in his attempt. The first type of dreams have been identified as gratifying, the second as non-gratifying. These variations of the dream theme are a testament that the dream's wish can achieve different degrees of success. This view is in keeping with Freud's revision of his wish fulfillment theory, in which he states that every dream is an attempted wish fulfillment. Gratifying dreams would, therefore, be considered as those that met with success (i.e., need-satisfying activities occurred), while non-gratifying dreams would be seen as comparably less successful in the attempted fulfillment (i.e., need-satisfying activities did not occur).

In this study, independent judges identified gratifying and

non-gratifying dream themes for the Thirst and Cigarette-Withdrawal conditions. When we compared Ss having both types of dreams, it was determined that there was a greater frequency of gratification themes (6) in the Phasic-No-Stimulus, than Tonic-No-Stimulus condition--irrespective of the deprivation procedure (see Table 19). Next, those participants only having gratifying dreams were used to assess that type of content on postsleep fluid- and cigarette-need ratings. We failed to replicate Bokert's positive finding that Ss reporting gratifying dreams rated themselves as feeling less thirsty than non-gratified Ss. Although the same negative results were obtained for cigarette-need, the correlation between gratifying dreams and postsleep cigarette need approached significance. However, we did find that participants in the Cigarette-Withdrawal condition with gratifying dreams smoked less the following morning than non-gratified counterparts (see Tables 23 and 24). How do we understand Bokert's finding that Ss with gratifying dreams rated themselves as less thirsty than non-gratified individuals?

The discrepant findings between this and Bokert's investigation might well be accounted for by the subjects' particular drinking patterns. It could be that Bokert's subjects did not typically drink water immediately upon awakening. It should be pointed out that subjects in this study did not drink any water upon awakening, even though they rated themselves as thirsty. However, several individuals spontaneously stated that they wished they had some coffee, tea, etc. Had Bokert's Ss anticipated receiving some fluid other than water they

might have rated themselves as thirstier than with their expectation of water.

The abovementioned discussion of fluid need also has implications for our observation of Ss' gratifying dreams and their subsequent post-sleep cigarette need. Let us assume that smokers, for all intents and purposes, "feel" that they "need" cigarettes lest they feel irritable, hostile, angry, etc. It seems reasonable to state that these same smokers would smoke for a variety of reasons, consistently and regularly. In fact, a cigarette smoker might "stock up" with cigarettes in anticipation of some future "need." Thus, this feeling of cigarette need becomes a conditioned response for any thought of such need. Therefore, the observation that cigarette smokers, even with gratifying dreams, did not rate themselves as less needy of cigarettes than their non-gratified cohort is quite consistent with our view of the smoking phenomenon. But how do we explain the fact that smokers with gratifying dream themes smoked less cigarettes immediately upon awakening than non-gratified Ss?

It is possible that the message "a soothing, relaxing smoke" gratified a different, but related, unconscious wish or need (e.g., sexual urges). This gratification would have reduced the tension and anxiety levels, resulting in a decreased cigarette intake upon awakening. It is equally likely that the subwaking threshold stimulus disrupted the inhibitory mechanisms of certain brain structures, resulting in less cigarette content and associated need. We suggest that fulfillment and/or discharge is facilitated when the dream

portrays memories closely linked, or identical to, a prior act of need-gratification.

The Effects of Cigarette-Withdrawal or Thirst on REM Activity and Length of Mentation Report

The final issue for discussion is the effect of the various deprivation procedures on the formal properties of REM activity. Fisher (1965) has hypothesized that an increase in drive pressure is associated with an increase in total dream time. He elaborates by stating that an aroused need-state may precipitate a heightened ratio of REMs to Stage 1 EEG. Bokert determined that REM activity was significantly greater in the Thirst-No-Stimulus than the Thirst-Stimulus and Sated conditions. Results of the present study showed that, in the absence of stimulation, there was a greater amount of REM Phasic activity in the: (1) Baseline-Phasic than Cigarette-Withdrawal-Phasic condition, (2) Baseline-Phasic than Thirst-Phasic condition, and (3) Thirst-Phasic than Cigarette-Withdrawal-Phasic condition (see Table 13). Thus, we failed to demonstrate that REM activity was maximized in the Thirst-No-Stimulus than the Thirst-Stimulus condition. However, we did determine that there were more Phasic events (i.e., REMs) with stimulation than without it when we compared the Stimulus On and Off deprivation conditions (see Table 14). Bokert noted of his results "that REM activity was not significantly elevated in the thirst-stimulus condition over the amount of such activity in the sated condition appeared to be a result of the exteroceptive stimulus, which tended to evoke alpha, and reduce the frequency

of rapid eye movements" (p. 83). The results of our study, perhaps, highlight the importance of: (1) using a Baseline condition, and (2) presenting the stimulus at subwaking threshold intensities so as to reduce alpha bursts--to ensure sleep, and maximize REM Phasic events.

Thirst- or Cigarette-Need may also have lengthened dream narratives. Dreams (6) were found to be significantly longer in the: (1) Thirst-Phasic-Stimulus than Baseline-Phasic condition, (2) Thirst-Phasic-Stimulus than Thirst-Tonic-Stimulus, and (3) Cigarette-Withdrawal-Phasic-Stimulus than Tonic condition. Also, there were generally more words from the Phasic than Tonic aspect of REM sleep (see Table 15). Bokert found that dreams were longer in the Thirst-No-Stimulus than in the Sated condition. Again, our comments regarding his REM activity findings are applicable here, namely: results might have differed had a baseline condition been used, and a subwaking threshold stimulus presentation intensity might have increased the likelihood of obtaining a message effect without interfering with REM Phasic activity and possibly word count.

In summary, we may conclude that in the presence of a need-related auditory message, both thirst- and cigarette-need with stimulation tended to maximize the amount of REM Phasic activity. And, overall, there tended to be more words from dreams in the Phasic than Tonic aspects of REM sleep.

CHAPTER V

FUTURE RESEARCH

A theory generated from this study involves the role of various need-states and its subsequent impact on dream content. As the reader will recall, we hypothesized that dreams would contain a greater amount of thirst-related content in the: (1) Fluid-Deprivation than the Baseline condition. Bokert (1968) predicted more thirst-related content in dreams from the Thirst-No-Stimulus than the Sated condition. We failed to support our hypothesis. However, Bokert found that thirst-related content was more frequent in the two thirst conditions than in the Sated condition. The same negative finding was observed for our Cigarette-Withdrawal effect.

When one examines the results from both Bokert's and the present experiment, it appears that as need increases, the number of representations (of the need) in the dream decreases. This is quite consistent with Freud's (1900) theory of anxiety in dreams. That is, the preconscious binds and neutralizes disturbing content, which makes it powerless.

To adequately test out this theory, future investigations might compare the effects of Supersaturated, Sated, Baseline, and Deprivation conditions on mentation reports. The predictions would be made that there would be more representations of the need-state in the:

(1) Baseline than the other conditions, and (2) Sated than Super-saturated or Deprivation condition.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The effects of Cigarette-Withdrawal (or Thirst) and a verbally related stimulus on dream reports were investigated. In our first condition, Baseline dreams were elicited from Ss. In the second counterbalanced condition, Ss were cigarette-deprived for 24 hours, and during the laboratory sleep period a cigarette-related message was delivered to Ss during REMPs (i.e., Phasic and Tonic). In a variation of the second night, the same subjects were fluid-deprived for 24 hours and then fed a salty meal prior to going to bed; dream report elicitation and thirst message introduction was similar to our cigarette condition. It was hypothesized that:

1. Dream reports would contain a greater amount of thirst-related content following the arousal of thirst than in the control (Baseline) condition: Hypothesis (1) was not confirmed.
2. Dream reports would contain a greater amount of thirst-related content in conditions where a thirst-related auditory stimulus was presented to Ss than in the control and No-Stimulus conditions: Thirst-related dream content was more frequent in the Thirst-Stimulus than Thirst-No-Stimulus condition, but not more than the control situation.
3. Dream reports would contain a greater amount of cigarette-related content, following Cigarette-Withdrawal than a control

control condition; Hypothesis (3) was not confirmed.

4. Dream reports would contain a greater amount of cigarette-related content in conditions where a cigarette-related auditory stimulus was presented to cigarette-deprived Ss than in the control and No-Stimulus conditions: Cigarette-related dream content was more frequent in the Cigarette-Withdrawal-Tonic-Stimulus than its No-Stimulus counterpart.

5. Ss' dreams would contain more themes of hostility on Cigarette-Withdrawal than Thirst or control conditions: Class 2 Minimum Hostility was more frequent in theCigarette-Withdrawal than Fluid-Deprivation condition, but not for control.

TABLE 26

HYPOTHESES AND RESULTS

Hypotheses	Results
(1) Dream reports would contain a greater amount of thirst-related content, following the arousal of thirst, than in the control (Baseline) condition.	1. Hypothesis (1) was not confirmed. Thirst content in dreams was not maximized in the Fluid-Deprivation condition beyond the level of the control situation.
(2) Dream reports would contain a greater amount of thirst-related content in conditions where a thirst-related auditory stimulus was presented to Ss, than in the control and No-Stimulus conditions.	2. Thirst-related dream content was more frequent in the Thirst-Stimulus, than Thirst-No-Stimulus condition, but, not more than the control condition, thus partially supporting Hypothesis (2).
(3) Dream reports would contain a greater amount of cigarette-related content, following Cigarette-Withdrawal than a control condition.	3. Hypothesis (3) was not confirmed. Cigarette content in dreams was not maximized in the Cigarette-Withdrawal condition beyond the level of the control situation.
(4) Dream reports would contain a greater amount of cigarette-related content in conditions where a cigarette-related auditory stimulus was presented to cigarette-deprived Ss than in the control and No-Stimulus conditions.	4. Cigarette-related dream content was more frequent in the Cigarette-Withdrawal-Tonic-Stimulus, than the Cigarette-Withdrawal-Tonic-No-Stimulus condition.
(5) Ss' dreams would contain more themes of hostility on Cigarette-Withdrawal than Thirst or control conditions.	5. Class 2 Minimum Hostility was more frequent in the Cigarette-Withdrawal than the Fluid-Deprivation condition, but not for control.
	6. Neither Thirst nor Cigarette-Withdrawal increased the frequency of oral-derivative dream themes.

Continued

TABLE 26 (Contd.)

Hypotheses	Results
(5) Continued	7. Dream themes seemed to have bearing on intensity of post-sleep cigarette-need. Ss with gratifying dreams smokes less cigarettes following sleep than non-gratified Ss. 8. Cigarette-Withdrawal and Thirst, in the presence of the auditory stimulus, increased the amount of REM Phasic activity. More words were obtained in the: (1) Thirst-Phasic-Stimulus, than Baseline-Phasic condition, (2) Thirst-Phasic-Stimulus, than Thirst-Tonic-Stimulus condition, and (3) Cigarette-Withdrawal-Phasic-Stimulus, than Tonic counterpart condition. Also, there tended to be more words from dreams in the Phasic than Tonic aspect of REM sleep.

APPENDIXES

APPENDIX A

QUESTIONNAIRE ON INTERNAL STATES

We would like you to rate your internal state at the present time. These ratings are important because your internal state may be related to the depth and quality of your sleep. Would you please rate the intensity of each internal state by placing the appropriate number.

SCALE
1. not at all
2. minimal
3. somewhat
4. moderate
5. quite
6. very
7. extremely

A. TIREDNESS ___

B. WARM ___

C. COLD ___

D. HUNGRY ___

E. THIRSTY ___

F. NAUSEOUS ___

G. NEED TO URINATE ___

H. NEED TO MOVE ___

I. NEED FOR CIGARETTE ___

J. NEED FOR SLEEP ___

K. NEED FOR VISUAL STIMULATION ___

THANK YOU.

APPENDIX B

Check List for Scoring Thirst Related Content in Dreams

I. Words related to THIRST SENSATIONS

1. Thirsty
2. Parched
3. Dry
4. Arid
5. Salty taste

   etc.

II. Words related to THIRST SATISFIERS

This category includes LIQUIDS, FOODS containing a high percentage of water content and WATER in one of its natural states.

A. LIQUIDS

1. water
2. beer
3. soda
4. Pepsi Cola
5. Coke
6. "a drink"
7. liquor
8. whiskey
9. "a liquid"
10. juices
11. milk
12. orange juice
13. "a beverage"
14. fluids

    etc.

B. FOODS WITH HIGH WATER CONTENT

1. watermelon (or any other type of melon)
2. ice cream
3. apple (or any other fruit)
4. tomato (or other juicy vegetable)

   etc.

C. WATER IN ITS NATURAL STATE

1. snow
2. rain
3. ice
4. stream
5. lake
6. puddle
7. ocean
8. wave
9. river
10. sleet
    etc.

III. Words related to ACTIVITIES or BEHAVIOR associated with thirst

1. to drink, drank, etc. (all forms of the verb)
2. sip
3. pour
4. gulp
5. quench
6. suck
7. imbibe
8. eat (only if the word appears in association with foods having high water content)
9. to toast
    etc.

IV. Words related to PLACES associated with thirst

1. bar
2. drug store
3. ice cream parlor
4. refreshment stand
5. dining room (only if the words appear in association with thirst satisfying beverages or drinking themes)
6. kitchen "
7. restaurant "
8. diner "
9. fountain
10. spring
11. oasis
12. water hole
13. desert (or mention of a specific desert such as Sahara)
    etc.

V. Words related to PERSONS associated with thirst

1. bartender
2. counterman
3. soda jerk
4. drunkard
5. waiter, waitress (only if the words appear in association with thirst satisfying beverages or drinking themes)

VI. Words describing INANIMATE OBJECTS associated with thirst

1. glass
2. bottle
3. cup
4. refrigerator
5. straw
6. water cooler
7. faucet
8. flash
9. hydrant

etc.

Reliability:

Thirst references, as identified by the two judges, were pooled respectively; then a reliability coefficient was computed. Assuming a good reliability, the scorers' subjective thirst ratings were averaged for each condition.

APPENDIX B (continued)

Check List for Scoring Cigarette Related Content in Dreams

Symptom or Behavior

Insomnia
Anxiety
Tremor
Palpitations
Drowsiness
Concentration
Pulse slow
Sweating
Impatience
Energy loss
Lightheadedness
Dizziness
Swollen ankle
Cramps
Fatigue
Nervousness
Headaches
Constipation/Diarrhea
Abdominal pain
Gas (Anal)
Poor circulation
Unsteady walk
Numbness
Itching
Aches
Unstable temper
Mouth sores
Sense of well-being
Decreased nervousness
Smoke
Crave Cigarettes
Talk to others
Avoid Smokers
Eat more
Drink coffee or liquor
Food better
Bothered by smoke
Still ought to quit
Confident
Proud of self

Reliability:

Cigarette references, as identified by the two judges, were pooled respectively; then a reliability coefficient was computed. Assuming a good reliability, the scorers' subjective cigarette ratings were averaged for each condition.

APPENDIX C

RATIONALE FOR ARCSINE TRANSFORMATION

Guilford (1956) has drawn attention to the potential risks in the use of proportional data. If N is small and $\bar{p}$ deviates from .5 in either direction, the distribution of $\bar{p}$ becomes skewed. In this study, the proportions of both thirst and cigarette content were low, suggesting that $\bar{p}$ may be non-normally distributed. This non-normality must be taken into account in using the analysis of variance. A second assumption underlying the use of the test is that of homogeity of variance. Bokert (1967) reported on the results of his Bartlett's test, which was computed on the thirst references proportion distribution. His variances were found to be significantly heterogeneous. For this reason he transformed the data to radians (arcsine transformation, Winer, 1962; Edwards, 1963). The transformation eliminated the heterogeneity between Bokert's Thirst-No-Stimulus and Sated conditions. It also reduced the marked heterogeneity between the Thirst-Stimulus and the other two conditions. Considering that the present study is in part a replication of Bokert, and obtained similarly small proportions, we also transformed data to radians for both thirst and cigarette words.

APPENDIX D

EXPERIMENTAL QUESTION FOR ELICITATION OF MENTATION REPORTS

1. TELL ME EVERYTHING THAT WAS GOING THROUGH YOUR MIND BEFORE YOU WERE AWAKENED.

2. ANY MORE DETAIL TO THIS?

3. HOW VIVID AND CLEAR WAS THE SLEEP EXPERIENCE YOU JUST DESCRIBED?

4. WHAT FEELINGS WERE YOU AWARE OF IN THE COURSE OF THIS SLEEP EXPERIENCE?

5. TO WHAT EXTENT DID THIS SLEEP EXPERIENCE FEEL LIKE IT WAS REALLY HAPPENING?

6. ANALYZE YOUR SLEEP EXPERIENCE.

THANK YOU. YOU MAY GO BACK TO SLEEP NOW.

APPENDIX E

Oral Derivatives Check List

I. Words related to symbolized ORAL SENSATIONS associated with deprivation or satisfaction

a. feeling frustrated. Phrases such as "I couldn't," "I wasn't able to."
b. feeling impatient
c. feeling angry or irritated
d. feeling pessimistic
e. disappointed
f. feeling empty
g. feeling deprived
h. feeling poor
i. feeling rejected
j. feeling satisfied, sated
k. feeling full
l. optimistic
m. euphoric
n. feeling blissful
o. receiving warmth
etc.

II. Words related to symbolized ORAL ACTIVITIES

a. to give (all forms of the verb)
b. to take
c. demand
d. request
e. help
f. steal
g. withhold
h. be greedy
i. rejected
j. abandoned
k. grant
l. shop
m. depend
n. to take care of, to be taken care of
o. nurture
p. beg
q. plead
r. receive
s. get
t. hope, wish
u. comfort
etc.

III. WORD PLAY having a symbolized oral meaning

a. "biting sarcasm"
b. "acerbic"
c. "incisive"
d. "in poor taste"
e. "he drank in the view"
f. "he swallowed his pride"
g. "guillible"
. etc.

APPENDIX E (Continued)

ORALITY SCALE

Definition of Orality

Orality is herein defined as a motivating factor derived from the somatic impulse of taking nourishment into the body by way of the mouth. In the dream the orality may be expressed directly in somatic terms, or in forms closely related to the somatic drive. The derivative forms may be recognized as items dealing with food, or the obtaining of food, as items dealing with the mouth, lips, teeth, and/or tongue. Indirectly related forms include items such as general shopping, emphasis on speech or conversation, and characters demonstrating obesity or greed. Concern with the mouth of either a pleasurable or unpleasurable nature is scored in the orality scale, e.g., kissing, tooth trouble, going to the dentist.

When there is evidence that a dream contains orality as herein defined or as itemized in the scoring, each category must be scored by marking the appropriate class numbers under each category. A particular dream may score in any of the listed classes as long as the dream elements conform to the specifications for each class. A score in one class does not exclude a score in any of the other classes. As in all the scales, each class may be scored only once.

When no orality is evident in the dream as herein defined or as itemized in the scoring instructions, the dream is scored 0 for orality.

A. Category: Intensity of Orality

In this category the degree of the oral impulse is scored as expressed through the characters, actions, conversations, feelings, or dream scene. The intensity of the orality may be contained in the characters of the dream story: e.g., a grotesquely fat lady would score as maximum; may be contained in the feelings: being hungry or thirsty; in the action: eating or going shopping or deliverying a speech, and/or in the conversation: discussions about food.

Class 8: Maximum

A score is given in this class where the dream story contains elements indicative of orality which overwhelms or rules the characters rather than serving as an evenue for satisfying nutritional requirements or realistic aims. Overwhelming orality may be

recognized by its bizarre nature, its failure to produce satisfaction, and/or by its eventuating in undesirable or unpleasant results. Examples: "I was eating bits of glass," "The man was vomiting blood," "My teeth fell out," "A drunkard was lying in the gutter."

Class 5: Medium

A score is given in this class when the dream story depicts fairly realistic, benign use of the mouth in the ingestion of nourishing food, or depicts realistic benign settings in which food is being prepared, obtained or served. Examples: "I was waiting in line in the cafeteria," "I was in the supermarket," "Our cook was late."

Class 2: Minimum

A score is given in this class when the dream story describes elements representative of sublimated or symbolic oral impulses. These generally include intaking impulses and various pleasurable uses of the mouth other than directly in eating. Instances of shopping in stores other than food stores, extensive talking or speech making, parties, smoking, vacations, chewing gum, kissing, and drinking cocktails in socially acceptable fashion would score in this class. Examples: "We were at a vacation resort," "I went on a shopping spree."

Note re: Reliability

Oral-derivative and orality themes, as identified by the two raters, were pooled respectively, then a reliability coefficient was computed. Assuming a good reliability, the judges' subjective oral-derivative (or orality) ratings were averaged for each condition.

APPENDIX F

HOSTILITY SCALE

Definition of Hostility

Hostility in the manifest content of the dream is herein defined as a motivational factor derived from the factor of aggression emanating from the adrenal hormone-sympathetic nervous system complex and identifiable in the dream by imagery of destruction, disruption, or malfunction of some kind and/or degree. The hostility may be represented by destructive behavior, inimical interpersonal relationships, disintegration of mind, matter, or concepts, or by unpleasant sensations. The hostility may occur in the form of action: "John stabbed Bill"; in the form of disagreeable states or maladies: "She was sick in bed"; in the form of the characters: "A robber came into the house"; or in the form of the scene: "The building was delapidated." Hostility may occur spontaneously in the dream or as a response to frustration, deprivation or feelings of inferiority, and may be expressed as the emotions of hate, rage, anger, anxiety, or panic.

Scoring Instructions

For those dreams which contain evidence of hostility as above defined, each category of the hostility rating scale must be scored at least once. A class within the category may be scored only once. A score in one class within a category does not exclude the possibility of the scoring of the other classes within that same category. Thus, where appropriate, all classes within a single category may be scored. A score within a class is indicated by marking the assigned number of the class within the category column.

When no hostility is evident in the dream as above defined it receives a 0 score on the hostility scale.

A. Category: Intensity of Hostility

In this category the degree of the hostile impulse portrayed in the dream is scored. The intensity of the hostility may be expressed in the characters of the dream story: e.g., a murderer would score in class 8, regardless of the action of the character; in the feelings: e.g., a murderous rage would score in the maximum class, whereas mild dislike would score in class 1; in action, total destruction would

score maximum, mild malfunction, minimum; in conversation, shattering statements would score 8; and in setting, scenes of total destruction or deprivation would score in the maximum. In the destruction of inanimate objects, the value of the object and the manner of the destruction would determine the degree of the hostility. Where the value of the object is stated in the dream, it is scored according to the dreamer's stated evaluation if this is felt to be appropriate. Where the value of the object is not stated in the dream, or the dream's reaction is inappropriate, its value is determined by ordinary usage. Thus, a fire which destroys a home would be considered maximal degree, whereas the loss of an insignificant button would be considered minimal.

In this category all negatives score the same as positive statements. Thus, "I did not mean to hurt him" is scored the same as "I meant to hurt him." Also, hostility which is implicit in a situation is scored the same as hostility which is overtly stated, i.e., "I rescued her from drowning" is scored the same as "She was drowning." The hostility also is scored the same for actual, intended, threatened, or accidental events, e.g., "I killed a dog," "I warned my neighbor I would kill his dog," "I thought about killing the dog," "A dog had been killed running after a car."

Class 8: Maximum Hostility

Hostility is scored as maximum where there is evidence of death or destruction of important objects, whether threatened or actual, and whether positively or negatively stated. Mortal illness, insanity, and death by any means score in this class. Examples: "I was afraid that I had killed her," "Mrs. J. was dying," "The airplane crashed," "Someone was drowning," "There had been a terrible explosion, but not many people were killed," "I felt I hated her enough to kill her," "Mr. J. went crazy."

Class 5: Medium Hostility

Hostility is scored as medium where there is injury or moderate impairment with the possibility of repair or recovery. Hostile characters such as robbers and spies would score in this class. Examples: "John was sick in the hospital with a virus," The boys were having a fistfight," "My car had a flat tire," Environments indicative of impairment are scored according to the statements about the significance of the environment. Thus, a hospital would score maximal if it is depicted as the scene of dying; medium if it is the scene of moderate illness. Also, a prison would score according to the function of the prison: death row would score maximally, prison sentence would score moderately.

Class 2: Minimum Hostility

Hostility is scored as minimal when there is actual or threatened mild impairment which does not incapacitate, and which is reparable. Social slights, mild criticism, feelings of discomfort and things not going quite right would score in this class. Examples: "John acted as if he did not know me," "I was afraid I would be late for work," "My typewriter was stuck," "I was waiting for her to call but the phone never rang."

Note re: Reliability

Each hostility word , as identified by the two raters, was multiplied by its Class designation (i.e., Class 2, 5, and 8) to determine its weighted sum. A reliability coefficient was then computed. Assuming a good reliability, the judges' subjective hostility ratings were averaged for each condition.

APPENDIX G

DETERMINATION OF RELIABILITY FOR GRATIFICATION THEMES

Gratification themes, as identified by the two judges, were pooled; then a reliability coefficient was computed. Assuming a good reliability, the scorers' subjective gratification ratings were averaged for each condition.

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