The Function of Dreams in Adaptation to a Stressful Intellectual Activity

by

Janet S. Wright

A thesis
presented to the University of Manitoba
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy
in
Psychology

Winnipeg, Manitoba

ISBN 0-315-37245-1

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A thesis submitted to the Faculty of Graduate Studies of the University of Manitoba in partial fulfillment of the requirements of the degree of

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ABSTRACT

Though past research provides some evidence for dreams having either a mastery or a compensatory function in adaptation to stress, no study has entertained the possibility that dreams may serve both to master and to compensate for a stressful situation. The present study was designed to address the possibility that adaptation to stress may be a dynamic process in which dreams operate both to master and to compensate for stress.

Following an adaptation and a baseline night, subjects were exposed to either an easy or a difficult "aptitude test". Then, each subject recorded dreams and completed mood assessments at home on six consecutive nights. The dependent measures included pre- and post-test mood, pre- and post-sleep mood, self-report dream ratings, and dream content. T tests, univariate repeated measures analyses of variance, multivariate analyses of variance (MANOVAs) and univariate F tests on significant MANOVAs were conducted to examine differences between the two treatment groups on the dependent measures and to detect changes in mood and dream measures across nights following the stress manipulation. In addition, multivariate multiple linear regression analyses were performed to examine the relationship between mood and dream ratings.

Pre- and post-test mood measures revealed that both versions of the aptitude test induced stress in subjects. Dream content ratings of treatment incorporation for the difficult and easy test conditions showed a significant change across successive post-stressor nights. For both test conditions, there was a trend toward more treatment incorporation in dreams across nights. Subject ratings of dreams did not significantly change across nights and did not differ between treatment conditions. There was a significant interaction between treatment group and post-test night in the amount of expressed post-sleep affect. The easy test subjects reported an initial increase and then a decrease in negative affect across nights while the difficult test subjects expressed alternating levels of negative affect across successive post-stressor nights.

It was concluded that dreams served both a mastery and a compensatory function in adaptation to stress following a stressful intellectual activity. There was some speculation that dreams oscillated between mastery and compensation (or avoidance) processes of dream function until the dreamer attained adaptation to the stressor. Some of the difficulties associated with this study and the area of dream research in general were reviewed and suggestions were made for further research.

ACKNOWLEDGEMENTS

The completion of this dissertation and my Ph.D. marks the culmination of several years of learning, growth and challenge. The satisfaction and relief that I feel at this time is surpassed only by the gratitude that I owe to some people who have enhanced this pursuit.

To my advisor, Dr. David Koulack, I wish to extend my gratitude for his encouragement and advice. His thoughtful guidance, understanding and support throughout all the stages of this project are greatly appreciated.

I am also grateful for the assistance provided by my thesis committee: Drs. Joanne Keselman, Michael Le Bow, and Raymond Perry. Dr. Joanne Keselman in particular showed seemingly endless patience and tolerance as I encountered and tackled difficult statistical concerns.

To Terry Wong, I wish to express my appreciation for his assistance in the process of scoring the content of subjects' dreams.

Further, I am indebted to very good friends who have, at different times, provided me with the social diversions and the caring necessary to continue. Thank you Drs. Wenda Dickens, Morry Schwartz, Paul Harland, and Rod Michalko! And thank you Barbara Williams and Nancy Mc Leod!

My special thanks goes to Dr. Petr Mirejovsky whose humour, caring and unconditional support has made my life "more livable".

Finally, to my family and especially, my parents, I am grateful for their encouragement to pursue ambitious goals, their patience, and love throughout the years.

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INTRODUCTION

Dreams have long intrigued and fascinated mankind. Countless speculations about their function have ranged from the belief that the will of God is revealed in dreams (Sandford, 1968) to the conviction that dreams foretell the future (Kramer, Winget, & Whitman, 1971). With the publication of his monumental work, The Interpretation of Dreams, Freud (1900/1953) focused attention on the possible function dreams may have in both protecting sleep and disclosing the dreamer's inner concerns. Freud (1900/1953) considered dreams to be both the "royal road to the unconscious" and the "guardians of sleep". In his view, dreams, by disguising the true nature of taboo desires, permit the discharge of psychic energy and allow the dreamer to continue sleeping. Considered in this manner, dreams serve an adaptive function in that they gratify repressed infantile wishes or fantasies while maintaining sleep. Freud developed his notion of the function of dreams by examining dream reports and relating the content of the dream to life events of the dreamer.

More recently, the discovery of rapid eye movement (REM) sleep (Aserinsky & Kleitman, 1953) seemed to link the experience of dreaming to an identifiable physiological

state (Dement & Kleitman, 1957). These findings gave impetus to the scientific inquiry into the function of dreams (Kramer, 1982).

Based on evidence provided by morning dream reports and by dream collection following REM period awakenings, present-day theorists have proposed the notion that dreams serve an adaptive function in dealing with contemporary stress and maintaining an individual's well-being (Breger, 1967; Brown & Donderi, 1986; Fisher, 1965; French & Fromm, 1964; Greenberg, Pearlman, Fingar, Kantrowitz, & Kawliche, 1970). Some theorists suggest dreams may help the individual to master or handle a stressful experience by allowing the dreamer to integrate the event with similar past, stressful experiences (e.g., Breger, Hunter, & Lane, 1971; Cartwright, Bernick, Borowitz, & Kling, 1969; Cohen & Cox, 1975; Greenberg, Pearlman, & Gampel, 1972). Others speculate dreams may augment or complement the stressful contemporary event and thus help the dreamer adapt to the situation by promoting psychological balance between waking and sleeping experiences (e.g., Baldridge, 1966; Foulkes, Pivik, Steadman, Spear, & Symonds, 1967; Hauri, 1970). Regardless of the specific process, dreams have been implicated as serving an adaptive function in response to stress.

Concept of Stress

Stress is a process in which environmental events or forces, called stressors, threaten the individual's existence and well-being, causing the individual to respond to the threat (Baum, Singer, & Baum, 1981). The stress reaction involves both physiological and psychological processes whereby the individual perceives the threat, copes with it and adapts to it. This adaptation sequence is continuously in operation since our lives require almost constant adaptation to changes of either a gradual or sudden nature. When these changes are minor, the individual might adapt to them without being aware of the process. Though the stress reaction clearly includes physiological processes (for example, hormonal changes and other endocrine activities), it is the psychological processes that are of more direct concern in the study of the adaptive function of dreams in dealing with contemporary stress. For this reason, the focus when considering the function of dreams in adaptation to stress is on psychological issues (see Mason, 1968, 1975; Selye, 1973, 1979 for the physiological aspects of stress).

Psychological approaches to the concept of stress view psychological processes as instrumental in the onset of stress and emphasize the importance of interpretation of stressors in the stress response (e.g., Baum & Greenberg, 1975). The specific response to a stressor is determined by

the individual's appraisal of the threat, harm or challenge presented by the event (Lazarus, 1966). The individual not only responds to present dangers or threats but also to the expectation of such events (Wolf & Goodell, 1968). Psychological stress may precede the actual event, last longer, and continue after the event is past (Baum, Singer, & Baum, 1981). The specific appraisal of a stressor will depend upon a number of factors, including prior experience with the stressor and attitudes toward it (Lazarus, 1966). When a situation is appraised as stressful, a stress reaction is induced that causes the individual to seek ways of coping and adapting to the demands of the situation. The stress reaction compells the individual to achieve or reinstate psychological balance by means of some form of adaptive response. Adaptation to stress is conceptualized as beginning at the time of the disturbing event and continuing while the individual is both awake and asleep until he or she achieves some resolution of the stress engendered by the stimulus event. Thus, it may be speculated that if stress is induced during the day then subsequent dreams may play an instrumental role in the individual's adaptation to the stressful event.

Dream Adaptation Theories

Basically, the theories concerning the adaptive function of dreams fall into two broad categories (Dallett, 1973): those proposing dreams have a "compensatory"

function; and those suggesting dreams have a "mastery" function. The compensation hypothesis suggests that dreams serve to compensate for an event by providing elements which are missing from waking experience. For example, Jung (1933, 1974) suggested that, by compensating for waking experience in fantasy, dreams restore psychological balance. Dream content that is discontinuous or inconsistent with elements of the waking stresssful situation may psychologically compensate for the event. Thus, elements complementary to those of a stressful event might appear in a dream in order to promote psychological balance. In this way, dreams augment the waking experience and purportedly help the individual adapt to the situation.

The mastery hypothesis (Cohen & Cox, 1975; Greenberg, Pearlman, & Gampel, 1972) suggests that dreams help the individual to master or handle stressful experiences. According to this notion, dreams aid in mastery by enabling the dreamer to find creative solutions to contemporary problems. While the exact mechanism for this process is not clearly articulated, the basic paradigm postulates that incorporation of stressful elements allows or encourages the integration of current stress with memory traces of successful solutions to similar past, stressful experiences. Thus, the incorporation of stressful elements in dream is often considered to be evidence of a mastery function (Kramer, 1981).

Although incorporation of stressful elements suggests the operation of a mastery function in dreams, incorporation alone does not necessarily signify that the dream is fulfilling a mastery function. For example, if incorporation in dreams is serving a function, then some change or consequence should follow the dream. However, incorporation simply shows that the dream has been altered by a waking experience. The alteration or change in dream content may be indicative of an underlying function of dreams that facilitates mastery of the stressor. Incorporation of stressful elements in dreams therefore is not necessarily equivalent to mastery but rather may be evidence of the operation of a mastery function.

Compensation Hypothesis

Support for the compensation hypothesis comes from numerous studies which examined the effects of stressful or unusual presleep experiences on dream content and structure (Baldridge, 1966; Bokert, 1968; De Koninck & Koulack, 1975; Dement & Wolpert, 1958; Foulkes, Pivik, Steadman, Spear, & Symonds, 1967; Hauri, 1970; Koulack, 1970; Kramer, Whitman, Baldridge, & Ornstein, 1966; Newton, 1970; Wood, 1962). Some studies attempted to create a stressful presleep experience by depriving subjects of either food or drink (Baldridge, 1966; Bokert, 1968). In Bokert's (1968) study, subjects were deprived of all fluids for 24 hours and given

a thirst-inducing meal prior to going to sleep. During sleep they were presented with a verbal stimulus (consisting of the recorded phrase, "a cool delicious drink of water"). Bokert (1968) found that water-deprived subjects whose dreams contained overt reference to some form of gratification of their thirst were less thirsty and drank less water in the morning than subjects whose dreams did not consist of a theme of gratification. A similar finding was obtained following 24-hour food deprivation. Baldridge (1966) mentioned an "obsessive reference to food" (p.1275) as a dream occurrence among food-deprived subjects. In these studies, the dreams can be interpreted as providing some compensation for the deprivation.

Other studies lend support to the possibility that dreams play a compensatory role in response to certain types of physiological events (Kramer, Whitman, Baldridge, & Ornstein, 1966; Newton, 1970). After injecting subjects with a muscle relaxant and tranquilizer (meprobamate), Kramer, Whitman, Baldridge, and Ornstein (1966) found an increase in motility in subjects' dreams. Similarly, Newton (1970) noted that recently paralyzed individuals reported more physical activity in their dreams than individuals who were not paralyzed. In these cases, the dreams may have been providing compensation to the individual for being deprived of movement.

Wood (1962) found that subjects socially isolated for a day exhibited an increase in social content in their dreams. The dreams associated with social deprivation tended to involve groups of people talking in a sociable fashion. It is possible to interpret this dream occurrence as compensation for the deprivation of social interactions.

In a study by Hauri (1970), subjects who had engaged in physical activity prior to sleep experienced dreams with little reference to exercise while those subjects who had worked on problem solving tended to have dreams which were unrelated to this activity. Similarly, Foulkes, Pivik, Steadman, Spear, and Symonds (1967) collected compensation dreams in young boys following the presentation of either a film about baseball or a violent western film. After the western film, the dreams of the subjects contained fewer themes of aggression or hostility than following the baseball film.

These studies indicate dreams may serve a compensatory function in adaptation to stress. Dream content that is discontinuous or inconsistent with elements of the waking stressful situation may psychologically compensate for the event. By containing the element which is missing from the waking experience, dreams may promote psychological balance and facilitate adaptation to the waking stressful situation. Thus, the compensation hypothesis postulates adaptation to stress to be the

establishment and maintenance of psychological balance or equilibrium between waking and sleeping experiences.

Mastery Hypothesis

In contrast to the compensation hypothesis, the various mastery hypotheses (for a more complete review see Dallett, 1973) suggest that dreams help the individual to master or handle problems and stressful experiences. Theorists have conceived and formulated the mastery function of dreams in diverse ways. For example, Fisher (1965) took a classical psychoanalytic approach and envisioned dreams as a vehicle for the discharge or fulfillment of unconscious wishes. The cognitive view of Breger (1967) suggests dreams "serve to integrate affectively aroused material into structures within the memory system that have previously proved satisfactory in dealing with similar material" (p.24). A similar integration or "synthetic" function was proposed by Greenberg, Pillard, and Pearlman (1972). They speculated that dreams allow ego-threatening or conflicted feelings aroused by waking experiences to interact with previously repressed materials. Through this interaction, the individual gains access to previously acquired patterns of defense and adaptation to the stressful situation is able to take place. Viewed in this manner, dreams aid the "adaptive, coping, mastering functions of the ego" (Greenberg, Pearlman, & Gampel, 1972; p.27).

Other information processing models use computer analogies to describe a mastery function for dreams. Newman and Evans (1965) suggest that dreams aid in the removal of unnecessary programs or information from the active processing system whereas Spitz (1964) postulates that dreams eliminate the day's residue of incompleted tasks and activities from the system. Gaarder (1966) proposes that dreams serve to edit recent information and submit important new information into existing program structures. In his "P" hypothesis, Dewan (1970) suggests dreams incorporate elements of stressful experiences as an integral part of the information processing system. In contrast to the information processing models, the affect regulatory view of Kramer and his associates maintains that dreams incorporate elements of the most emotionally intense activity of the day as part of a mood regulatory function (Kramer, 1981; Piccione, Jacobs, Kramer, & Roth, 1977). Further, according to this view, dreams help to determine waking affect (Kramer & Roth, 1973, 1980). Though different in form, all of these mastery hypotheses have as a common foundation the premise that dreams incorporate and manipulate elements from waking experience and thus assist the individual to master stressful events.

The mastery notion receives support from some of the studies which examined the effects of stressful presleep experiences on dream content (Breger, Hunter, & Lane, 1971;

Buck & Walker, 1982; Cartwright, Bernick, Borowitz, & Kling, 1969; Cartwright, Kasniak, Borowitz, & Kling, 1972; Cohen & Cox, 1975; Collins, Davison, & Breger, 1967; Greenberg, Pearlman, & Gampel, 1972; Koulack, LeBow, & Church, 1976; Koulack, Prevost, & De Koninck, 1985; McGrath & Cohen, 1980; Pruyser, 1983; Wilkinson, 1983; Witkin & Lewis, 1965). Among the studies using films as presleep stressors was that of Collins, Davison, and Breger (1967). They used a subincision film and found that subjects who rated themselves emotionally aroused by the film tended to dream about it, usually in a symbolized fashion. Witkin and Lewis (1965) also used the subincision film and reported elements of the presleep film often appeared in dreams, while Goodenough, Witkin, Lewis, Koulack, and Cohen (1974) and Goodenough, Witkin, Koulack, and Cohen (1975) using both the subincision and a birth film reported an increase in anxiety in dreams following the viewing of those films.

Cartwright, Bernick, Borowitz, and Kling (1969) showed pornographic films to subjects before they went to bed. Though the sleep records revealed no evidence of sleep-cycle changes, the content of dreams appeared to be affected by the film viewing. Following the erotic films, there was a significant decrease in ability to recall dream content but an increase in the number of dreams involving one person acting alone. The incidence of dreams involving exchanges between two same-sex people gradually increased

over subsequent post-film nights but heterosexual dreams did not regain their pre-film level until the fourth post-film night. However, the amount of symbolic representation of the film in dreams on all post-film nights was higher than was expected, based on reports given by subjects who had not seen the sex film. In their dreams, subjects appeared to be reviewing or working through material gleaned from the presleep film, possibly in order to master the experience.

Using a demanding intellectual task as the stressor, Cohen and Cox (1975) provided support for the mastery notion. They found that subjects who incorporated elements from the experimental situation in their dreams expressed a marked positive change in "state of mind" (p.91) or affect from presleep to postsleep mood. This was interpreted as evidence that dreams serve a mastery function in adaptation to stress. Though utilizing a stressor similar to that used by Cohen and Cox (1975), Koulack, Prevost, and De Koninck (1985) concluded that dream incorporation was associated with less adaptation on awakening, rather than increased adaptation. Using anxiety level as a measure for adaptation to stress, dream incorporation of elements from a stressful intellectual activity appeared to lead to more anxiety and cognitive disturbance the next morning instead of less affect. Koulack et al. (1985) tried to reconcile the discrepancies in their findings and those of Cohen and Cox (1975) by reference to procedural differences between the two studies.

Dreams appearing to reflect a mastery function also have been reported following several "real life" stressful experiences. Breger, Hunter, and Lane (1971) examined the content of dreams of subjects who were participating in sensitivity-group therapy sessions. The material aroused during the stressful group sessions was incorporated and worked through in dreams. In comparison to their baseline nights, the subjects rated dreams following therapy sessions as less pleasant. Breger et al. (1971) attributed the negative affect to the impact of the group-therapy experience. More precisely, it is possible that the negative feeling was indicative of the stress and conflict engendered by the therapy sessions the subjects were attempting to master in their dreams.

Breger et al. (1971) also investigated the dream content of patients both before and after major surgery. Themes of cutting and other surgical procedures dominated their dreams. Material from the stressful surgical experience appeared to be integrated with or assimilated into an organized network of older memories which also were present in the dream content. The authors concluded that it is affect-related or emotionally arousing information of personal relevance that one tends to dream about and that dreams serve an adaptive function. They suggested that psychologically aversive stimuli are transformed into forms familiar to the dreamer which allow him or her to integrate

the new stimuli by means of mental processes that have been adaptive in the past.

Interestingly, in 1983, Pruyser reported a dream that he experienced on the fourth or fifth night following coronary bypass surgery. He described the dream as a "direct, affective experience" (p.555) in which material from the stressful surgical experience appeared to be integrated with older memories also present in the dream. This suggests the dream was serving a mastery function in adaptation to the stress engendered by the surgery.

There is additional evidence often cited as support for the notion that dreams are involved in the process of handling and integrating stressful experiences. For example, Greenberg, Pearlman, and Gampel (1972) found that dreams reflected the war experiences among patients suffering from war neuroses. The persistence of war dreams (usually in the form of nightmares or anxiety dreams) was considered to be a reflection of the patient's continuing attempt to deal with the war trauma and his continuing failure to master it. According to Greenberg et al. (1972), a personally relevant stressful experience such as participation in combat appears to elicit dreams involving the same situation in order to help the individual adjust to the traumatic experience. More recently, Buck and Walker (1982) reported "recurrent and intrusive re-experiencing of the (combat) trauma" (p.705) in dreams of Vietnam veterans

diagnosed as suffering from posttraumatic stress disorder (see also Walker, 1981a, 1981b, and Walker & Cavenar, 1982).

Similarly, Wilkinson (1983) reported that many people present during the collapse of the skywalk of a hotel subsequently dreamed about the event or had nightmares about other kinds of disaster. The presence of these dreams can be interpreted as evidence that dreams served to help these people gain mastery over the stress aroused by the disaster situation.

These studies which indicate a mastery function for dreams in adaptation to stress focus on dreams incorporating and manipulating elements from waking experience. In the mastery formulation of adaptation to stress, dreams help the individual to work through the stressful experience by presenting or rehearsing elements of that event. It should be noted this is in direct contrast to the compensation notion which suggests dreams promote psychological balance by presenting elements that are either complementary to or discontinuous with those of the waking experience.

Mastery-Compensatory Model

The studies cited above provide some evidence for dreams having either a mastery or a compensatory function. Typically, these two notions are viewed as mutually exclusive. To date, no study has entertained the possibility that dreams may serve both to master and to

compensate for a stressful situation. It is conceivable that an individual will experience both mastery and compensatory dreams as part of adaptation to a given stressor. There may be a development or structuring of dream content to aid adaptation following a particular stressful situation. In other words, adaptation may commence at the time of the stressful event and continue while the individual is both awake and asleep. Viewed in this manner, adaptation to stress is an on-going process, active at various levels of consciousness.

In this conceptualization, the dynamic process of adaptation to stress would involve two phases. Initially, the individual may attempt to work through, rehearse or master the stressor. At this phase one might expect dreams to reflect these attempts by containing incorporations of the stressor, along with negative affect (or anxiety). As the adaptation process continues, some degree of mastery may be attained and a need to compensate for the stressor (and possibly the stressful aspects of the dreams themselves) may become dominant. At this point, one would expect dreams to reflect the compensation process; that is, dream content would be complementary to the stressful event and pleasant in nature. By this two-fold process, a balance or equilibrium may be reinstated and the individual may be better able to adjust to the stressful situation. Hence, adaptation to stress is here conceptualized as an on-going

dynamic process starting at the time of the occurrence of the stressful situation and continuing through the individual's waking and sleeping life until he or she achieves some resolution to the conflict engendered by the stressor.

The notion that dreams may serve both to master and to compensate for a stressful situation during adaptation is consistent with the disruption-avoidance-adaptation model proposed by Wright and Koulack (1987). According to this model, dream content may be altered by an antecedent stressful waking experience. Incorporation of elements of the stressful experience may represent attempts to obtain mastery of the event. However, the process of dreaming about the stressful event may itself be stressful and so the individual may then experience dreams that are unrelated or complementary to the stressor as a way of avoiding and obtaining temporary relief from the disruptive material. That is, mastery (or disruptive) dreams are replaced by pleasant (or avoidance) dreams in order to achieve equilibrium or homeostasis. If the individual has not successfully dealt with the stressor, then dreams will again address the stressful event in an attempt to master the stress. This oscillation between functions of dream is postulated by Wright and Koulack (1987) to continue until the individual is able to obtain some sort of resolution of the stress.

Support for Mastery-Compensatory Model

Although, as already mentioned, previous research has not been designed to examine a possible interrelationship between the mastery and compensatory function of dreams, there is some indirect, fragmentary evidence which is consistent with this notion. Bokert's (1968) study in which subjects were water-deprived for a day suggests that dreams serve both a mastery and a compensatory function following a presleep stressful experience. Following water deprivation, subjects reported an increase in thirst-related dream content, reflecting a continuation of the same state which had prevailed prior to sleep. In addition, subjects whose dreams contained overt reference to some form of gratification were less thirsty and drank less water in the morning than subjects whose dreams did not consist of a theme of gratification. Thus, dream reports contained evidence of a mastery process which incorporated elements from the waking deprivation experience and suggest the operation of a compensatory process which provided gratification in dreams.

Similarly, the findings of a study by De Koninck and Koulack (1975) suggest that dreams may serve both a compensatory and a mastery function. In this study, a film showing industrial accidents was presented to a group of subjects before sleep at night and again in the morning. It was hypothesized that subjects who experienced more anxiety-

infused dreams and more dream content related to the film would exhibit better mastery of the presleep stress, as measured by less emotionality following a morning viewing of the film. Contrary to the prediction, subjects who exhibited more emotionality at the morning film presentation tended to be those who had more dream incorporations of film elements. Thus, film incorporation was associated with less, rather than greater, mastery of the experimental stress. The authors noted that the findings appeared more consistent with the compensation hypothesis than with the mastery hypothesis, since the subjects who did not dream about the film tended to be less affected by the film at the morning presentation. However, the occurrence of anxiety at the second film presentation among subjects who had incorporated film elements into their dreams might have been an indication that the adaptation process was not as yet complete for these particular subjects. If more time had intervened between the two film presentations for these subjects, then it is possible that adaptation to stress would have been accomplished and their dreams would have been pleasant in nature with little reference to the stressful film presentation. Therefore, certain aspects of the study indicate that adaptation to stress in dreams occurs by means of a compensation or possibly an avoidance mechanism while other aspects indicate that a mastery process cannot be entirely discounted.

Additional evidence of both a mastery process and a compensatory process operating in dreams can be found in Cartwright, Bernick, Borowitz, and Kling's (1969) study of the effect of an erotic film on the dreams of young men. The increase of symbolic representation of the film in dreams is consistent with the mastery notion whereas the gradual change in dreams containing one character acting alone to exchanges between pairs of individuals supports the compensation notion. That is, subjects appeared to be reviewing or working through elements of the presleep film in dreams, possibly in order to master the experience, and later their dreams seemed to compensate for that experience. Dreams of a single character, followed by an increase in dreams with same-sex characters in them may represent a compensatory process which complemented the material of the film. The presence of heterosexual dreams after several post-film nights may indicate the re-establishment of psychological balance and successful adaptation to the stressful film.

Mastery-Compensatory Interpretation of Extant Research

If the proposed mastery-compensatory model of adaptation to stress is a valid portrayal of dream function, then research previously presented in support of either the compensation hypothesis or the mastery hypothesis should be interpretable within this framework. Indeed, this is the case.

In accordance with the mastery-compensatory model, studies which are suggestive of a compensatory function of dreams provided ample time for mastery of the stressor to have occurred prior to sampling dream content. For example, Newton (1970) found that recently paralyzed individuals described more physical activity in their dreams than individuals who were not paralyzed. Although dreams were not collected immediately after the onset of paralysis, one may speculate that dreams from this period probably would be replete with injury incorporations in an attempt to master the disability. The paralyzed individuals in this study had been disabled a mean of 155 months (or 13 years) with a range of eight to 422 months (35 years) since the onset of the disability. After a minimum period of eight months, paralyzed people would presumably have had time to master and adjust to some extent to this stressful disability during the waking state and in their dreams. Hence, only compensatory dreams would be required to complete adaptation to the stressor. As the duration of the disability increased and adaptation progressed, there would be less need for compensatory dreams. Indeed the longer the individual had been disabled, the less physical activity occurred in their dreams, suggesting that physically active dreams ultimately became unnecessary once adaptation to the disability had been achieved.

Theroux (1980) examined the effects of a weight reduction program on the dream content of obese women. The study obtained a non-significant difference between dieting and non-dieting obese people for dream incorporation of elements from the stressful diet regimen. However, this finding does not eliminate the possibility that both mastery and compensatory dreams operated to aid the subjects in adaptation to the diet stressor. The study was designed only to examine dream content after the subjects had been exposed to the diet schedule for at least four weeks. It would not be unreasonable to assume that subjects had ample time to master and adjust to the stressor during the month-long treatment period. In addition, all the subjects had previous experiences with dieting and so may have mastered this type of stressor prior to the study.

Other studies obtaining compensatory dreams utilized stressors that might require little mastery before subjects reach the compensation phase in adaptation to the stress (e.g., Foulkes, Pivik, Steadman, Spear, & Symonds, 1967; Hauri, 1970). These studies did not use intensive personally relevant emotional stressors which would presumably result in the need to work through the stressful experience. Foulkes, Pivik, Steadman, Spear, and Symonds (1967) presented either a documentary baseball film or a Western film depicting Indians and settlers to young boys before sleep. Dreams following the baseball film contained

more themes of aggression or hostility than those following the Western. Because the material of these films was not difficult to understand and was non-threatening to subjects, mastery of these films might have been completed before the dreams were collected. Subjects sometimes experienced several relatively brief initial episodes of REM sleep lasting less than 10 minutes; however they were not awakened for a dream report until 10 minutes after the onset of a REM period. Thus, the nature of the stressful stimuli and the possible occurrence of short dreams prior to dream collection can account for the absence of mastery dreams. Non-hostile, pleasant dreams following the Western film may have provided compensation for the violent elements present in that film.

Similarly, the use of presleep activities that may neither carry a high emotional valence for the subjects nor are threatening to them may account for Hauri's (1970) finding of compensatory dreams among subjects who engaged in either physical activity or studying prior to sleep. In addition, dreams were not collected for several hours following the presleep activity. Given the nature of the presleep tasks and the fact that subjects were never asked to report a dream until a minimum of 3 1/2 hours of sleep had occurred, the material aroused by the presleep activity may have been mastered before dreams were collected, leaving only a compensation requirement for the completion of

adaptation to the presleep experience. Hence, subjects who had exercised prior to sleep experienced dreams with little reference to physical activity while those subjects who had studied and solved problems tended to have dreams which were unrelated to this activity.

Other studies which reported compensatory dream content manipulated the stressors in such a way that their effectiveness as threatening or stressful stimuli may have been diluted and thus the time period needed by subjects to master the engendered stress may have been reduced (e.g., Baldridge, 1966; Kramer, Whitman, Baldridge, & Ornstein, 1966; Wood, 1962). When subjects were told the duration of the deprivation period before the start of the experiment, Baldridge (1966) noted an "obsessive reference to food" (p.1275) in dreams among food-deprived subjects, suggesting the operation of a mastery process. The information provided by Baldridge may have made the deprivation experience less threatening by giving subjects the ability to predict the end of deprivation (cf., Cohen, Glass, & Phillips, 1977; Gatchel, 1980; Glass, Singer, & Pennebaker, 1977). Hence this form of control through prediction may have facilitated mastery over the stressor. It is also possible that the categories for scoring dream content did not clearly distinguish between elements that suggest a mastery function (for example, themes of being hungry) and those that indicate a compensatory function (such as

references to eating food). Thus, this study does not eliminate the possibility that a mastery process, as well as a compensatory process operated during adaptation to the deprivation stressor.

Two additional studies provided subjects with information concerning the nature and conditions of the stressor to which they would be subsequently exposed (Kramer, Whitman, Baldridge, & Ornstein, 1966; Wood, 1962). Providing information about the stressor possibly instilled in subjects some sense of control that reduced tha amount of stress they would need to master in order to adapt to the situation. Kramer, Whitman, Baldridge, and Ornstein (1966) briefed subjects concerning the effects of meprobamate and found an increase in motility in subjects' dreams following an injection with the muscle relaxant and tranquilizer. Similarly, Wood (1962) informed subjects that they would each spend a day in solitary confinement and then obtained dreams containing an increase in social content. Thus, the specific conditions of administering these stressors may have facilitated the mastery process by providing subjects with information about the stressor (a procedure which also might have permitted subjects to prepare for the effects of the stressor before it was experienced). As a result, mastery of the stress may have been accomplished relatively rapidly leaving only the compensatory process evident when the dreams were collected.

In contrast to studies suggesting a compensatory function for dreams, all the studies indicating a mastery function examined dreams following intensive, emotional stressors, which appear to be difficult to master (e.g., Breger, Hunter, & Lane, 1971; Cohen & Cox, 1975; Collins, Davison, & Breger, 1967; Greenberg, Pearlman, & Gampel, 1972; Koulack, Prevost, & De Koninck, 1985; Witkin & Lewis, 1965). Following an intense, affect-ladened or emotionally arousing stressor, dream content consistent with the mastery notion may be evident for a relatively long time period, reflecting the individual's continuing struggle to master the stress and conflict engendered by the stressor. Greenberg, Pearlman, and Gampel (1972) monitored dreams depicting war experiences among patients suffering from war neuroses. Describing the patient with a war neurosis as an "individual whose overwhelmed ego is struggling with a recent, unmastered trauma" (p.28), these authors interpreted the persistence of war dreams as evidence of the patient's continuing attempt to deal with the war trauma. Since mastery over the stress had not yet been attained, dreams did not contain elements complementary to the war experiences. However, it is possible that once a patient had worked through his war experiences, dreams would reflect a compensatory function, as part of the continuing adaptation process. A similar explanation can account for Breger, Hunter, and Lane's (1971) finding that material aroused during sensitivity-group therapy sessions dominated

subsequent dreams and themes of surgical procedures appeared in the dream of surgical patients. That is, personally relevant, emotionally arousing information from the presleep event was incorporated and worked through in dreams, indicating a continuing need to master the stressful experience before compensation for the stressor could begin in dreams.

Similarly, after viewing graphic subincision or birth films, subjects tended to incorporate elements of the film in their dreams (Collins, Davison, & Breger, 1967; Witkin & Lewis, 1965). The material shown in both films was rated by subjects as emotionally arousing (Collins et al., 1967) and the subincision film elicited strong physiological reactions from male viewers (Witkin & Lewis, 1965). These arousing, emotionally-charged stressors were followed by dreams containing elements of the films consistent with the mastery notion. It is speculated that, given either more time and/or less affect-ladened stressors, dreams would reveal elements complementary to the stressful stimuli, as evidence of a compensatory process following the mastery phase in adaptation to stress.

Cohen and Cox (1975) and Koulack, Prevost, and De Koninck (1985) gave university students ego-involving intellectual activities to do before going to sleep. The intellectual tasks were specifically designed to be ego-threatening to subjects and to arouse anxiety and unpleasant

affect. Instructions informed subjects that the task reflected intellectual potential since the items of the test had been derived from common intelligence tests and college students were suppose to finish the test with relative ease. After working on the very difficult test items, subjects reported dreams incorporating elements from the experimental situation. Thus, a stressor developed to involve and challenge the subject's ego was immediately followed by dreams which appeared to be reviewing the stressful experience, possibly in an attempt to master the anxiety and cognitive disturbance caused by the emotionally charged stressor. Compensation dreams might be expected to follow mastery dreams in order to complete the re-establishment of the ego's integrity in adaptation to stress.

In summary, when the specific nature of the stressor and the conditions surrounding the administration of the stressor to subjects are examined, existing research which supports either a mastery function or a compensatory function of dreams can be re-interpreted within the framework of a mastery-compensatory model of adaptation to stress. The affect associated with the stressor and the subject's knowledge concerning the nature and duration of the stressor appear to partly determine the amount of stress and material that the subject must master before dreams assume a compensatory function in adaptation to stress. In addition, the delay following the presentation of a stressor

before dreams are collected may help to determine whether dreams reflect a mastery or a compensatory function. Therefore, the mastery-compensatory model of adaptation to stress can accommodate and interpret the findings of extant research.

Contributing Factors

Although dreams may serve both to master and to compensate for a stressful situation, the specific content of a given dream in response to stress may be dependent upon an intricate matrix of factors. The personality of the individual, the personal relevance of the stressor to the individual, and, the nature and duration of the stressor all may influence manifest dream content subsequent to a stressful experience.

For example, Cohen and Cox (1975) found dreaming to be a representational process which reflects personality and presleep situations. Specifically, they identified neuroticism as a determinant of dream content following stress. Individuals scoring high on a neuroticism scale were more susceptible to presleep stress as measured by subsequent dream recall and affect than individuals scoring low on neuroticism. The authors suggested that "stress tends to affect a general transformation of sleep and waking fantasy toward more bizarre, dysphoric, metaphorical, indirect forms of expression" (p.103). The relevance of

individual personality differences to manifest dream content has been largely unexplored. Nevertheless, it appears as if certain aspects of personality temper the dream process following stress (see also McGrath & Cohen, 1980).

As well as personality factors, a person's reaction to stress may be related to his or her cognitive appraisal of the situation. Lazarus, Speisman, Mordkoff, and Davison (1962) noted that a person must perceive a stimulus as a threat to his or her welfare in order for stress responses to occur. The nature of the stimulus, the person's past experiences and his or her mode of interpreting events all effect cognitive appraisal of a situation. Cognitive appraisal has been demonstrated by Speisman, Lazarus, Mordkoff, and Davison (1964) to be instrumental in determining the amount of stress resulting from a situation. Thus, if an individual interprets a stressful situation as personally relevant to himself or herself, a stress reaction can be expected.

Besides personal relevance to the individual, the nature of a given stressor might effect stress reactions and in turn, dream content. For instance, exposure to a continuous or chronic stressor (such as social isolation or a diet regimen) might allow the individual to institute an adaptive mechanism which aids in adjustment to the chronic stressor. Conceivably, in response to a chronic stressor, the adaptive mechanism begins to operate during the waking

state and continues the adaptive process into sleep and dreams in order to resolve any conflict initiated by the stressor. When a stressor is present over an extended period, a working through or mastery of the stress might be attained. If mastery of the stressor has occurred, then mastery dreams would no longer be required to promote adaptation to the stressor. Compensating dreams, however, may still be needed to compensate for the stressor and possibly for the mastery process itself. Hence, compensating dreams but not mastery dreams may be evident when an individual has experienced a stressor for a relatively long time. Conversely, the presentation for a relatively short duration of acute stressor (for example, an emotionally arousing film or a demanding intellectual activity) might result in the individual seeking to overcome or master the acute stressor. If the individual has not had sufficient time to master the stress while awake, then the adaptation process of mastering the acute stressor might continue into sleep. Dream content may partially reveal this adaptation process by reflecting elements indicative of working through or mastering the stressful event.

In summary, adaptation to stress is conceptualized as an on-going process which is initiated following the occurrence of a stressful event and is continued through the individual's waking and sleeping life until the conflict aroused by the stressor is resolved. The precise content of

dreams following stress may be tempered by numerous factors which include the personality of the individual, the relevance of the stressor to the individual, the duration of the stressor, and the elapsed time since the stressor was experienced.

Home versus Laboratory Dreams

Without exception, the studies described above were conducted in the laboratory. This practice has been criticized because the laboratory environment itself might distort and alter the quality of the dream experience. Several authors have suggested that dreams collected in the laboratory are not representative of dreams which occur in the more natural home environment (Domhoff, 1969; Domhoff & Kamiya, 1964; Weisz & Foulkes, 1970).

Three major studies have indicated that there are differences between home and laboratory dreams (Domhoff & Kamiya, 1964; Hall & Van de Castle, 1966; Weisz & Foulkes, 1970). Home dream reports were collected either by asking subjects to record any dream which they could recall upon awakening in the morning (Domhoff & Kamiya, 1964; Hall & Van de Castle, 1966) or by asking subjects to set an alarm clock for a certain time and to record any dream which could be recalled when the alarm clock sounded (Weisz & Foulkes, 1970). Domhoff and Kamiya (1964) reported a greater number of sexual and aggression/misfortune elements in home dreams,

whereas Weisz and Foulkes (1970) noted a tendency for impulse-related content to occur in the home setting. However, bizarre elements (e.g., animals talking, inanimate objects becoming animate) were more frequently reported in the laboratory setting than the home setting (Domhoff & Kamiya, 1964). Home reports have been characterized as being more "dramatic" (Hall & Van de Castle, 1966), "vivid" and "spicier" (Domhoff & Kamiya, 1964) while laboratory reports have been termed "prosaic" (Hall & Van de Castle, 1966). Furthermore, Domhoff and Kamiya (1964) observed that the laboratory situation is likely responsible for an increase in dream themes about "sleeping", "printed material" and other activities which can be construed as laboratory incorporation. Thus, it appears that the setting and conditions under which dreams are collected influence dream content.

Because dream content seems to be affected by the setting, the method and conditions of collecting dream reports must be carefully selected in a study. If the specific content of dreams in relation to an experimental manipulation is the matter of interest, then it is necessary to minimize the effect of any extraneous factors upon dreams. Since the lab setting <u>per se</u> has been shown to influence dream content, it would be prudent to implement an experimental design utilizing home-dream reporting rather than lab reporting. This is especially true if

physiological indices are not of concern in a given study. Home dream reporting also offers the possible advantage that dreams are likely to be more charged or emotionally-ladened at home (Domhoff & Kamiya, 1964) which may facilitate the study of adaptation to stress in dreams.

Examining the Mastery-Compensatory Model

As previously mentioned, the proposal that adaptation to stress might involve both mastery and compensation dreams in certain stressful circumstances is consistent with the scant data available. However, extant research has neither addressed nor pursued the possibility that adaptation to stress may be an evolving or dynamic process. The present study was designed to examine this issue.

Subjects were exposed to a stressful intellectual activity and their dreams and mood were monitored for several nights following the stress treatment. By sampling dreams for more than one night following presentation of the stressor, it was possible to determine if the nature of the dream content changed as adaptation to the stress progressed. This can be conceptualized as mapping the decay of the stress reaction aroused by the experimental treatment. This procedure promised to provide the opportunity to examine the proposed interrelationship between mastery and compensatory functions of dreams and adaptation to stress.

The appearance of adaptation to stress in dreams is necessarily dependent upon the effectiveness of the stressor. To ensure that the stressor would indeed induce a stress reaction, the present study attempted to maximize the treatment effect by preselecting subjects who were likely to be susceptible to presleep stress (Cohen & Cox, 1975) and by choosing a stressor personally relevant to the subjects (Greenberg, Pearlman, & Gampel, 1972; Speisman, Lazarus, Mordkoff, & Davison, 1964). Capitalizing on the findings of Cohen and Cox (1975) that individuals selected for high neuroticism show more dream recall and affect following presleep stress than individuals selected for low neuroticism (also see Cohen, 1974a, 1974b), the subjects were individuals with a high neuroticism score on the Maudsley Personality Inventory. As demonstrated by several studies (e.g., Cohen & Cox, 1975; Koulack, Prevost, & De Koninck, 1985; McGrath & Cohen, 1980), a demanding or ego-threatening intellectual activity is stressful to subjects who are university students. For this reason, an intellectual "aptitude test" was utilized as a presleep stressor.

Two versions of an "aptitude test" were used in this study. A demanding or difficult aptitude test served as the stressor for the experimental group while an easy aptitude test was given to the control group. In accordance with the suggested dynamic relationship between

dream content and adaptation to stress, it was expected that the dreams of the subjects receiving the difficult test would undergo a content change as adaptation progressed. Immediately following the stressful intellectual activity, the dreams were expected to consist of content indicative of the mastery function; i.e., content incorporating elements from the experimental condition. In addition, it was expected that mastery dreams would be accompanied by increased negative affect, as assessed by reports of anxiety, depression, and distrust on a mood adjective checklist and on a dream rating scale. As adaptation took place, the dreams were expected to become more pleasant and to reflect a compensatory process. Unlike the dreams and mood of the subjects exposed to the difficult test, the dreams and mood of the easy test subjects were expected to have little if any negative affect immediately after the presentation of the stressor. The dreams were expected to consist of either neutral or compensatory themes. Because the subjects may have experienced mild stress from the very fact that they were part of an experimental procedure, it was thought, that compensatory dreams may be present.

Hypotheses

Thus, the experimental hypotheses were as follows:

H1: Subjects administered the difficult test version will exhibit more incorporation of the stressor in dreams on post-test Night 1 than subjects

given the easy test version.

H2: Subjects given the difficult test will rate their dreams on post-test Night 1 as more unpleasant on the Dream Rating Scale than subjects administered the easy test.

H3: Subjects who receive the difficult test will express more negative affect on the post-sleep Mood Adjective Checklist on post-test Night 1 than subjects given the easy test.

H4: The difficult test subjects will exhibit a change in treatment incorporation in dream content across nights while the easy test subjects will not show a change. Specifically, the difficult test subjects will report more treatment incorporation immediately following the stress manipulation than on baseline and then will show less treatment incorporation across successive post-test nights. The easy test subjects will show little or no change in the amount of incorporation in dream content across nights.

H5: The difficult test subjects will experience a change in dream pleasantness across nights while the easy test subjects will not report a change. Specifically, the difficult test subjects will experience less pleasant dreams immediately following

the stress manipulation than on baseline and then report more pleasant dreams across successive post-test nights, as shown by lower unpleasant scores on the Dream Rating Scale on successive post-test nights. The easy test subjects will experience little or no change in dream pleasantness across nights.

H6: The difficult test subjects will express a change in negative affect across nights while the easy test subjects will not report a change. Specifically, the difficult test subjects will express more negative affect on the post-sleep Mood Adjective Checklist immediately following the stress manipulation than on baseline and then report less negative affect across successive post-test nights. The easy test subjects will show little or no change in negative affect across nights.

H7: Subjects administered the difficult test will report more incorporation of the stressor in dreams on each post-test night than subjects given the easy test.

H8: Subjects who receive the difficult test will rate their dreams more negatively on the Dream Rating Scale on each post-test night than subjects given the easy test.

H9: Subjects administered the difficult test will report more negative affect on the post-sleep Mood Adjective Checklist on each post-test night than subjects given the easy test.

METHOD

Subjects

A total of 216 male undergraduates enrolled in an introductory psychology course at the University of Manitoba completed the Maudsley Personality Inventory (MPI) and a questionnaire assessing their sleep habits and primary language. The MPI of only those individuals who indicated English as their first language was scored. In accordance with Cohen and Cox (1975), individuals scoring in the top quartile of the MPI neuroticism scale distribution (scores$\geq$34) were considered high scorers and eligible to serve as subjects in the study. Thirty-nine men displayed a score on the neuroticism scale within this acceptable range. Eligible individuals were contacted and asked to participate in a study concerning the relationship between intellectual functioning and dreams. Of the 35 individuals contacted, 33 agreed to participate. These individuals ranged in age from 18 to 23 years, with a mean age of 19.7 years. Credit toward a course requirement for research participation was assigned to all participants who completed the selection questionnaire and a cash payment of $35 was given to subjects who participated in the actual study.

Experimental Design

Subjects were randomly assigned to the "difficult" or to the "easy" test condition and run in groups of six subjects. The subjects in each of the conditions recorded dreams at home on a total of eight nights. Dreams were obtained from all subjects for the first three nights following the test and at least two of the post-test nights 4 to 6. Thus, the repeated measures design consists of two groups with 15 subjects in each group who recorded dreams on two pre-experimental treatment nights (which served as adaptation and baseline nights) and then on six consecutive nights after the experimental treatment. Though previous studies have varied from allowing no nights for adaptation to the experimental setting (e.g., Cohen & Cox, 1975) to implementing as many as three nights of adaptation (e.g., Antrobus, Fein, Jordan, Ellman, & Arkin, 1978), Foulkes, Pivik, Steadman, Spear, and Symonds (1967) found no significant Night 1 versus Night 2 effect for any of the dream rating dimensions and concluded that adaptation nights may not be as necessary for studies of dream content as they are for studies of the sleep cycle (e.g., Cohen, 1979).

In the present study, one adaptation night was used to enable subjects to become adept at recording and rating their dreams and mood. Thus, the first night served as an adaptation night and the second night was a baseline night. After the baseline night, each subject received either the

easy test or the difficult test the following day around noon and recorded dream reports and completed pre- and post-sleep mood assessments on six consecutive nights following treatment. The dependent measures included pre- and post-stress mood, pre- and post-sleep mood, self-report dream ratings, and dream content. A judge rated the content of dream reports on a series of dimensions which form categories (see Appendix E) in order to analyze the nature of events and affect appearing in the dreams.

Materials

Equipment. A tape recorder and two 90-minute recording tapes were provided for each subject during the study.

Test conditions. An easy and a difficult version of an "aptitude test" resembling the Graduate Record Examination (GRE), the Miller Analogies Test (MAT), and the Scholastic Aptitude Test (SAT) served as the non-stressful and the stressful treatment respectively (see Appendix A). The tests each contained 20 verbal analogies, 10 quantitative problems, and 20 sentence completions, presented in a multiple-choice format with four alternatives per question. The subjects were given approximately 30 minutes to complete the tests. The easy test was designed in such a way that 20 minutes was ample time to complete it. The difficult test version was constructed so that the subjects were pressed for time to complete the test. The exact form of each test

version was determined on the basis of data obtained from a pilot study designed to identify the easy and difficult items among a pool of sample questions. Those questions which 50% or more of the pilot subjects answered incorrectly were selected as the difficult test items while the questions answered correctly by 75% of the pilot subjects were designated as the easy test items.

Mood adjective checklist (MACL). A modified version of the Nowlis Mood Check List (Nowlis, 1965) was completed before and after the aptitude test administration to examine the effects of the test situations. In addition, it was completed before retiring at night and after each dream report to assess changes in pre- and post-sleep mood. The MACL is an instrument which has been used to assess mood and affect in previous studies (e.g., De Koninck & Koulack, 1975; Koulack, Prevost, & De Koninck, 1985; Sirois-Berliss & De Koninck, 1982). It consists of 24 adjectives (shown in Appendix B) assessed on a four-point scale (0-3) divided into eight categories: aggression, anxiety, surgency, social affection, depression, distrust, quiet, and detached. Since three distinct adjectives represent each category, the score for each category can range from 0 to 9.

Dream rating scale (DRS). After recording the dream, each subject rated it on 10 different dimensions, using

bipolar scales which range from 1 to 7. The scales for rating the dimensions of the dream are: dream very pleasant (1) to dream very unpleasant (7), dream very active (1) to dream calm (7), dream strange (1) to dream familiar (7), dream confused (1) to dream organized (7), dream thought-like (1) to dream emotional (7), dream vivid (1) to dream vague (7), subject active (1) to subject passive (7), subject anxious (1) to subject happy (7), subject participant (1) to subject observer (7), and subject deeply asleep (1) to subject mildly asleep (7).

Post-test questionnaire. Following the aptitude test, each subject answered a questionnaire concerning his attitude toward the aptitude test (shown in Appendix C), as an additional measure of the effectiveness and effects of the stress manipulation.

Post-experimental questionnaire (PEQ). Following the last dream collection night, each subject completed a questionnaire concerning his attitude toward the experiment and the aptitude test (see Appendix D). It also included control items designed to detect the occurrence of potential sources of nonexperimental stress encountered by the subject in his daily life.

Procedure

The 33 selected subjects indicating a willingness to participate were briefed on the general procedure and given a tape recorder and two recording tapes to record dream reports at home. A booklet containing the Mood Adjective Checklist and the Dream Rating Scale was also given to each subject. An additional subject was recruited whenever a participant failed to meet the criteria of a dream report for each of the first three nights following the test and for at least two of the post-test nights 4 to 6 in order to attain a total sample of 30 subjects meeting the study's criteria. One subject left the study due to illness (flu) and two subjects were unable to report a dream on each of the required nights and so 33 subjects were recruited during the course of the study.

Adaptation. Subjects were asked to set an alarm clock for a half hour before their usual wake-up time and to complete the MACL at bedtime. Those who had clock-radios were requested to use the buzzer setting. Subjects were also asked to refrain from or at least limit their smoking and consumption of coffee, alcohol or any other drugs during the evening, if it were not a hardship to them. They were contacted by telephone during the evening to remind them to set the clock and to inquire if they had smoked or consumed coffee, alcohol or any other drugs within the previous five

hours. When the alarm clock sounded, each subject was required to tape record anything going through his mind, in as much detail as possible. They were asked to describe the surroundings in the dream, to indicate whether they were a participant or an observer, to describe any feelings or emotion in the dream, to say whether there was any colour and to indicate if the dream was vivid. After the adaptation night but prior to the baseline night, each subject brought his taped dream report to the experimenter and together they listened to the tape. At this time, the subject was again encouraged to record his dreams in as much detail as possible.

Dream collection. The same sequence of events as those described above were followed to collect baseline and post-stress dreams and mood assessments, except the subject did not bring the taped dream reports to the experimenter until after the sixth post-test night. Dream reports were collected on a baseline night and on six consecutive nights following the administration of the stressful test condition. As well as recording dream reports, subjects were asked to complete the MACL and the DRS contained in the booklet after each dream report.

Experimental stress manipulation. After the baseline dream collection night, subjects were individually given

either the easy or the difficult version of the "aptitude test" and the post-test questionnaire. To ensure that their performance on the test was important to the subjects, the subjects received the following instructions immediately before the administration of the tests:

> This research is designed to study the relationship between dreams and intellectual functioning. A test derived from common aptitude tests will be administered to you. In order to carry out research successfully, it is necessary to ask you not to discuss the content of the test with anybody. It is essential that you do the best you can on the test, since it is assumed that the results of the test reflect your intellectual potential. The test has been constructed so that an average university student should complete most of the items within the allotted time. You will have 30 minutes to complete the test. Please work as rapidly and as carefully as possible. Do not spend too much time on any particular item; instead, go on to the following items and come back to the difficult one if you have time left at the end.

Post-experimental Questionnaire administration. For six consecutive nights immediately following the experimental test manipulation, subjects recorded dreams at home, completed the MACL before and after sleep, and rated the dreams in the morning. Subjects returned the tape recorder, the tapes and the booklet with the completed scales (ie., MACLs, DRSs) to the experimenter following the sixth post-treatment dream report night. At this time, they were asked to fill-out a questionnaire (PEQ) which helped to assess the effectiveness of the experimental manipulation. And finally they were debriefed and any questions about the study were answered.

Analysis of Data

Analysis of dream content. After the dream reports were transcribed from the tapes, they were analyzed by a judge blind as to the conditions under which the reports were obtained. A total of 198 dreams were collected across the baseline and experimental nights. Each dream was analyzed along a total of 54 dimensions that can be divided into eight categories, using scales developed by Hall and Van de Castle (1966) and Koulack (1969). The categories for examining the content of dreams included treatment incorporation, affect, activity, social interaction, fortune, sequence change, bizarreness, and vividness (see Appendix E for more detail). The judge's rater reliability was assessed by correlating his analysis with that of another judge on 24 dreams. In accordance with previous research (e.g., Koulack, Prevost, and De Koninck, 1985; Theroux, 1980), a correlation of .70 between the ratings of the two judges was the minimum acceptable level. This standard was achieved on all 54 dimensions.

Statistical analysis. One-tailed independent sample *t* tests (H1, H2, H3, H7, H8, H9) and two-factor mixed model analyses of variance (H4, H5, H6) followed by post-hoc analyses where appropriate were used to test the study hypotheses. The relationships between mood and dream ratings were assessed by multivariate multiple linear regression analyses. The *t* tests, analyses of variance and

post hoc analyses were computed using Biomedical Data Program (BMDP) Statistical Software packages (Dixon, 1983) and the regression analyses were completed using a Statistical Analysis System (SAS) package (SAS User's Guide, 1985).

RESULTS

Effects of the Intellectual Activity as a Stressor

To test the hypotheses, it was necessary to determine that the difficult version of the intellectual activity served as a stressor. If the difficult version was indeed a stressor, then a decrease in positive affect and an increase in negative affect for the difficult test condition subjects would be expected following the test manipulation. It also was important to ascertain whether the two versions of the activity were differentially stressful to each of the treatment groups. In order to detect changes in mood following the stress manipulation, three 2 X 2 repeated measures (BMDP4V) multivariate analyses of variance (MANOVAs) were computed using "test time" (pre-stressor/post-stressor) as the repeated dimension and "groups" (difficult test/easy test) as the between subjects factor. The two positive affect MACL items (ie., surgency, social affection) were the dependent variables in the first MANOVA and the four negative affect MACL items (ie., aggression, anxiety, depression, distrust) were the dependent variables in the second MANOVA. In the third MANOVA, the two neutral affect MACL items (ie., quiet, detachment) were the dependent variables. For each

analysis, all omnibus hypotheses were tested at the .05 level of significance (α = .05).

Table 1 presents the results of the omnibus analyses. As shown in the table, the "group X test time" interaction effect was not significant in any MANOVA, indicating that the treatment manipulation was not differentially stressful to the two groups. However, there was a significant main effect for "test time" on the positive MACL items ($p < .0012$) and also on the negative MACL items ($p < .0002$) but not on the neutral MACL items ($p < .4659$). This demonstrated that the intellectual activity did induce a change in mood but that this change was experienced by both groups. Hence the analyses revealed that both versions of the aptitude test induced stress in subjects, as measured by pre- and post-stressor mood ratings. Though both versions were stressful, the aptitude test versions did differ in level of difficulty: subjects did more poorly on the difficult version than the easy version with a mean test score 56.0% versus 76.6%, respectively.

In order to probe the significant "test time" factor, groups (2) X test time (2) repeated measures analyses of variance (ANOVAs) were conducted on the six MACL items that represent positive and negative affect. To maintain the overall probability of a Type I error at .10, each univariate "test time" effect was assessed at an α =

.10/6 = .0167. Results indicated significant pre-/post-stressor differences on five of the six affect items. Specifically, analyses indicated that there was a significant increase in anxiety ($p < .0004$), in depression ($p < .01$), in distrust ($p < .01$) and a significant decrease in surgency ($p < .0001$) and social affection ($p < .00001$) following the intellectual activity. There was no significant change on the aggression dimension ($p < .08$). Table 2 gives the means and standard deviations of pre-test and post-test scores on the different MACL dimensions for each test condition.

TABLE 1

Multivariate Analyses of Variance (MANOVAs) on Pre- and Post-stressor Positive, Negative and Neutral MACL Items

MANOVA on Positive MACL Items

Source	SS	df	MS	F	p
Group (G)	1.067	1	1.067	0.39	.5357
Error	75.954	28	2.713		
Time	14.017	1	14.017	13.07	.0012
G X Time	0.267	1	0.267	0.25	.6219
Error	30.029	28	1.073		

MANOVA on Negative MACL Items

Source	SS	df	MS	F	p
Group (G)	3.384	1	3.384	0.52	.4765
Error	181.971	28	6.499		
Time	22.509	1	22.509	17.75	.0002
G X Time	0.759	1	0.759	0.60	.4455
Error	35.513	28	1.268		

MANOVA on Neutral MACL Items

Source	SS	df	MS	F	p
Group (G)	2.063	1	2.063	0.79	.3814
Error	73.021	28	2.608		
Time	0.250	1	0.250	0.55	.4659
G X Time	0.482	1	0.482	1.05	.3140
Error	12.823	28	0.458		

TABLE 2

Means and Standard Deviations ( ) of Mood Adjective Checklist (MACL) Scores Before and After the Test Administration for the Difficult and Easy Condition Subjects

	Difficult		Easy	
MACL category	Before	After	Before	After
Aggression	1.067 (1.624)	2.533 (2.615)	1.800 (2.757)	1.933 (2.865)
Anxiety	2.000 (1.773)	3.667 (2.440)	2.400 (2.923)	3.867 (2.167)
Surgency	3.933 (2.549)	1.533 (2.167)	4.400 (2.131)	2.067 (1.870)
Social Affection	4.000 (2.673)	1.667 (2.160)	3.600 (2.444)	1.800 (2.274)
Depression	1.400 (1.765)	2.467 (2.560)	1.733 (2.890)	3.400 (2.849)
Distrust	1.800 (1.821)	3.400 (2.100)	3.133 (2.949)	3.867 (2.100)
Quiet	2.533 (2.326)	2.733 (2.604)	2.467 (2.134)	2.600 (2.746)
Detached	1.000 (1.464)	2.200 (2.908)	2.600 (3.180)	2.200 (2.731)

Post-test Questionnaire

Following completion of the aptitude test session, each subject answered a post-test questionnaire concerning his attitude toward the aptitude test, as an additional measure of the effectiveness and effects of the stress manipulation. A single factor MANOVA (BMDP4V; $\alpha = .05$) on the 12 Post-test Questionnaire items indicated that the two treatment groups did not differ significantly in their responses to the questionnaire items, F (12, 17) = 1.87, $p < .1167$. Thus, the analysis of the Post-test Questionnaire data provided additional evidence to that supplied by the pre-/post-stressor mood analyses that the administration of the aptitude test affected both treatment groups in a similar manner. Specifically, it appears that each version of the aptitude test served as a stressor and induced stress among subjects of both test conditions.

On the basis of self-report, all subjects felt frustration while writing the test (group means on a 7-point scale: 2.5 and 2.8 for the difficult and easy test subjects, respectively) and reported not being pleased about their performance (group means: 2.4 and 3.0 for the difficult and easy test subjects, respectively). They also indicated that they placed importance on doing well on the problems (group means: 5.7 and 6.3 for the difficult and easy test subjects, respectively) and tried hard to solve the problems (group means: 2.2 and 1.8 for the difficult and easy test subjects, respectively).

Although the experimental manipulation seemed to induce similar stress in both groups immediately following the test administration, it was decided to maintain group membership in the analysis of dream reports and pre- and post-sleep mood ratings. The rationale was that dream measures of stress are potentially more subtle (Theroux, 1980) than waking measures and therefore might provide additional information concerning the effects of the manipulation on each treatment group. This decision to examine the dream reports and mood ratings also permitted the testing of the experimental hypotheses.

Post-test Night 1 (H1, H2, H3)

It was predicted that the dreams of the subjects in the difficult test condition on the first post-test night would contain more incorporation of the stressor and would be rated by these subjects as more unpleasant than the dreams experienced by subjects in the easy test condition. It further was anticipated that subjects who received the difficult test would express more negative affect on the post-sleep MACL than subjects given the easy test. None of these predictions was supported.

Treatment incorporation in dreams was rated by the judge and included the appearance of specific items present when the aptitude test was administered (eg., test

questions, pencil, experimenter, long hallway) or reference to the treatment situation (e.g., time pressure, marks). The four dimensions of treatment incorporation (ie., incorporation of treatment object, person, location or situation) were averaged in order to obtain one incorporation of stressor score. A two independent sample one-tailed t test (BMDP3D; $\alpha = .01$) found no significant difference between groups in treatment incorporation on post-test Night 1, t (14.3) = 0.98, $p < .3445$. Similarly, though both the difficult test subjects and the easy test subjects reported their dreams were unpleasant (means on a 7-point scale: 4.133 and 4.200, respectively), a one-tailed two independent sample t test ($\alpha = .01$) on the Dream Rating Scale item estimating dream pleasantness indicated that the two groups of subjects did not differ significantly in their ratings on the first night following the test, t (27.5) = 0.11, $p < 0.9169$. Finally, a two independent sample one-tailed t test ($\alpha = .01$) using the mean negative affect score on post-test Night 1 (ie., the average of aggression, anxiety, depression and distrust ratings on the MACL) also did not reach statistical significance, t (26.4) = 0.26, $p < 0.7956$. Table 3 shows the group means and standard deviations associated with H1, H2 and H3 as well as the means and standard deviations on each treatment incorporation dimension, on dream pleasantness and each negative affect item for post-test Night 1.

Therefore, the first three hypotheses were not supported: the difficult versus the easy aptitude test conditions did not result in a significant difference between groups on any of the dependent measures on post-test Night 1. When compared to subjects given the easy test, the difficult test subjects did not show more treatment incorporation, more unpleasant dreams, or a greater level of negative affect.

TABLE 3

Means and Standard Deviations ( ) on the Dream Content Analysis of Treatment Incorporation, Dream Pleasantness Rating and Negative Affect Measures of the MACL for Difficult and Easy Condition Subjects (Post-test Night 1)

ITEM	Difficult Condition (N=15)	Easy Condition (N=15)
H1:		
Incorporation		
treatment object	.667 (2.319)	.133 (.352)
" person	.600 (2.323)	.067 (.258)
" location	.667 (2.319)	.133 (.352)
" situation	.867 (2.294)	.133 (.352)
Average Incorporation	.700 (2.300)	.117 (.229)
H2:		
Rating		
unpleasant	4.133 (1.847)	4.200 (1.612)
H3:		
Affect		
aggression	1.733 (2.604)	1.267 (2.282)
anxiety	3.067 (3.150)	2.400 (2.529)
depression	1.467 (2.099)	1.333 (1.633)
distrust	2.067 (2.219)	2.600 (1.993)
Average Affect	2.083 (2.142)	1.900 (1.666)

Across Nights (H4, H5, H6)

Following the stressful intellectual activity, the difficult test subjects were expected to report more incorporation of the stressor in dream content, rate the dream as less pleasant and express more post-sleep negative affect, compared to the baseline night. It was further predicted that dreams of subjects in the difficult condition would contain less treatment incorporation and become more pleasant to subjects across successive post-test nights. These subjects were also expected to report less negative affect on the post-sleep MACL across successive post-test nights. In contrast, the dreams and mood of the easy test subjects were expected to change little or not at all across nights. Thus, an interaction between treatment group and night was predicted to occur on each of the dependent measures of treatment incorporation in dream content, subject rating of dream pleasantness and post-sleep negative affect.

Table 4 displays the results of the groups (2) X nights (7) repeated measures analysis of variance (ANOVA) (BMDP2V) computed to detect changes in the amount of treatment incorporation in dream content for each group across baseline and successive post-test nights. For this analysis, "groups" was designated a between subjects factor, while "nights" was designated a within subject factor. The dream content category of treatment incorporation consists

of four dimensions: incorporation of treatment object, person, location, and situation. The average score of these four dimensions provided the measure of treatment incorporation and served as the dependent measure in the analysis of variance. For this analysis, each of the three omnibus tests was assessed at $\alpha = .01$.

Contrary to H4, the group X night interaction was not significant, indicating that the change, if any, in treatment incorporation across nights was the same for the difficult and the easy test subjects. Similarly, the "group" main effect ($p < .35$) was not significant indicating that the difficult and the easy test subjects did not differ in overall treatment incorporation. However, there was a significant "night" main effect ($p < .01$) indicating that a difference occurred across nights in the amount of treatment incorporation in dreams.

A pairwise comparison of nights was performed using the Scheffe test (Scheffe, 1953) to probe the nature of this "night" main effect. The Scheffe indicated that the amount of treatment incorporation in dream content on the baseline night was significantly different than the amount reported on post-test Nights 1, 3 and 4 ($ps < .05$) and on post-test Night 5 ($p < .01$). In addition, treatment incorporation on post-test Night 5 differed significantly from the amount of incorporation recorded on post-test Nights 1, 2 and 3 ($ps < .01$). The average treatment incorporation for each night

and each treatment group as well as the standard deviation for each treatment combination is presented in Table 5. Consistent with H4, an examination of the average treatment incorporation for each night shows that the difficult test subjects expressed more treatment incorporation immediately following the stress manipulation than on baseline but, contrary to H4, they do not consistently show less treatment incorporation across successive post-test nights. Figure 1 displays a graph of the treatment incorporation data across nights.

It should be noted from Figure 1 that the trend in treatment incorporation across nights was not in the direction predicted by H4. Recall that H4 proposed that the difficult test subjects would exhibit <u>less</u> treatment incorporation on successive post-test nights. However, the trend indicated in Figure 1 is toward <u>more</u> incorporation reported across nights.

TABLE 4

Groups X Nights Repeated Measures Analysis of Variance on Treatment Incorporation in Dream Content

Source	SS	df	MS	F	p	H-F
Group (G)	2.1400	1	2.1400	0.90	.3500	
Error	65.4833	28	2.3391			
Night (N)	68.5620	6	11.4270	2.97	.0087	.0102
G X N	30.6952	6	5.1159	1.33	.2456	.3784
Error	645.3141	168	3.8410			

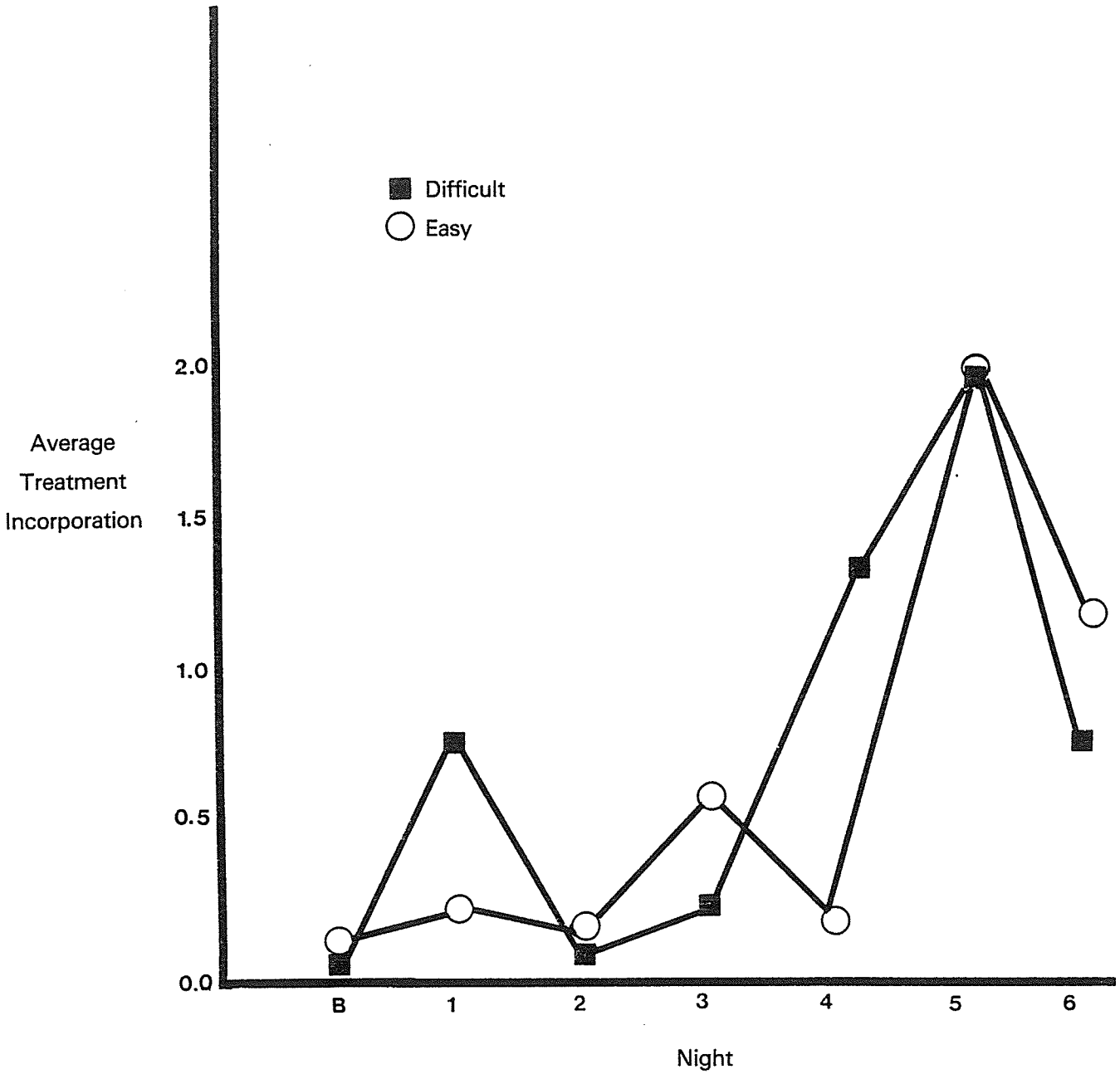
H-F = Huynh-Feldt (1970) tail probability

TABLE 5

Means and Standard Deviations ( ) of Treatment Incorporation in Dream Content for Difficult and Easy Condition Subjects across Nights

	Baseline	Night 1	Night 2	Night 3	Night 4	Night 5	Night 6
Difficult							
Incorporation treatment object	.000 (.000)	.667 (2.320)	.000 (.000)	.067 (.258)	1.333 (3.132)	1.867 (3.701)	1.667 (2.320)
" person	.000 (.000)	.600 (2.324)	.000 (.000)	.000 (.000)	1.200 (3.167)	1.800 (3.726)	.600 (2.324)
" location	.036 (.660)	.667 (2.320)	.000 (.000)	.067 (.258)	1.200 (3.167)	1.800 (3.701)	.600 (2.324)
" situation	.000 (.000)	.867 (2.295)	.067 (.258)	.200 (.414)	1.333 (3.132)	1.867 (3.701)	.667 (2.324)
Average Incorporation	.009 (.165)	.700 (2.230)	.017 (.065)	.083 (.181)	1.267 (3.142)	1.833 (3.710)	.633 (2.318)
Easy							
Incorporation treatment object	.000 (.000)	.133 (.352)	.067 (.258)	.200 (2.324)	.200 (.414)	1.800 (3.726)	1.200 (3.167)
" person	.041 (.972)	.067 (.258)	.000 (.000)	.600 (2.324)	.000 (.000)	1.800 (3.726)	1.200 (3.167)
" location	.000 (.000)	.133 (.352)	.000 (.000)	.600 (2.324)	.000 (.000)	1.867 (3.701)	1.200 (3.167)
" situation	.000 (.000)	.133 (.352)	.267 (.458)	.600 (2.324)	.133 (.352)	1.867 (3.701)	1.267 (3.150)
Average Incorporation	.010 (.243)	.117 (.229)	.083 (.122)	.600 (2.324)	.083 (.154)	1.833 (3.710)	1.217 (3.161)

Figure 1: Treatment incorporation in dream content for the difficult and easy test subjects on each night.


Difficult
Easy
Average
Treatment
Incorporation
2.0
1.5
1.0
0.5
0.0
B
1
2
3
4
5
6
Night

To test the hypothesis that the difficult test subjects but not the easy test subjects would report a change in dream pleasantness across nights, a groups (2) X nights (7) repeated measures ANOVA (BMDP2V) on the subject rating of dream pleasantness on the Dream Rating Scale was performed. As with the previous analysis, "groups" was designated a between subjects factor while "nights" was designated a within subjects factor. Further, each omnibus hypothesis was tested at the .01 level of significance. The results of this analysis are presented in Table 6. Table 7 contains the means and standard deviations of each treatment combination while Figure 2 presents a graph of these data.

As can be seen from Table 6, a non-significant group X night interaction ($p < .64$) indicated that any change across nights in the dream pleasantness ratings of the difficult test subjects was similar to that of the easy test subjects, a finding which was contrary to H5. In addition, neither the "group" main effect ($p < .48$) nor the "night" main effect ($p < .03$) was statistically significant, indicating that the two treatment groups rated their dreams the same in terms of pleasantness and neither group significantly changed its rating across nights.

TABLE 6

Groups X Nights Repeated Measures Analysis of Variance on Dream Pleasantness Rating

Source	SS	df	MS	F	p	H-F
Group (G)	1.5470	1	1.5470	0.58	.4776	
Error	74.0871	28	2.6450			
Night (N)	70.2022	6	11.7000	2.32	.0231	.0268
G X N	13.9781	6	2.3290	0.46	.5461	.6428
Error	897.6670	168	5.0431			

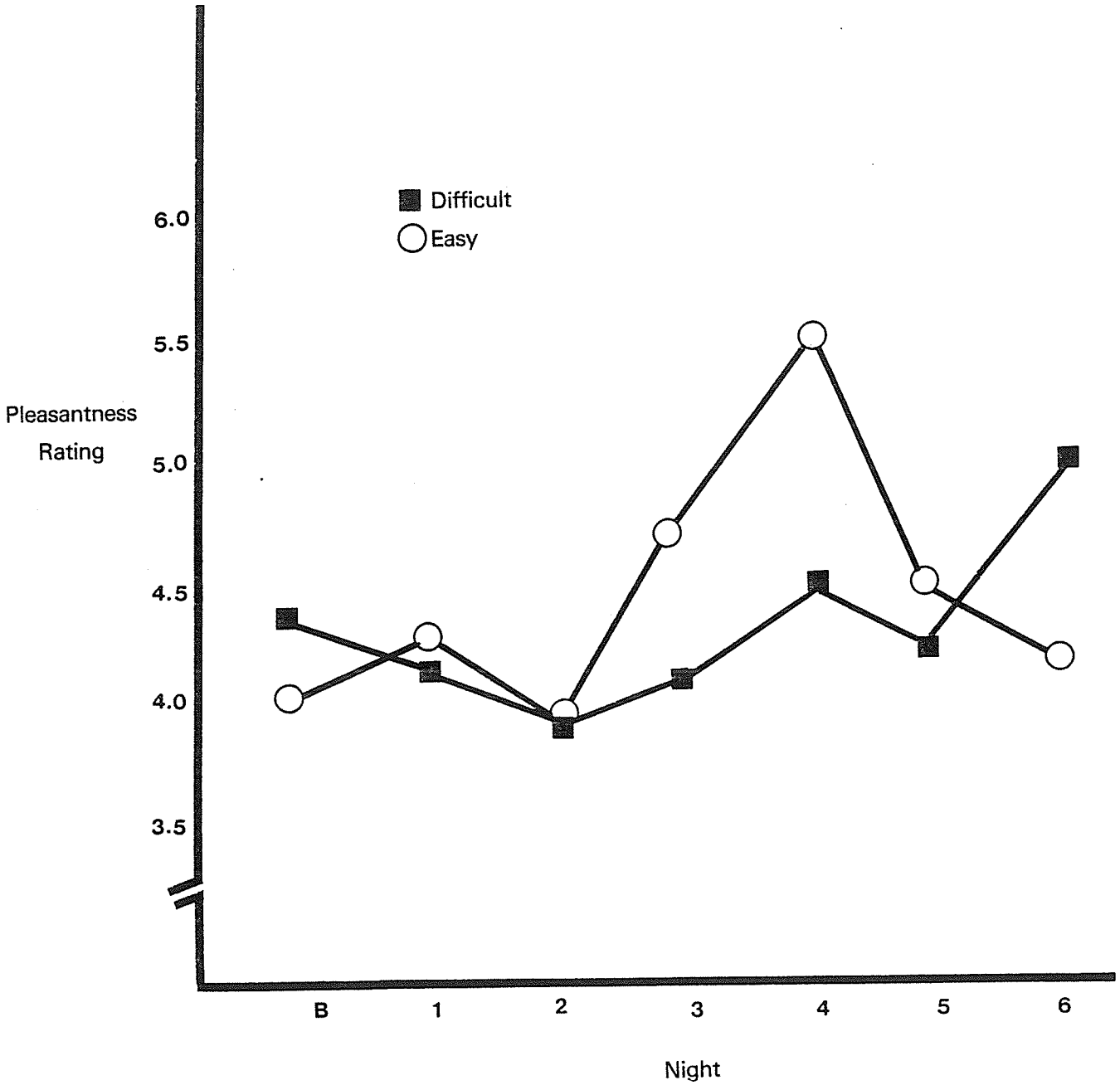
H-F = Huynh-Feldt (1970) tail probability

TABLE 7

Means and Standard Deviations ( ) of Dream Pleasantness Ratings for Difficult and Easy Condition Subjects across Nights

Night	Difficult Condition (N=15)	Easy Condition (N=15)
Baseline	4.445 (1.979)	4.010 (0.243)
1	4.133 (1.847)	4.200 (1.613)
2	3.933 (1.387)	3.933 (1.709)
3	4.067 (1.981)	4.667 (1.915)
4	4.467 (2.232)	5.467 (2.748)
5	4.333 (2.289)	4.467 (1.356)
6	4.800 (2.705)	4.133 (2.326)

Figure 2: Rating of dream pleasantness for the difficult and easy test subjects on each night.


Difficult
Easy
6.0
5.5
5.0
4.5
4.0
3.5
Pleasantness Rating
B
1
2
3
4
5
6
Night

The last of the interaction hypotheses, H6, proposed that the difficult test subjects would express a change in negative affect on the post-sleep Mood Adjective Checklist across nights while the easy test subjects would not report any change in negative affect across nights. This prediction was tested by a groups (2) X nights (7) repeated measures ANOVA (BMDP2V) where "groups" was designated the between subjects factor, "nights" the within subjects factor and the average score of the four negative MACL items (aggression, anxiety, depression and distrust) on each post-test morning as the dependent measure. Table 8 shows the results of this analysis. As hypothesized, there was a significant group X night interaction ($p < .0061$). Thus, the data indicated that the change across nights in negative affect was not the same for the difficult and easy test subjects.

To probe this significant interaction, treatment-trend contrasts (see Kirk, 1968) were conducted and are reported in Table 8. As indicated in this table, there was a marginally significant treatment group X quadratic trend ($p < .0162$). This significant treatment-quadratic trend is depicted in the means of Table 9 and visually in the graph of Figure 3. As can be seen in Figure 3, the easy test subjects showed a general increase followed by a general decrease in negative affect across successive nights while the difficult test subjects presented a different response

profile which alternated between decreasing and increasing levels of negative affect across nights. It should be noted that this finding is contrary to H6. That is, it was not the difficult test subjects who expressed less negative affect across successive post-test nights as hypothesized but the easy test subjects who reported a change in negative affect across nights.

In addition, as shown in Table 8, there was a significant "night" main effect indicating that a difference occurred across nights in the rating of post-sleep negative affect. A Scheffe test showed that the baseline night was significantly different than post-test Nights 3 and 4 on post-sleep negative affect (ps < .05). A pairwise comparision of post-test nights did not reveal any other significant differences between nights on post-sleep negative affect (ps > .05).

TABLE 8

Groups X Nights Repeated Measures Analysis of Variance and Trend Analyses on Negative Affect

Source	SS	df	MS	F	p	H-F
Group (G)	1.9481	1	1.9481	0.81	.3552	
Error	67.2380	28	2.4011			
Linear	3.4203	1	3.4203	2.34	.1373	
LinXG	4.1853	1	4.1853	2.86	.1017	
Error	40.9150	28	1.4613			
Quadratic	5.7859	1	5.7859	1.70	.2024	
QuaXG	22.2423	1	22.2423	6.55	.0162	
Error	95.0856	28	3.3959			
Cubic	0.1375	1	0.1375	0.08	.7756	
CubXG	1.0072	1	1.0072	0.61	.4425	
Error	46.4778	28	1.6599			
Quartic	3.9703	1	3.9703	3.28	.0811	
QurXG	1.1626	1	1.1626	0.96	.3358	
Error	33.9408	28	1.2122			
Quintic	0.3016	1	0.3016	0.28	.6033	
QuiXG	0.0877	1	0.0877	0.08	.7789	
Error	30.5613	28	1.0915			
Night (N)	69.1620	6	11.5270	3.72	.0017	.0040
G X N	56.9150	6	9.4849	3.06	.0048	.0061
Error	520.0000	168	3.0951			

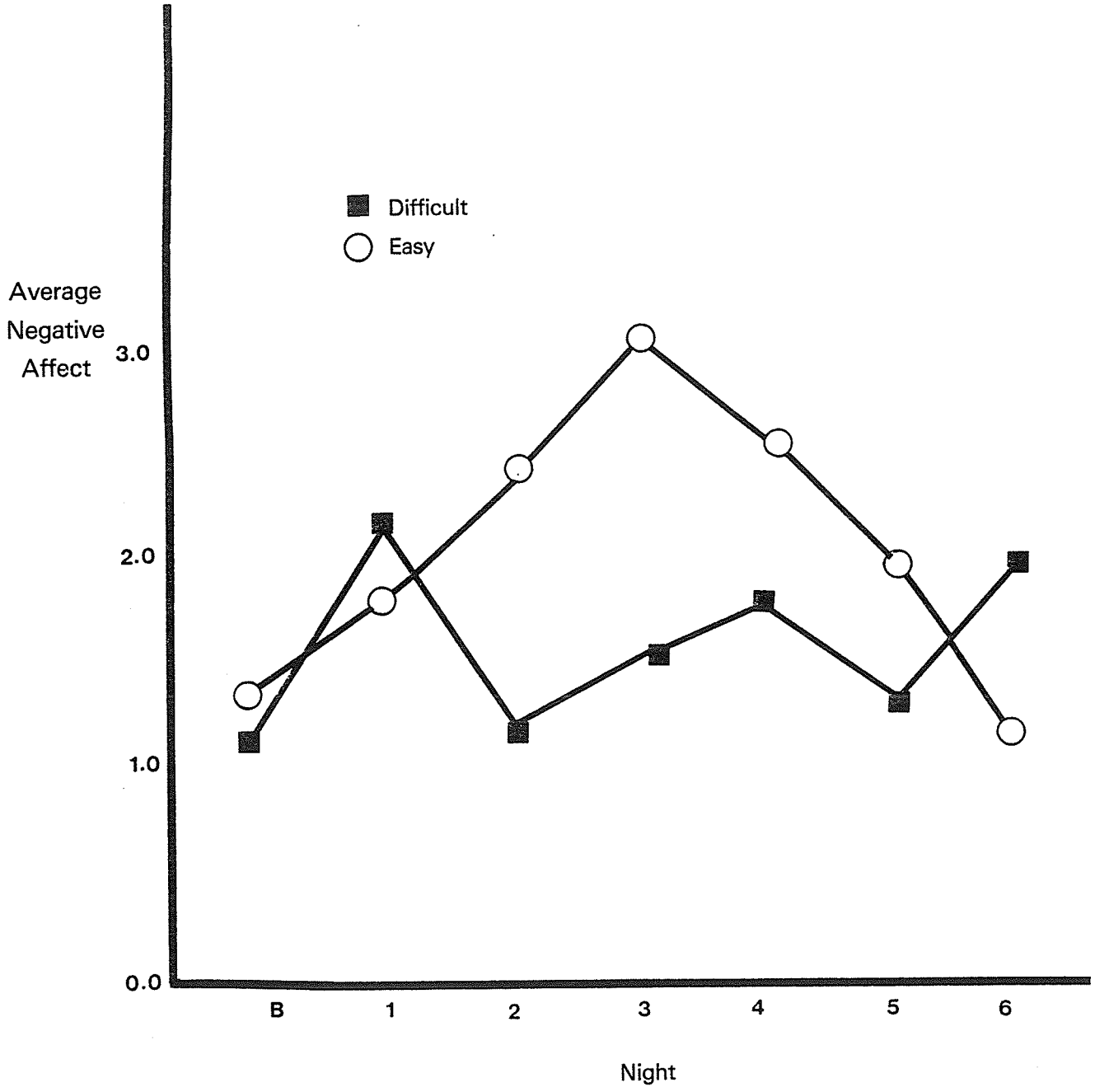
H-F = Huynh-Feldt (1970) tail probability

TABLE 9

Means and Standard Deviations ( ) of MACL Negative Affect Measures for Difficult and Easy Condition Subjects across Nights

	Baseline	Night 1	Night 2	Night 3	Night 4	Night 5	Night 6
Difficult							
aggression	.033	1.733	.333	1.333	.800	1.200	1.400
	(.642)	(2.604)	(.724)	(1.589)	(1.207)	(1.859)	(2.354)
anxiety	1.533	3.067	1.5333	2.000	2.600	2.400	2.267
	(2.022)	(3.150)	(1.922)	(1.927)	(2.746)	(2.923)	(2.658)
depression	1.114	1.467	1.800	1.333	1.667	.667	2.133
	(1.979)	(2.100)	(2.042)	(1.952)	(2.526)	(1.175)	(2.560)
distrust	1.867	2.067	.933	1.933	1.933	1.600	1.933
	(1.680)	(2.219)	(1.487)	(1.668)	(2.017)	(2.098)	(1.981)
Average Affect	1.100	2.083	1.150	1.650	1.750	1.467	1.933
	(1.671)	(2.142)	(1.105)	(1.021)	(1.820)	(1.614)	(2.054)
Easy							
aggression	.900	1.267	2.667	3.067	1.867	1.533	1.133
	(1.236)	(2.282)	(2.554)	(2.052)	(2.264)	(1.885)	(1.995)
anxiety	2.142	2.400	2.733	3.733	3.600	2.667	.933
	(2.746)	(2.530)	(2.738)	(2.604)	(2.957)	(2.577)	(1.624)
depression	1.333	1.333	1.733	2.133	2.400	2.067	1.133
	(2.033)	(1.633)	(2.154)	(1.922)	(2.923)	(2.463)	(2.356)
distrust	1.867	2.600	2.867	3.200	2.533	2.000	1.267
	(1.949)	(1.993)	(2.356)	(2.678)	(2.356)	(2.299)	(2.120)
Average Affect	1.348	1.900	2.500	3.033	2.600	1.967	1.117
	(1.002)	(1.666)	(1.750)	(1.936)	(2.134)	(1.706)	(1.661)

Figure 3: MACL negative affect for the difficult and easy test subjects on each night.


Difficult
Easy
Average
Negative
Affect
3.0
2.0
1.0
0.0
B
1
2
3
4
5
6
Night

In summarizing the results pertaining to the three interaction hypotheses, any change across successive nights in the amount of treatment incorporation in dreams was the same for the difficult test subjects and the easy test subjects. Further, any trends seen in the data were not in the direction predicted by H4. That is, the trends were toward an increase rather than a decrease in treatment incorporation across nights. However, a significant "night" effect provided evidence of a change in the amount of treatment incorporation in dreams across nights. The difficult test subjects and the easy test subjects expressed more treatment incorporation on post-test Nights 1, 3, 4 and 5 than on the baseline night. They also recorded more treatment incorporation on post-test Night 5 than on post-test Nights 1, 2 and 3. For both treatment groups, subject ratings of dream pleasantness did not significantly change across nights. Moreover, the difficult test subjects and the easy test subjects rated their dreams the same in terms of pleasantness. They also reported more negative affect on post-test Nights 3 and 4 than on the baseline night. There was a significant interaction between treatment group and night in the amount of post-sleep negative affect expressed on the MACL. Though this interaction was predicted in H6, post hoc analyses of the interaction indicated that it was the easy test subjects who reported less negative affect across nights and not the difficult test subjects. The difficult test subjects expressed fluctuating levels of

negative affect across successive nights, whereas the easy test subjects exhibited an initial increase and then a decrease in negative affect across nights. Therefore, H4, H5 and H6 were not supported.

All Post-test Nights (H7, H8, H9)

Finally, a last set of predictions proposed a difference between groups on measures of treatment incorporation, dream pleasantness and negative affect on each post-test night. That is, subjects in the difficult test condition would report more incorporation of the stressor in dreams (H7), rate their dreams more negatively on the DRS (H8), and report more negative affect on the MACL (H9) on each post-test night than subjects in the easy test condition.

To test these hypotheses, a series of two independent sample one-tailed *t* tests (BMDP3D) were conducted. Each *t* test performed on the data from post-test Nights 2 through 6 was assessed for statistical significance at the .01 level. (Note that it was not necessary to perform *t* tests on the data from post-test Night 1 as this test was already performed with respect to H1.) With respect to H7, the four dimensions of treatment incorporation were averaged in order to obtain one incorporation of stressor score. As shown in Table 10, none of the *t* tests examining differences between groups in

treatment incorporation reached statistical significance. Thus, H7 was not supported in that subjects given the difficult test did not report more incorporation of the stressor in dreams on any post-test night than subjects who completed the easy test.

Table 10 also lists the results of the t tests conducted on the DRS item measuring dream pleasantness to test whether the difficult test subjects rated their dreams as being more unpleasant than the easy test subjects on any of the post-test nights (H8). As can be seen from the table, H8 was not supported as there was no significant difference between treatment groups in the unpleasantness rating of dreams on any night. Similar results were obtained for H9 which postulated group differences on negative affect. While differences between groups on negative affect approached significance on post-test Nights 2 ($p < .0187$) and 3 ($p < .0232$), these differences were not in the direction predicted by H9. It was expected that the difficult test subjects would report more negative affect on the post-sleep MACL than the easy test subjects. In fact, it was the easy test subjects who expressed more negative affect (see Table 9).

TABLE 10

Two Independent Sample t Statistics Testing Group Differences on Treatment Incorporation in Dream Content, Dream Pleasantness Rating, and Negative Affect on each Night

Post-test Night [a]	Treatment Incorporation (H7)			Pleasantness Rating (H8)			Negative Affect (H9)		
	df	t	p	df	t	p	df	t	p
1	14.3	0.98	.3445	27.5	0.11	.9169	26.4	0.26	.7956
2	18.5	1.89	.0745	26.9	0.00	1.0000	23.6	2.58	.0187
3	14.3	0.83	.4206	28.0	0.84	.4061	21.2	2.45	.0232
4	14.2	1.44	.1720	26.9	1.09	.2837	27.3	1.17	.2506
5	28.0	0.01	.9903	22.7	0.19	.8478	27.9	0.82	.4166
6	25.7	0.56	.5804	27.4	0.72	.4753	26.8	1.20	.2416

[a] Post-test Night 1 information was obtained from the test of significance associated with H1

Summary of Hypothesis testing. Exposure to an aptitude test appears to have elicited similar responses among the easy and difficult test condition subjects on the first post-test night: they did not differ in the amount of treatment incorporation displayed in dreams, in their rating of the dream's pleasantness or in their expression of post-sleep negative affect. In addition, any change across nights in treatment incorporation of the difficult test subjects was similar to that of the easy test subjects. Contrary to H4, the trends seen in the data were toward an increase rather than a decrease in treatment incorporation across nights. Indeed, more treatment incorporation was reported on post-test Night 5 than on post-test Nights 1,2 and 3. Subject ratings of dream pleasantness did not significantly change across nights and did not differ between treatment conditions. There was a significant interaction between treatment group and night in the amount of post-sleep negative affect expressed on the MACL. Though this interaction was predicted in H6, it was the easy test subjects who reported less negative affect across post-test nights and not the difficult test subjects. Also contrary to expectation, the easy test subjects expressed more negative affect on post-test Nights 2 and 3 than the difficult test subjects. Subjects given the difficult test did not report more incorporation of the stressor in dreams or rate their dreams as being more unpleasant than subjects administered the easy test on any of the six post-test

nights. Therefore, none of the hypotheses received empirical support.

In addition to testing the experimental hypotheses, the data provided an opportunity to examine some other questions concerning the alteration of dream content and mood following exposure to an intellectual stressor (cf., Kramer & Roth, 1973, 1980). Specifically, these data permitted the examination of possible changes in the prevalence of certain dream content items, dream ratings or mood across post-stressor nights. It was also possible to examine potential relationships between dream content and subjects' dream ratings and/or mood. These questions are addressed in the section which follows.

Did the content of dreams change across nights?

The content of each dream report was analyzed by a judge along a total of 54 dimensions which represent the eight dream content categories (treatment incorporation, affect, activity, fortune, social interaction, sequence change, bizarreness, vividness). The dimensions of a given dream content category were averaged in order to obtain the category score. A groups (2) X nights (6) repeated measures

multivariate analysis of variance (MANOVA) (BMDP4V) using the eight dream content categories as the dependent measures assessed whether dream content changed across nights. For this analysis, "groups" was designated a between subjects factor while "nights" was declared a within subjects factor. Each omnibus hypothesis was assessed at an .01 level of significance. Results indicated that neither the "night" main effect [F (40, 582.53) = 1.32, p < .0921] nor the "group X night" interaction [F (40, 582.53) = 1.05, p < .3858] were statistically significant. Therefore, dream content did not change across nights for either group. In addition, the "group" main effect showed that the dream content of the difficult test subjects did not differ significantly from that of the easy test subjects, F (8, 21) = 0.30, p < .9583.

Did an alteration occur in the way subjects described their dream experience across nights?

A groups (2) X nights (6) repeated measures MANOVA (BMDP4V) using the 10 items of the Dream Rating Scale as the dependent measures examined the question of whether subjects reported a change in their dream experience across nights. "Groups" was designated the between subjects factor while "nights" was the within subjects factor and each omnibus hypothesis was tested at α = .01. Results indicated that

the "night" main effect was not significant [F (50, 600.82) = 1.17, p < .2027], showing no change in subject dream ratings across nights. The "group X night" interaction further indicated that this lack of change across nights pertained to subjects in either test condition, F (50, 600.82) = 0.97, p < .5436. Finally, the "group" main effect revealed no significant difference in dream ratings between the two test conditions, F (10, 19) = 1.12, p < .3991.

Did mood change between pre- and post-sleep?

In order to determine whether subjects' mood changed during the night, three groups (2) X nights (6) X time (2) repeated measures MANOVAs (BMDP4V) were computed using nights and time (pre-sleep/ post-sleep) as the repeated dimensions and groups as the between factor. The two positive affect MACL items (ie., surgency, social affection) served as the dependent variables in the first MANOVA, the four negative affect MACL items (ie., aggression, anxiety, depression, distrust) were the dependent variables in the second MANOVA, and the two neutral affect MACL items (ie., quiet, detachment) were the dependent variables in the third MANOVA. Since interest focused on mood change between pre- and post-sleep, the critical tests were those involving the "time" factor, ie., the "time" main effect, the "group X time" interaction, the "night X time" interaction, and, finally, the "group X night X time" interaction.

Adopting a .01 level of significance for each omnibus hypothesis, results indicated that there was a significant multivariate "time" main effect on the positive MACL items, F (2, 27) = 7.75, p < .0022. Univariate analyses associated with this time main effect showed a significant change in the MACL items of surgency [F (1, 28) = 13.60, p < .0010] and social affection [F (1,28) = 12.25, p < .0016]. An examination of the scale means associated with this main effect indicated that less surgency and social affection were reported in the morning than at night [respective pre-sleep and post-sleep means and standard deviations ( ): for surgency, 3.1722 (2.6528), 2.5056 (2.6373), and for social affection, 3.4556 (3.0127), 2.7167 (2.8072)]. None of the other tests examining pre-sleep versus post-sleep positive MACL ratings for the difficult and easy test subjects across nights were statistically significant. That is, the "group X time" interaction (p < .64), the "night X time" interaction (p < .68), and the "group X night X time" interaction (p < .73) were non-significant, indicating that the observed "time" effect was constant across groups and nights. In addition, the "group" main effect showed no overall difference between the difficult and easy test conditions in positive mood ratings (p < .73). Finally, neither the "night" main effect (p < .07) nor the "group X night" interaction (p < .26) were significant.

No main effects or interactions were found to be statistically significant on the MANOVA that tested for changes in negative mood. That is, the "group" main effect ($p < .92$), the "night" main effect ($p < .14$), the "time" main effect ($p < .59$), the "group X time" interaction ($p < .65$), the "group X night" interaction ($p < .16$), the "night X time" interaction ($p < .70$) and the "group X night X time" interaction ($p < .92$) were non-significant. Thus, both the difficult condition subjects and the easy condition subjects reported similar overall levels of negative mood and neither group experienced a change in negative mood during the night or across nights.

Further, no main effects or interactions were found to be statistically significant on the MANOVA that tested for changes in neutral mood. The "group" main effect ($p < .11$), the "night" main effect ($p < .31$), the "time" main effect ($p < .74$), the "group X time" interaction ($p < .88$), the "group X night" interaction ($p < .02$), the "night X time" interaction ($p < .35$) and the "group X night X time" interaction ($p < .24$) were non-significant. Thus, both the difficult condition subjects and the easy condition subjects reported similar overall levels of quiet and detachment, and, neither group experienced a change in these two MACL items during the night or across nights.

To summarize, the changes in mood between pre- and post-sleep concerned the positive mood dimensions of

surgency and social affection. Both the difficult test condition subjects and the easy test condition subjects showed less surgency and less social affection in the morning than at night.

Was pre-sleep mood related to subsequent dream content?

Using the Statistical Analysis System (SAS), a multivariate linear regression analysis was computed to determine if pre-sleep or evening mood served as a predictor of dream content. The eight pre-sleep MACL items (ie., surgency, social affection, quiet, detachment, aggression, anxiety, depression, distrust) were the predictor variables and the eight dream content categories (ie., treatment incorporation, affect, activity, fortune, social interaction, sequence change, bizarreness, vividness) were the criterion variables. For each criterion variable, the mean value across the six post-test nights for each subject was used in this analysis. Adopting a .01 level of significance, the results indicated that the content of a dream was not significantly related to evening mood, $\underline{F}$ (64, 98) = 0.891, $\underline{p} < .6880$.

Was post-sleep mood related to the dream content of the preceding night?

To determine if post-sleep or morning mood was related to the previous night's dream content, a multiple linear regression (SAS) was performed using the eight dream content categories previously enumerated as the predictor variables and the eight post-sleep MACL items as the criterion variables. Again, for each criterion variable, the mean value across the six post-test nights for each subject was used in this analysis. Adopting a .01 level of significance, the multivariate test was judged non-significant, indicating that morning mood was not affected by the previous night's dream content, F (64, 98) = 0.898, p < .6749.

Were subject ratings of the dream related to pre-sleep mood?

To answer this question, a multivariate multiple linear regression analysis (SAS) was computed using each of the eight pre-sleep MACL scores averaged across the six post-test nights for each subject as the predictor variables and each of the 10 DRS items averaged across post-test nights for each subject as the criterion variables. Adopting .01 as the level of significance, results indicated that the subject ratings of the dream were not predictive of evening mood, F (80, 82) = 1.300, p < .1197.

Were subject ratings of the dreams related to post-sleep mood?

A multivariate multiple linear regression analysis (SAS) using the average of each post-sleep MACL item across nights for each subject as the predictor variables and the average of each DRS item across nights as the criterion variables was computed to determine if subject ratings of dreams were related to morning mood. Adopting .01 as the level of significance, results indicated that there was no relationship between subject dream ratings and morning mood, $\underline{F}$ (80, 82) = 1.436, $\underline{p} < .0524$.

Were subject ratings of the dreams related to the dream content?

A multivariate multiple linear regression analysis (SAS) was computed using each of the eight dream content categories averaged across the six post-test nights for each subject as the predictor variables and each of the 10 DRS items averaged across post-test nights for each subject as the criterion variables. Adopting .01 as the level of significance, results indicated that dream content did not predict the subject ratings of the dream, $\underline{F}$ (80, 82) = 1.431, $\underline{p} < .0549$.

Summary of question testing. The opportunity provided by the data to examine several questions concerning possible changes in dream or mood measures across post-stressor nights and the potential relationships between dream content and subjects' dream ratings and/or mood revealed no significant relationships between dream and mood measures. There however was a change in the ratings of two affect items during the night.

None of the dream content categories showed a significant change across nights for either the difficult or easy test subjects. Similarly, subject dream ratings did not differ significantly across nights for either test condition. However, both easy and difficult test subjects did express a significant change in positive affect between pre- and post-sleep. Specifically, across all nights, subjects of each treatment condition felt less surgency and social affection in the morning than at night. In contrast, subjects in each treatment condition exhibited similar levels of negative mood at night as in the morning. That is, neither the difficult test subject nor the easy test subjects reported a change in negative mood during or across nights. Finally, across all nights, both the difficult test subjects and the easy test subjects reported similar levels of quiet and detachment on the MACL at night as in the morning. No significant relationship was found between evening mood and subsequent dream content or between evening

mood and subject ratings of the dreams. Moreover, morning mood was not related to the dream content of the preceding night. And finally, subject ratings of the dreams were not affected by morning mood or by dream content.

Post-experimental Questionnaire (PEQ)

Because responses to the post-experimental questionnaire (PEQ) were descriptive in nature, the PEQ items were not subjected to statistial analysis but instead they were examined as a source of information concerning the subject's attitude toward the experiment and the aptitude test.

When asked what they thought was the purpose of the experiment, one-third of all subjects stated the study sought to examine the relationship between mood before sleep and dream content. Six subjects (or 1/5 of the participants; 4 difficult test and 2 easy test subjects) suggested the intent was to see if there is any correlation between intelligence and dream content. Some speculated the experiment's purpose was to study the effects of dreams on mood while others mentioned the reason was to determine if the amount of dream recalled was related to mood.

The aptitude test had a mixed effect on subjects' opinion of their intelligence. Almost half of the subjects (8 difficult test subjects; 6 easy test subjects) indicated that the test had either no or very little influence on the opinion they held concerning their own intelligence. Several participants reported the aptitude test just supported their prior opinion: they were neither brilliant nor "stupid". However, 11 subjects (9 difficult and 2 easy test subjects) expressed disappointment, felt they were not very smart and found there was really a lot they did not know. As well the aptitude test affected levels of confidence and ambition in diverse manners. Though many subjects (7 difficult and 10 easy test subjects) reported the test had little or no effect on their levels of confidence and ambition, some (6 difficult and 2 easy test subjects) commented that they found parts of the test difficult and so they were less confident, while others (2 difficult test subjects) mentioned their confidence level dropped considerably and their ambitions changed because they thought they were not very intelligent. One participant recounted a process whereby his confidence was decreased by the test but his level of ambition increased in an attempt to restore his confidence.

When asked to speculate on the relationship between the aptitude test and the collection of dreams, 20 subjects (8 difficult and 12 easy test subjects) stated there was no

relationship. However, suggestions were made that intelligence may influence dream and therefore people with high aptitude test scores may have "eccentric" dreams or have different kinds of dreams than people with low test scores. One individual proposed that the aptitude test determined the "complexity" of subsequent dream, explaining that the test induced emotion rather than action in dreams.

Many subjects (4 difficult and 7 easy test subjects) thought the purpose of dream collection each night was to determine a relationship between mood before going to bed and dream content. One participant speculated the reason for the collection of dreams was to ascertain the amount of dream material a dreamer can recall. Others suggested dream collection was conducted to evaluate the influence of aptitude or confidence on dreams. Only two men stated the purpose of dream collection each night was to investigate whether dream content changes from night to night.

None of the subjects reported having any prior knowledge concerning the experiment. Further, no subject expressed any concern or felt he was treated unfairly during the experiment.

DISCUSSION

In order to examine the function of dreams in adaptation to a stressful intellectual activity, it was essential that the difficult version of the aptitude test used in this study induce stress and as a consequence influence mood and dream content. Although not anticipated, both versions of the aptitude test significantly affected subjects' mood immediately following the test administration. Subjects of each treatment condition reported more anxiety, depression and distrust and less surgency and social affection following the test. The responses of the subjects to the Post-test Questionnaire further indicated that the experimental manipulation induced stress in both the easy and difficult conditions. All subjects felt frustration while writing the test and reported not being pleased about their performance. Thus, the data suggested that the test manipulation was effective and stressful enough to induce change in dream content and mood measures but it did not seem to differentially effect the two treatment conditions.

Because each test version induced a similar stress reaction, there was no significant difference between the two conditions on measures of treatment incorporation in

dreams, ratings of dream pleasantness or ratings of post-sleep negative affect on post-test Night 1. Further, each treatment condition showed a similar trend of more incidents of treatment incorporation across nights. The subjects of the difficult test condition and the easy test condition subjects gave similar pleasantness ratings to their dreams and moreover they did not change their ratings across nights. The treatment conditions however differed in post-sleep negative affect across nights: the easy test subjects reported initially more and then less negative affect while the difficult test subjects expressed fluctuating levels of negative affect across successive nights. In terms of positive affect, subjects of each test condition felt more surgency and social affection at night than in the morning. Thus, only for morning negative mood was there a significant difference between the treatment conditions.

Measures of treatment incorporation and post-sleep negative affect showed a significant change across nights. More treatment incorporation was reported on post-test Nights 1, 3, 4 and 5 and more post-sleep affect was recorded on post-test Nights 3 and 4 than on the baseline night. This suggests that adaptation to stress is a dynamic process that involves change in the function of dreams. Although the rating of dream pleasantness did not show a statistically significant change across nights, Figure 2 suggests some fluctuation across successive post-stressor

nights. Indeed all the figures, Figures 1, 2 and 3, suggest the occurrence of some shifting in ratings across nights. Ratings of treatment incorporation and and dream pleasantness appear to decrease and increase repeatedly across nights, with a tendency to increase on the last three post-stressor nights of the study. This evidence of change or oscillation of ratings supports the notion that adaptation to stress is a dynamic process that involves change in the function of dreams.

Interestingly, Figures 1 and 2 also show that ratings of treatment incorporation and measures of dream pleasantness produce remarkably similar but inverse configurations. The similarity in profiles suggests that there may be a relationship between treatment incorporation in dreams and subjects' ratings of dream pleasantness, though the regression analysis examining this relationship was nonsignificant. Because there is a lack of statistical support, the suggestive evidence provided by Figures 1 and 2 permits only cautious speculation that these two measures are related.

Given that the test manipulation induced a stress reaction in both treatment conditions and because there was only one significant difference between treatment conditions, it seems that the present study in essence consisted of only one treatment group. The apparent presence of only one treatment group is a finding that was

especially surprising since the results of a pilot study had indicated that the two versions of the intellectual task were differentially stressful to each of the treatment groups. There were however procedural differences between the pilot and present studies that may account for the disparity in findings. It is therefore pertinent to compare the procedures of the pilot study to those of the present study in an attempt to understand reasons why the experimental manipulation was not differentially stressful to the treatment groups in the present study.

Procedural Differences

As mentioned previously, a pilot study was conducted in order to develop the exact form of the difficult and easy test versions of the intellectual activity and to ensure that the two versions were differentially stressful to participants. In the pilot study, groups of subjects completed versions of the aptitude test, pre- and post-test MACL, and the Post-test Questionnaire for course credit. Subjects were not selected on the basis of scores on the MPI neuroticism scale. Results of the pilot study indicated that the difficult test version but not the easy test version induced a stress reaction immediately following the test administration, as measured by pre-test to post-test changes in mood. When compared to pre-test ratings, those subjects who wrote the difficult test version reported more depression and aggression but less surgency and social

affection while those subjects completing the easy test version recorded less depression, aggression, anxiety and distrust following the test. These differences also were significant between test groups. Thus, the pilot findings not only indicated that the difficult test version was effective as a stress inducer but also showed that the difficult and easy test versions were differentially stressful to subjects. In contrast, the present study failed to demonstrate that the difficult test version was more stressful to subjects than the easy test version.

This discrepancy in findings between the pilot and present study may be accounted for by a difference in the selection of subjects. The subjects of the pilot study were not selected on the basis of their scores on the neuroticism scale of the MPI. However, subjects in the present study were specifically chosen to participate because they had a high neuroticism score. This was because such individuals have been shown to be particularly good at recall of their dreams (Cohen & Cox, 1975), an especially important criterion for this study because dream reports were recorded in the morning at home rather than during a REM period awakening in a laboratory.

Subjects high in neuroticism are also susceptible to stress induction (Cohen & Cox, 1975). Since neuroticism is defined as a strong and labile emotional responsiveness (Eysenck & Rachman, 1965), individuals who score high on

this dimension are thought to experience more intense and affective reactivity than those individuals scoring low on neuroticism (Claridge, 1967). Therefore, the personal characteristic of neuroticism may have caused all subjects in the present study to respond to the intellectual activity with a stress reaction, regardless of its difficulty. Moreover, the test situation itself may have induced stress in subjects who are susceptible to affective reactivity. In fact, then, the pilot and present study may have inadvertently sampled very different populations.

Furthermore, participants in the experimental study were exposed to more potential stressors and as a result may have been subjected to more stress than the participants of the pilot study. Subjects consented to participate in a study that required some interest, dedication and involvement on their part. Being reimbursed by a cash payment as well as by course credit contributed additional reason and pressure to do well. The very setting in which the aptitude test was administered conceivably focused subject attention on the test and enhanced the importance of doing well since each subject wrote the test in isolation, free from many potential distractions. It seems reasonable to assume that, taken in combination, these sources of stress created a situation that potentially induced more stress than did the pilot study. The presence of additional stress inducers in the experimental study can partly account for the difference in findings between the two studies.

Adaptation to a Stressful Intellectual Activity

This study was designed to address and pursue the possibility that adaptation to stress may be an evolving or dynamic process. If adaptation is indeed an evolving process, then significant differences in dream measures and mood ratings should occur across nights following exposure to the stressful intellectual activity. Ratings of treatment incorporation in dream content and post-sleep negative affect showed significant differences across succesive post-test nights. In addition, there was a signficant "group X night" interaction, indicating that the change across nights in negative affect was not the same for the difficult and easy test subjects. Therefore, the data the data failed to statistically support the notion that adaptation to a stressful intellectual activity is a dynamic process that evolves across post-stressor nights.

Given the evidence provided by the manipulation checks that the intellectual activity did indeed induce stress, it seems that the adaptation process changed across successive post-test nights. There was a significant increase between the baseline night and post-test Night 1 on treatment incorporation of dream content for both the difficult test subjects and the easy test subjects. Significantly more treatment incorporation was also reported by the difficult and easy test subjects on post-test Nights 3, 4 and 5 than on the baseline night. Dream treatment

incorporation is consistent with the mastery hypothesis of dream function. Therefore dream content findings of treatment incorporation suggested that subjects were attempting to master or handle the stress engendered by the intellectual activity during post-stressor Nights 1, 3, 4 and 5. Also consistent with the mastery hypothesis, ratings of post-sleep negative affect for both the difficult test subjects and easy test subjects showed an increase on post-test Nights 3 and 4. Based on the conceptualization of the mastery hypothesis described earlier, on several post-stressor nights subjects may have been attempting to integrate the stress induced by the test manipulation with memory traces of similar past, stressful experiences in order to achieve some resolution to the conflict aroused by the test.

It is unclear why the mastery process should occur on several post-stressor nights. Since Cohen and Cox (1975) found that individuals who score high on neuroticism were more easily influenced by external conditions than those who score low, it is possible that these subjects experienced so much ongoing, current stress in their daily lives that they were unable to master the experimental stress during waking. In addition, recording and rating their dreams and reporting mood might have served to re-introduce and partly maintain the effects of the experimental stress manipulation.

Not only was there evidence of a mastery process of adaptation operating on several post-stressor nights but there was a tentative suggestion that the mastery process was actually becoming more evident in dreams toward the end of the study than in those dreams of nights immediately following the stress manipulation. For example, Figure 1 clearly depicts a trend toward more treatment incorporation in dream content across successive post-stressor nights for subjects of both test conditions. This suggests that the greatest disruption of dream content might have occurred toward the end of the study, as measured by incidents of treatment incorporation in dream content. The emotional reactivity associated with neuroticism may have repressed or delayed the appearance of treatment incorporation in dreams.

An apparent delay in maximal impact of a stressor on dream content has been suggested by two studies. Cartwright, Bernick, Borowitz, and Kling (1969) reported that subjects described more incorporation of an erotic film in dreams on the second and third nights after the movie presentation than on the first post-film night. In addition, De Koninck and Koulack (1975) showed a film depicting industrial accidents before sleep and found the film was stressful enough to affect presleep mood and the sleep pattern of subjects but did not influence the dream content. They posited that subjects possibly delayed film incorporation in their dreams beyond the dream collection period of one night.

Though dreams were not collected across successive post-stressor nights, an intellectual activity has been used as the presleep stressor in two additional studies (Cohen and Cox, 1975; Koulack, Prevost, and De Koninck, 1985). Cohen and Cox (1975) administered difficult or easy WAIS items to subjects and found that subjects who dreamed overtly or symbolically of the presleep condition had a marked positive change in "state of mind" (p.91), as measured by positive post-sleep affect. Design variations make it difficult to compare the findings of the present study to Cohen and Cox's findings. Subjects in the Cohen and Cox (1975) study slept in the laboratory for only one night and thus had an adaptation night superimposed on the night of the experimental manipulation. This procedure may have combined the stressful effects of sleeping in the laboratory with those of the experimental manipulation. Consistent with the findings of the present study, some treatment incorporation was evident in the subjects' dreams, suggesting a mastery function in adaptation to stress. However, Cohen and Cox's observation that subjects exhibited a marked positive change in "state of mind" or post-sleep affect was not observed in the present study, where the change in pre- to post-sleep affect indicated that subjects from each treatment condition felt less positive affect in the morning than at night. That is, subjects expressed more surgency and social affection on the pre-sleep MACL than on the post-sleep MACL. Again, a procedural variation between

studies makes it difficult to interpret the importance of this difference concerning mood. Cohen and Cox used a general affect rating that was obtained by summing and then averaging the scores of three affect dimensions: happy-depressed, affectionate-angry, relaxed-nervous. The present study however adopted the MACL to provide a more specific measure of mood components.

In the Koulack, Prevost, and De Koninck (1985) study, subjects worked on either a difficult or an easy version of an intellectual test on each of two evenings immediately before going to bed in the laboratory. The first night was a night of uninterrupted sleep and the second was a dream collection night. Dreams of subjects in the difficult condition contained more anxiety and somewhat higher levels of incorporation of the presleep material than subjects in the easy condition, supporting the notion that dreams serve a mastery function following a stressful event. Again, design variations make it difficult to compare the findings of their study to those of the present study. Koulack et al. (1985) collected dream reports by awakening subjects during each REM period of the dream collection night. Besides possibly being stressful to subjects, this procedure undoubtedly disrupted the subjects sleep since it involved a number of awakenings on a single night. Several awakenings during the same night may have disturbed the function of dreams if, in fact, the dreams of a single night

are interrelated and part of a single whole (Freud, 1953; Kramer, Whitman, Baldridge, & Lansky, 1964). In contrast, the morning dream report procedure of the present study permitted subjects to experience dreams without interruption during the night. As suggested by Koulack et al. (1985), subjects presumably have available a number of different and/or integrative ways of dealing with a stressful event when they remain asleep during their dreams (p.251). In addition, the two studies used different dream affect measures. Anxiety was the only dream affect measure in the Koulack et al. (1985) study while anxiety was combined with other affect dimensions to form the dream content category of affect in the present study. Thus the earlier study examined a specific dimension of affect in dream whereas the present study investigated global affect.

Examining the pre- and post-sleep MACL ratings, Koulack, Prevost, and De Koninck (1985) noted a significant increase in night to morning anxiety following a night of dream collection while Cohen and Cox (1975) reported a positive change in post-sleep affect. The present study however found less positive affect in the morning than at night: ratings of surgency and social affection showed a decrease from night to morning. Similarly, Sirois-Berliss and De Koninck (1982) observed that global positive and global negative mood scores tended to decrease from presleep to postsleep, suggesting that subjects experienced less

affect in the morning than at night. Therefore, several studies have shown night to morning differences in mood, though the direction of differences has varied among studies. This type of finding has led Kramer and Roth (1973, 1980) to suggest that pre- to post-sleep differences in mood are related to sleep and hence sleep might serve a mood-regulating function. In support of this notion, differences in mood from night to morning were found to be related to dream content in the Kramer and Roth (1973, 1980) studies. Specifically, the mood rating of unhappy was associated with the number of characters in the dream. When a number of characters appeared in the dream, subjects reported a decrease in the unhappy mood rating from night to morning. The present study however did not find a significant relationship between pre- or post-sleep affect and dream content. It should be noted though, that the exact number of characters were not specifically counted in this study (see Appendix E). Thus, this study provided evidence of a possible mood-regulating process occurring between night and morning, as indicated by the consistent diminution in positive affect, but it found no specific indication of a relationship between affect and dream content.

Examining the Mastery-Compensatory Model

A primary purpose of this study was to explore the applicability of the proposed Mastery-Compensatory Model to describe the function of dreams in adaptation to a stressful intellectual activity. In brief, the Mastery-Compensatory Model conceptualizes adaptation to stress as an on-going dynamic process commencing at the time of the occurrence of the stressful event and continuing throughout the individual's waking and sleeping life until he or she resolves the conflict engendered by the stressor. The model further proposes the individual will initially experience predominantly mastery dreams followed by compensation dreams as part of a two-fold adaptation process to restore balance or equilibrium. Indeed, the present study provides support for the notion that adaptation to stress is a dynamic process that involves mastery and compensatory phases.

An integral part of the Mastery-Compensatory Model is the prediction that instances of dream content incorporating elements from the experimental condition will decrease as mastery of the stressor is achieved. However, significantly more treatment incorporation was reported on post-test Nights 1, 3, 4 and 5 than on the baseline night. Furthermore, the results of this study showed the trend toward more treatment incorporation in the dream or dreams across successive post-stressor nights, suggesting the operation of a mastery function of dreams. This trend

indicates the mastery process was actually becoming more evident in dreams toward the end of the study than in dreams immediately following the stress manipulation.

One might speculate that the dreams immediately following the stressful intellectual activity served a function that was primarily mastery in nature. Hence, on post-test Night 1 subjects were attempting to work through or master the stress engendered by the intellectual activity administered that day by incorporating elements of the stressor in dreams. Because the process of mastery includes a rehearsal of stressful elements and associated affect, the process itself might have contributed additional stress to that already generated by the intellectual activity. Subjects then might have experienced dreams that would help to restore some degree of psychological balance. Consequently, dreams on post-test Night 2 might have provided some compensation for the conflict and possibly allowed subjects to avoid the stressor.

Compensation is suggested by dream content that is discontinuous or inconsistent with elements of the waking stressful situation. Given that compensation is, in effect, indicated by an absence of treatment incorporation in dreams, it is possible that dreams served primarily a compensatory function and less a mastery function on post-test Nights 2 and 6. As the subjects achieved some degree of solace through the compensation process on these nights,

a need to master the stressor might have become dominant again on subsequent nights if subjects had not adequately dealt with the contemporary stress.

Indeed, the findings of the present study are not inconsistent with the notion that adaptation to the stressful intellectual activity involved mastery and compensation phases. Dream content incorporation of the stressor and post-sleep negative affect suggest the operation of a mastery process on post-test Nights 3 and 4 and possibly also on post-test Nights 1 and 5. The changes in negative affect across successive post-stressor nights provide evidence of a mastery phase and a compensation phase. Although the easy test subjects showed an initial increase and then a decrease in morning negative affect across nights, the difficult test subjects presented a response profile that alternated between decreasing and increasing levels of post-sleep negative affect across nights, possibly as the result of some oscillation in dream function between mastery and compensation processes. Thus, although highly speculative, it is possible that dreams oscillated between serving a mastery and a compensation function until subjects were able to achieve adaptation to the stressful intellectual activity.

The notion that adaptation to an intellectual stressor might involve a process of oscillation between functions of dream is consistent with the disruption-

avoidance-adaptation model proposed by Wright and Koulack (1987). They suggested an oscillation occurs between dreams concerning the stressful event and dreams presenting elements that appear either complementary or unrelated to the event, until successful adaptation to the stressor has occurred. According to this model, dream content following a stressful event is altered or disrupted by the incorporation of elements of the situation in an attempt to master the event. However, the process of dreaming about the stressful event may itself be stressful and so the individual then experiences dreams that are unrelated or complementary to the stressor as a way of avoiding and obtaining temporary relief from the disruptive material. That is, mastery (or disruptive) dreams are replaced by pleasant (or avoidance) dreams in order to achieve equilibrium or homeostasis. If the individual has not successfully dealt with the stressor, then dreams will again address the stressful event in an attempt to master the stress. This oscillation between functions of dream is postulated by Wright and Koulack (1987) to continue until the individual is able to obtain some sort of resolution of the stress.

There is additional evidence that the function of dreams may change during adaptation. Kramer, Whitman, Baldridge, and Lansky (1964) examined the interrelationship between dreams within a night and found two main patterns.

One pattern consisted of a sequential relationship in which "progression occurs and in which each dream solution acts as a 'night residue' for the next dream" (p.438). The other pattern involved a repetition of themes related to "traumatic states". Though Kramer et al. suggested the two types of dream pattern may be at the ends of a continuum, the patterns of repetition and progression indicate that dreams might change or serve more than one function in adaptation. The function of dreams may include a rehearsal or repetition of the event and then a progression from that event in order to establish balance and eventually adaptation to the trauma. Possibly, the specific pattern of dreaming may be determined by the nature of the stressor itself, the significance of the stressor to the individual, and the capacity of the individual to withstand stress.

It appears then that adaptation to stress is a dynamic process. The findings of the present study are consistent with the notion that dreams serve to master stress following a stressful intellectual activity and that this function tends to assume a more prominent role in adaptation across successive post-stressor nights. In addition, there is at least suggestive evidence to speculate that adaptation to a stressor may involve an oscillation between mastery and compensation processes of dream function until successful adaptation to the stressor has occurred.

Special Considerations

Since the present study failed to statistically support the notion that dreams serve initially a mastery and then a compensatory function in adaptation to stress, it is pertinent to address some of the difficulties and considerations associated with this study and the general area of dream research (for a review of measurement and design issues in sleep research, see Antrobus, Fein, Jordan, Ellman, & Arkin, 1978). These considerations can be categorized as conceptual, methodological and statistical issues.

Typically, dreams are conceptualized as serving either a mastery or a compensatory function in adaptation to stress. Those dreams that contain incorporations of the stressful event are thought to reveal a mastery process. Though it is relatively easy, through incidents of treatment incorporation, to determine that a dream appears to be fulfilling a mastery function, it may not always be obvious that a dream is functioning to compensate the dreamer for the stressful experience. Compensatory dreams are conceptualized as containing themes complementary to the stressor and as a pleasant experience for the dreamer. However, in practice, it is difficult to determine the specific dream theme that would constitute complementary content and be pleasant for a particular individual. The operational definition of a compensation dream might almost

be phrased as "a dream that does not contain treatment incorporation". In other words, a dream is labelled "compensatory" when there is an absence of support for the mastery process. That is, in a sense, "compensation" occurs by default of the mastery process. This situation excludes the possibility of dream simultaneously serving a mastery and a compensatory function. Therefore it would be beneficial to identify dream themes or define dream rating dimensions that indicate the operation of a compensation process following a stressful event, in much the same way as treatment incorporation represents a mastery process.

A better, more precise operational definition of compensation in dream content might clarify the importance of the trend toward more treatment incorporation of dream content across post-stressor nights that was found in the present study. One can speculate that this trend was indicative of a mastery process gradually becoming more prominent in the dream across successive nights while a compensatory process was diminishing in activity. Relative to subsequent nights, subjects may have initially experienced compensation dreams that contained the element missing from the test situation and then experienced mastery dreams containing incorporations of the stressor. This possibility cannot be eliminated without a more refined definition that possibly addresses the specific stressor and predicts the content of the resulting compensation dream.

Not only is there vagueness in the operational definition of compensation but there is some question as to whether the term compensation adequately describes the process that occurs during adaptation. As mentioned earlier, Wright and Koulack (1987) proposed that avoidance replace the notion of compensation since it seems to be a more accurate reflection of the process. Avoidance is a broader concept than compensation and refers to attempts to achieve homeostasis after dreaming about a stressful stimulus. As outlined by Wright and Koulack (1987), the process of avoidance in dreams may take three general forms: 1) dreams may contain elements of a thought or activity missing from waking or sleeping experience; 2) dreams may have no apparent relationship to the stressful experience; or, 3) dreams may be complementary in affect to stressful waking or sleeping experiences. In addition to perhaps being a more accurate representation of the process than compensation, the concept of avoidance may further expedite understanding of the function of dreams in adaptation to stress by offering an operational definition of the process. That is, each of the three forms of avoidance in dreams can serve as a basis of an operational definition to determine the occurrence of this process in dreams.

In addition to concerns pertaining to the operational vagueness and accuracy of the compensation construct, there are methodological and statistical issues

that are relevant to the general area of dream research. Dream research exacts a great investment of time and effort, on the part of both the subject and the researcher. Consequently, dream studies tend to involve a small sample size. Though studies recruit relatively few subjects, many experimental measures commonly are obtained from the participants, including dream reports, subject ratings of the dream, affect ratings and questionnaire items. For hypothesis testing, this combination of few subjects and a large number of dependent measures creates a problem in striking a balance between Type I and Type II errors. That is, if a small per test significance level is adopted in an attempt to address the issue of compounding Type I errors in multiple testing situations, the sensitivity of the resulting tests is inadequate given the small sample sizes available and the effect size of interest. If a more lenient significance level is adopted in order to increase test sensitivity, rates of Type I error may become unaccountably large. This dilemma of selecting an appropriate significance level to test multiple hypotheses was a special concern of the present study.

This study attempted to confront the statistical problems associated with the methodology of employing few subjects and collecting many measures in several ways. It adopted significance levels for testing the experimental omnibus hypotheses (α = .05) and ancillary questions (α =

.01) that were neither excessively liberal nor conservative, given the number of statistical tests. However, it should be noted that in terms of the levels used in previous studies examining the effects of stressful events on dream, these levels are stringent. Generally in past research the required level of significance was .10 (e.g., De Koninck & Koulack, 1975; Foulkes, Pivik, Steadman, Speer, & Symonds, 1967; Greenberg, Pillard, & Pearlman, 1972; Hauri, 1970) although the range extends from .05 (Koulack, Prevost, & De Koninck, 1985) to .20 (Newton, 1970). The significance levels used in the present study attempted to achieve a balance in terms of Type I and Type II error control.

In addition, a concerted effort was made in this study to reduce the number of separate dependent variables that were being statistically tested for significance. For example, each of the eight affect items were classified as positive, neutral or negative affect items and then analyzed within these three affect categories. Though this procedure limits compounding Type I error rate by reducing the number of dependent measures directly being examined, it also exacts a cost through the loss of preciseness when data is collapsed across measures.

Finally, multivariate statistical analyses were used instead of univariate whenever appropriate to control the overall rate of Type I error over a set of dependent variables. Since multivariate statistics compare subjects

on all the measures simultaneously, a more comprehensive analysis was obtained than if univariate statistics were used (Tatsuoka, 1971). In particular, a MANOVA takes into account the intercorrelations of the dependent variables (Gabriel & Hopkins, 1974), an advantage not provided by an ANOVA. When a series of univariate comparisons is conducted, intercorrelations of dependent variables often magnify differences between groups (Kaplan & Litrownik, 1977). Therefore, the choice of technique (univariate or multivariate) can effect whether the findings reach statistical significance.

In the present study, there is reason to believe that the procedure of combining dependent variables to form a category coupled with the use of multivariate analyses yielded findings that differ from those that would be produced by univariate testing of many dependent measures. For example, when each of the 54 dream content rating dimensions was analyzed by an ANOVA, 47 dimensions showed a significant night main effect ($p < .02$) but when a MANOVA was used to analyze the eight dream content categories (consisting of the 54 dimensions), none of the categories revealed a significant night effect ($p > .05$).

Though multivariate analyses in this study permitted accurate control of the experimentwise probability of a Type I error across simultaneously considered dependent variables, the use of multivariate statistics made it

somewhat difficult to compare the present findings with those of previous research. Multivariate analyses have not as yet been widely employed in dream research. In fact, among all the studies mentioned, only the study by Sirois-Berliss and De Koninck (1982) examining the relationship between dream content and menstrual stress employed multivariate statistical techniques.

Therefore, there are a number of conceptual, methodological and statistical issues that need to be addresssed in the future by dream researchers before past and future findings can be integrated.

Suggestions for Further Research

The findings of the present study suggest that adaptation to a stressful event is a dynamic process involving both mastery and compensation phases. However some of the characteristics of this study already make it difficult to draw conclusions from these findings and extend them to theories of dream function. The design of the present study can be modified to better study the hypothesized mediating role of dreams in adaptation to stress.

Firstly, the present study attempted to maximize the treatment effect by preselecting subjects high in

neuroticism. Although this procedure was successful in selecting participants who were able to recall their dreams, it may have inadvertently induced an optimal stress reaction in all subjects, regardless of the assigned test condition. Consequently, subjects of both test conditions showed similar effects following the stress manipulation. In addition, the use of subjects who score high on the neuroticism scale of the Maudsley Personality Inventory made it very difficult to extend the findings of this study to the general population. Thus, to avoid these problems, it is suggested that scores on a neuroticism scale not be used to recruit subjects.

Not using individuals selected for high neurotism re-introduces the task of ensuring that subjects will be able to recall the content of dreams following a presleep stressor. An alternative to preselecting subjects on the basis of a personality characteristic is to conduct the study in a laboratory setting and awaken subjects during REM periods to report any dream. An additional advantage of a laboratory study is the ability to collect dreams from each REM period of a night and thus determine if dream changes across the course of successive REM periods on a single night.

The present study showed the trend toward more treatment incorporation of dream content across successive nights. Given the possibility that a significant change in

dream content occurred following the sixth or last post-stressor night of the study, it is advisable that subsequent research sample dream and affect at intervals beyond the sixth post-stressor night. Conceivably, such a study in which subjects were awakened during each REM period to report their dreams across a number of nights would effectively become a study examining the effects of REM deprivation. As a compromise, dream awakenings could take place on alternate nights and thus permit the subject one undisturbed night of REM between dream collection nights. If it was deemed essential to obtain dream reports from each post-stressor night of the study, then dream could be collected on even-numbered nights for some subjects and odd-numbered nights for other subjects.

And finally, if possible, it would be advisable to perform a manipulation check early in a study before continuing to ensure that the stress manipulation differentially effects each treatment group. This procedure should avoid the problem of conducting an entire study and then discovering that it consisted of essentially one treatment group.

By incorporating all or some of these modifications into the design of further research, it will be possible to better determine the function of dreams in adaptation to contemporary stress.

Summary

Various researchers have speculated on the possible adaptive functions of dreams in dealing with contemporary stress and maintaining an individual's well-being. Theories concerning the adaptive functions of dreams fall into two broad categories: those hypothesizing a "compensatory" role; and those proposing a "mastery" role. The compensation hypothesis (Foulkes, Pivik, Steadman, Spear, and Symonds, 1967; Hauri, 1970; Jung, 1974) suggests that dreams serve to compensate for an event by providing elements missing from experience. According to the compensation hypothesis, dream content that is discontinuous or inconsistent with elements of the waking stressful situation may psychologically compensate for the event. In contrast to the compensation hypothesis, the mastery hypothesis (Cohen and Cox, 1975; Greenberg, Pearlman, and Gampel, 1972) suggests that dreams help the individual to master or handle stressful experiences. According to this notion, dreams help the individual to work through or master the stressful experience by presenting elements of that event and allowing the dreamer to integrate current stress with the memory of solutions to similar past, stressful experience.

The present study was designed to address the possibility that adaptation to stress may be a dynamic process in which dreams operate both to master and to

compensate for stress. Following an adaptation and a baseline night, subjects were exposed to either an easy or a difficult "aptitude test". Then, each subject recorded dreams and completed mood assessments at home on six consecutive nights. The dependent measures included pre- and post-test mood, pre- and post-sleep mood, self-report dream ratings, and dream content.

Pre- and post-test mood measures revealed that both versions of the aptitude test induced stress in subjects. Dream content ratings of treatment incorporation for the difficult and easy test conditions showed a significant change across post-stressor nights. For both test conditions, there was a trend toward more treatment incorporation in dreams across nights. Subject ratings of dreams did not significantly change across nights and did not differ between treatment conditions. There was a significant interaction between treatment group and post-test night in the amount of expressed post-sleep affect. The easy test subjects reported an initial increase and then a decrease in negative affect across nights while the difficult test subjects expressed alternating levels of negative affect across successive post-stressor nights.

It was concluded that dreams served both a mastery and a compensatory function in adaptation to stress following a stressful intellectual activity. There was some speculation that dreams oscillated between mastery and

compensation processes of dream function until the dreamer attained adaptation to the stressor. It was also suggested that avoidance replace the notion of compensation since it seems to be a more accurate reflection of the process. Some of the difficulties associated with this study and the area of dream research in general were reviewed and suggestions were made for further research.

REFERENCES

Antrobus, J., Fein, G., Jordan, L., Ellman, S., and Arkin, A. (1978). Measurement and design in sleep reports. In A. M. Arkin, J. S. Antrobus, and S. J. Ellman (Eds.), The mind in sleep: Psychology and psychophysiology. Hillsdale: Erlbaum, 19-55.

Aserinsky, E., and Kleitman, N. (1953). Regularly occurring periods of eye mobility and concomitant phenomena during sleep. Science, 118, 273-274.

Baldridge, B. J. (1966). Physical concomitants of dreaming and the effect of stimulation on dreams. Ohio State Medical Journal, 62, 1271-1279.

Baum, A., and Greenberg, C. I. (1975). Waiting for a crowd: The behavioral and perceptual effects of anticipated crowding. Journal of Personality and Social Psychology, 32 (4), 671-679.

Baum, A., Singer, J. E., and Baum, C. S. (1981). Stress and the environment. Journal of Social Issues, 37 (1), 4-35.

Bokert, E. (1968). The effects of thirst and a related verbal stimulus on dream reports.

Dissertation Abstracts, 28, 4753B.

Breger, L. (1967). Function of dreams. Journal of Abnormal Psychology, 72, 1-28.

Breger, L., Hunter, I., and Lane, R. W. (1971). The effects of stress on dreams. Psychological Issues, 7 (3, Monograph 27).

Brown, R. J., and Donderi, D. C. (1986). Dream content and self-reported well-being among recurrent dreamers, past-recurrent dreamers, and nonrecurrent dreamers. Journal of Personality and Social Psychology, 50 (3), 612-623.

Buck, O. D., and Walker, J. I. (1982). Posttraumatic stress disorder in Vietnam veterans: A review. Southern Medical Journal, 75 (6), 704-706.

Cartwright, R. D., Bernick, N., Borowitz, G., and Kling, A. (1969). Effect of an erotic movie on the sleep and dreams of young men. Archives of General Psychiatry, 20, 263-271.

Cartwright, R. D., Kasniak, A., Borowitz, G., and Kling, A. (1972). The dreams of homosexual and heterosexual subjects to the same erotic movie. Psychophysiology, 9, 117.

Claridge, G. S. (1967). Personality and arousal. Oxford: Pergamon Press.

Cohen, D. B. (1974a). Presleep mood and dream recall. Journal of Abnormal Psychology, 83, 45-51.

Cohen, D. B. (1974b). Effect of personality and presleep mood on dream recall. Journal of Abnormal Psychology, 83,. 151-156.

Cohen, D. B. (1979). Sleep and dreaming: Origins, nature and functions. New York: Pergamon Press.

Cohen, D. B., and Cox, C. (1975). Neuroticism in the sleep laboratory: Implications for representational and adaptive properties of dreaming. Journal of Abnormal Psychology, 84, 91-108.

Collins, A. M., Davison, L., and Breger, L. (1967). Dream function in adaptation to threat: A preliminary study. Paper presented at the meeting of the Association for the Psychophysiological Study of Sleep, Santa Monica.

Dallett, J. (1973). Theories of dream function. Psychological Bulletin, 79, 408-416.

De Koninck, J. M., and Koulack, D. (1975). Dream content and adaptation to a stressful situation. Journal of Abnormal Psychology, 84, 250-260.

Dement, W. C., and Kleitman, N. (1957). Cyclic variations in EEG during sleep and their relations to eye movement, body mobility and dreaming.

Electroencephalography and Clinical Neurophysiology, 9, 673-690.

Dement, W. C., and Wolpert, E. (1958). The relation of eye movements, body motility, and external stimuli to dream content. Journal of Experimental Psychology, 55, 543-553.

Dewan, E. M. (1969). The programming (P) hypothesis for REMs. Physical Sciences Research Papers, Office of Aerospace Research, No. 388, 1-12.

Dixon, W. J. (Ed.) (1983). BMDP statistical software. Berkeley: University of California Press.

Domhoff, B. (1969). Home dreams versus laboratory dreams. In M. Kramer (Ed.), Dream psychology and the new biology of dreaming. Chicago: Charles C. Thomas.

Domhoff, B., and Kamiya, J. (1964). Problems in dream content study with objective indicators. I. A comparison of home and laboratory dream reports. Archives of General Psychiatry, 11, 519-524.

Eysenck, H. J., and Rachman, S. (1965). The causes and cures of neurosis. San Diego: Knapp.

Fisher, C. (1965). Psychoanalytic implications of recent research on sleep and dreaming. Journal of the

American Psychoanalytic Association, 13, 197-303.

Foulkes, D., Pivik, T., Steadman, H. S., Spear, P. S., and Symonds, J. D. (1967). Dreams of the male child: An EEG study. Journal of Abnormal Psychology, 72, 457-467.

French, T., and Fromm, E. (1964). Dream interpretation: A new approach. New York: Basic Books.

Freud, S. (1953). The interpretation of dreams. In J. Strachey (Ed.), The standard edition of the complete psychological works of Sigmund Freud. London: Hogarth Press. (Originally published, 1900).

Gaarder, K. (1966). A conceptual model of sleep. Archives of General Psychiatry, 14, 253-260.

Gabriel, R. M., and Hopkins, K. D. (1974). Research design and analysis clinic: Relative merits of MANOVA, repeated measures ANOVA, and univariate ANOVAs for research utilizing multiple criterion measures. The Journal of Special Education, 8 (4), 377-389.

Gatchel, R. J. (1980). Perceived control: A review and evaluation of therapeutic implications. In A. Baum, and J. E. Singer (Eds.), Advances in environmental psychology. Hillsdale: Erlbaum.

Glass, D. C., Singer, J. E., and Pennebaker, J. W. (1977). Behavioral and physiological effects of uncontrollable environmental events. In D. Stokols (Ed.), Perspectives on environment and behavior. New York: Plenum Press.

Goodenough, D. R., Witkin, H. A., Koulack, D., and Cohen, H. (1975). The effects of stress films on dream affect and on respiration and eye-movement activity during rapid-eye movement sleep. Psychophysiology, 12, 313-320.

Goodenough, D. R., Witkin, H., Lewis, H. B., Koulack, D., and Cohen, H. D. (1974). Repression, interference, and field dependence as factors in dream forgetting. Journal of Abnormal Psychology, 83, 32-44.

Greenberg, R., Pearlman, C., Fingar, R., Kantrowitz, J., and Kawliche, S. (1970). The effects of dream deprivation: Implications for a theory of the psychological function of dreaming. British Journal of Medical Psychology, 43, 1-11.

Greenberg, R., Pearlman, C. A., and Gampel, D. (1972). War neuroses and the adaptive function of REM sleep. British Journal of Medical Psychology, 45, 27-33.

Greenberg, R., Pillard, R., and Pearlman, C. (1972). The effect of dream (stage REM) deprivation of adaptation to stress. Psychosomatic Medicine, 34, 257-262.

Hall, C. S., and Van de Castle, R. L. (1966). The

content analysis of dreams. New York: Appleton-Century-Crofts.

Hauri, P. (1970). Evening activity, sleep mentation, and subjective sleep quality. Journal of Abnormal Psychology, 76, 270-275.

Huynh, H., and Feldt, L. S. (1970). Conditions under which mean square ratios in repeated measurement designs have exact F-distributions. Journal of the American Statistical Association, 65, 1582-1589.

Jung, C. G. (1933). Modern man in search of a soul. New York: Harcourt, Brace, & World.

Jung, C. G. (1974). Dreams. Princeton: Princeton University Press.

Kaplan, R. M., and Litrownik, A. J. (1977). Some statistical methods for the assessment of multiple outcome criteria in behavioral research. Behavior Therapy, 8, 383-392.

Kirk, R. E. (1968). Experimental design: Procedures for the behavioral sciences. Monterey, Calif.: Brooks/Cole.

Koulack, D. (1969). Effects of somatosensory stimulation on dream content. Archives of General Psychiatry, 20, 718-725.

Koulack, D. (1970). Effects of thirst on the sleep cycle. The Journal of Nervous and Mental Diseases, 151, 143-145.

Koulack, D., LeBow, M. D., and Church, M. (1976). The effect of desensitization on the sleep and dreams of a phobic subject. Canadian Journal of Behavioural Science, 8, 418-421.

Koulack, D., Prevost, F., and De Koninck, J. (1985). Sleep, dreaming and adaptation to a stressful intellectual activity. Sleep, 8 (3), 244-253.

Kramer, M. (1981). The function of psychological dreaming: A preliminary analysis. In W. P. Koella, and Levin, P. (Eds.), Sleep: Physiology, biochemistry, psychology, clinical implications. Basel: Karger, 182-185.

Kramer, M. (1982). The psychology of the dream: Art or science? The Psychiatric Journal of the University of Ottawa, 7, 87-100.

Kramer, M., and Roth, T. (1973). The mood-regulating function of sleep. In W. P. Koella, and P. Levin (Eds.), Sleep: Physiology, biochemistry, psychology, clinical implications. Basel: Karger, 563-571.

Kramer, M., and Roth, T. (1980). The relationship of dream content to night-morning mood change. In W. P. Koella, and P. Levin (Eds.),

Sleep: Physiology, biochemistry, psychology, clinical implications. Basel: Karger, 621-624.

Kramer, M., Whitman, R. M., Baldridge, B. J., and Lansky, L. M. (1964). Patterns of dreaming: The interrelationship of the dreams of a night. The Journal of Nervous and Mental Disease, 139 (5), 426-439.

Kramer, M., Whitman, R. M., Baldridge, B. J., and Ornstein, P. H. (1966). The pharmacology of dreaming: A review. In G. J. Martin and B. Kisch (Eds.), Enzymes in mental health. Philadelphia: Lippincott.

Kramer, M., Winget, C., and Whitman, R. (1971). A city of dreams: A survey approach to normative dream content. American Journal of Psychiatry, 127, 1350-1356.

Lazarus, R. S. (1966). Psychological stress and the coping process. New York: McGraw-Hill.

Lazarus, R. S., Speisman, J. C., Mordkoff, A. M., and Davison, L. A. (1962). A laboratory study of psychological stress produced by a motion picture film. Psychological Monographs, 76, 1-35.

Mason, J. W. (1968). A review of psychoendocrine research on the pituitary-adrenal cortical system.

Psychosomatic Medicine, 30, 576-607.

Mason, J. W. (1975). A historical view of the stress field. Journal of Human Stress, 1, 6-12, 22-36.

McGrath, M. J., and Cohen, D. (1980). REM drive and function: A study of the interactive effects of personality and presleep condition. Journal of Abnormal Psychology, 89, 737-743.

Newman, E., and Evans, C. P. (1965). Human dream processes as analogous to computer program clearance. Nature, 206, 534.

Newton, P. M. (1970). Recalled dream content and the maintenance of body image. Journal of Abnormal Psychology, 76, 134-139.

Nowlis, V. (1965). Research with the mood adjective checklist. In S. Tomkins and L. Izard (Eds.), Affects, cognition and personality. New York: Springer.

Piccione, P., Jacobs, G., Kramer, M., and Roth, T. (1977). The relationship between daily activities, emotions, and dream content. Sleep Research, 6, 133.

Pruyser, P. W. (1983). A dream after cardiac surgery. Bulletin of the Menninger Clinic, 47 (6), 549-555.

Sandford, J. (1968). Dreams: God's forgotten

language. Philadelphia: J. B. Lippencott.

Scheffe, H. (1953). A method for judging all contrasts in the analysis of variance. Biometrika, 40, 87-104.

Selye, H. (1973). The evolution of the stress concept. American Scientist, 61, 692-699.

Selye, H. (1974). Stress without distress. New York: J. B. Lippincott Company.

Selye, H. (1979). The stress concept and some of its implications. In V. Hamilton and D. M. Warburton (Eds.), Human stress and cognition. New York: John Wiley & Sons, Inc.

Sirois-Berliss, M., and De Koninck, J. (1982). Menstrual stress and dreams: Adaptation or interference? The Psychiatric Journal of the University of Ottawa, 7 (2), 77-86.

Speisman, J. C., Lazarus, R. S., Mordkoff, A., and Davison, L. (1964). Experimental reduction of stress based on ego-defense theory. Journal of Abnormal and Social Psychology, 68, 367-380.

Spitz, R. A. (1964). The derailment of dialogue: Stimulus overload, action cycles, and the completion gradient.

Journal of the American Psychoanalytic Association, 12, 752-775.

Tatsuoka, M. M. (1971). Multivariate analysis: Techniques for educational and psychological research. New York: Wiley.

Theroux, C. (1980). The adaptive function of dreams in dealing with stress. Unpublished doctoral dissertation, University of Manitoba.

Walker, J. I. (1981a). The psychological problems of Vietnam veterans. Journal of the American Medical Association, 246, 781-782.

Walker, J. I. (1981b). Viet Nam combat veterans with legal difficulties: A psychiatric problem? American Journal of Psychiatry, 138, 1384-1385.

Walker, J. I., and Cavenar, J. O., Jr. (1982). Vietnam veterans: Their problems continue. The Journal of Nervous and Mental Disease, 170, 174-180.

Weisz, R., and Foulkes, D. (1970). Home and laboratory dreams collected under uniform sampling conditions. Psychophysiology, 6, 588-596.

Wilkinson, C. B. (1983). Aftermath of a disaster: The collapse of the Hyatt Regency Hotel skywalks. American Journal of Psychiatry, 140 (9), 1134-1139.

Witkin, H. A., and Lewis, H. B. (1965). The relation of experimentally induced presleep experiences to dreams. Journal of the American Psychoanalytic Association, 13, 819-849.

Wolf, S., and Goodell, H. (1968). Stress and disease. Springfield, Il.: Thomas.

Wood, P. (1962). Dreaming and social isolation. Unpublished doctoral dissertation, University of North Carolina.

Wright, J., and Koulack, D. (1987). Dreams and contemporary stress: A disruption-avoidance-adaptation model. Sleep, 10 (2), 172-179.

Appendix A

Aptitude Test Versions

Form A: Difficult

Form B: Easy

Instructions

The analogy questions test your ability to recognize relationships between words and to apply this relationship to other words. Although the verbal analogy test is, to some degree, an indicator of your vocabulary, it is essentially a test of your ability to think things out.

This test contains two forms of analogy questions. One form of analogy is the type in which two capitalized words are followed by a third capitalized word and a group of four (4) non-capitalized words lettered a, b, c, and d. You are to select from the four (4) alternatives the single word which best completes the analogy with the three (3) capitalized words.

An example of this type of analogy question would be:

TRIANGLE is to SQUARE as PENTAGON is to a) octagon b) heptagon c) hexagon d) parallelogram

The correct answer is c) hexagon. A triangle has three sides, a square has four, a pentagon has five, and a hexagon has six sides.

Another example of this type of analogy question is:

WORM: BIRD: MOUSE: a) man b) snake c) rodent d)lion

The correct answer is b) snake. Birds like to eat worms; snakes like to eat mice.

The other form of analogy contained in this test is the type in which each question consists of two words which have some specific relationship to each other. From the four (4) pairs of words which follow, you are to select the pair which is related in the same way as the words of the first pair.

An example of this type of analogy question is:

PAGE: BOOK: : a) dictionary:library
b) slat:blind
c) teacher:school
d) boy:knight

The correct answer is b) slat:blind.

Choose the one response that best completes the analogy. Questions having more than one alternative selected will be considered incorrect.

FORM A

1. FLEECE : SHEEP : : PLUMAGE : (a. chest b. feather c. finery d. swan)

2. RUBY : TOMATO : : EMERALD : (a. rose b. gem c. shamrock d. squash)

3. THEATRE : (a. burlesque b. tragedy c. thespian d. in-the-round) : : POETRY : DOGGEREL

4. HARVEST : MARKET : : MANUFACTURE : (a. wholesale b. sell c. store d. purchase)

5. FLAUNT : (a. slyly b. ostentatiously c. brazenly d. boastfully) : : BETRAY : FAITHFULLY

6. WAGON : (a. adolescence b. birth c. youth d. travel) : : HORSE : CHILDHOOD

7. SILVER : PAPER : : TARNISH : (a. wrinkle b. yellow c. rust d. age)

8. FROND : FERN : : a) acorn:oak
b) bulb:tulip
c) needles:pine
d) foliage:blossom

9. THIEF : LARCENY : : a) traitor:sedition

b) demagogue:dissension

c) witness:perjury

d) critic:commentary

d) critic:commentary

10. OBEDIENT : OBSEQUIOUS : : a) ludicrous:ridiculous

b) helpful:officious

c) happy:zealous

d) serene:agitated

11. TREMULOUS : COURAGE : : a) portentous:strength

b) stupendous:stability

c) copious:quality

d) frivolous:seriousness

12. IMPRESSMENT : HIRING : : a) enchantment:enslaving

b) condemnation:forgiving

c) payment:compensating

d) confiscation:purchasing

13. PANTOMINE : DIALOGUE : : a) burlesque:humour

b) tableau:movement

c) melodrama:costume

d) choreography:music

14. TAXONOMY : ANIMALS : : a) cultivation:plants

b) codification:laws

c) emendation:resolutions

d) astronomy:stars

15. COURT : LITIGATION : : a) tournament:joust

b) reconciliation:dispute

c) judge:lawyer

d) prayer:litany

16. FAULT : EARTHQUAKE : : a) death:sorrow

b) volcano:lava c) pain:relief

d) delta:river

17. ENIGMA : EXPLICABILITY : : a) disembodiment:palpability

b) paradox:reality

c) abstraction:vacuity

d) ephemera:mutability

18. BREAKWATER : HARBOUR : : a) sandbag:river

b) jetty:ocean

c) dike:sea

d) levee:land

19. PLASTERED : WALL : : a) wet:ground

b) sanded:wood

c) smothered:fire

d) bound:book

20. EVADE : CAPTURE : : a) impede:obstacle

b) escape:fugitive

c) parry:thrust

d) bait:trap

Instructions

In this section, you will find quantitative questions. You do not need an advanced mathematics background to answer these questions. Very few of the questions require training beyond high school algebra and geometry.

Examples

1. The number 1729 is the sum of the cubes of two numbers. One of these numbers is 10. What is the other number?

   a) 17 b) 13 c) 9 d) 3

The answer is c) 9. 1729 - 1000 = 729. 729 is 9 cubed.

2. A certain type of siding for a house costs $10.50 per square yard. What does it cost for the siding of a wall 4 yards by 60 feet long?

   a) $800 b) $840 c) $2520 d) $3240

The answer is b) $840. Area of wall = 4 yards X 60 ft./3 = 80 sq.yd.. Cost = 80 X $10.50 = $840.

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21. The average of four numbers is 54. If one of the numbers is increased by 6, the average will remain

unchanged if each of the other three numbers is reduced by:

a) 2

b) 1

c) 3/4

d) 4

22. If the area of square S is six times the perimeter of S, then one side of S is:

a) 6

b) 12

c) 24

d) 36

23. Which of the following divides $2^6 \times 3^8 \times 5^3$?

a) $2^7 \times 3^7 \times 5^3$

b) $2^6 \times 3^5 \times 5^2$

c) $2^5 \times 3^9 \times 5^2$

d) $2^4 \times 3^7 \times 5^5$

24. After an initial deposit of X dollars, the amount of money in a certain fund is doubled at the end of each month for 5 months. If at the end of the 5-month period, there is a total of $560 in

the fund, how much money was in the fund at the beginning of the third month?

a) $17.50

b) $35

c) $70

d) $140

25. In the expression below, if each odd-numbered term is $x/2$ and each even-numbered term is $2/x$, what is the sum of the first 56 terms of the expression?

$$x/2 + 2/x + x/2 + 2/x + x/2 \ldots$$

a) $\dfrac{28x^2 + 28}{x}$

b) $\dfrac{7x^2 + 7}{x}$

c) $\dfrac{7x^2 + 32}{x}$

d) $\dfrac{14x^2 + 56}{x}$

26. Which of the following fractions is more than 3/4?

    a) 71/100

    b) 15/20

    c) 19/24

    d) 35/71

27. Starting from the same town, two trucks travel due east and due west, respectively. After three hours, they are 420 kilometers apart. If the truck going east travels 2/3 as fast as the truck going west, what is the rate, in kilometers per hour of the truck going east?

    a) 33.6

    b) 50.4

    c) 56

    d) 84

28. If $2 \leq X \leq 4$ and $2 \leq Y \leq 4$, then the maximum possible value of $X - X/Y$ is:

    a) 1

    b) 1 1/2

    c) 2

    d) 3

29. Which number in the series below is in error?

    3, 3, 6, 18, 72, 216, 2160

    a) 2160

    b) 216

    c) 72

    d) 6

30. What is the smallest positive number which, when it is divided by 3, 4, or 5, will leave a remainder of 2?

    a) 42

    b) 62

    c) 22

    d) 182

Instructions

In the following section, you will be required to complete a sentence in which one or two words are missing and represented by blank spaces. It is necessary to select the word or words which best complete the meaning of the statement from the lettered words or sets of words.

Example

The Citizens Budget Commission criticized the proposed legislation as _____ and wasteful. a) helpful b) completed c) praiseworthy d) illogical

The correct answer is d) illogical.

31. The fact is so _____ that no one has ever succeeded even in defining it.

    a) mastoidal

    b) elusive

    c) fragmentary

    d) morbid

32. Matty wanted nothing more than to _____ the pain.

    a) subordinate

    b) allegate

    c) increate

    d) alleviate

33. Historians of science will welcome this volume, for they have long _____ the fact that there is no adequate account of the development of science in ancient China.

    a) debated

    b) refuted

    c) belittled

    d) bemoaned

34. She was saddened to hear that her colleagues continued to _____ her protege, for she had hoped that success would _____ him.

    a) underwrite .... attract

    b) disparage .... vindicate

    c) patronize ..... enrage

    d) flatter .... encourage

35. Smith was _____, an elementary force in herself, driving, yearning, and resistant.
    a) guileless
    b) pretentious
    c) autonomous
    d) radical

36. To _____ the lecture on the _____ effects of smoking, the doctor showed slides of damaged lungs and distributed pamphlets replete with frightening statistics.
    a) authenticate .... salutary
    b) corroborate .... deleterious
    c) undermine .... innocuous
    d) substantiate .... innocuous

37. She owes most of her success to her calm, measured, analytical attacks on the problems of advertising, making order out of _____.
    a) chaos
    b) austerity
    c) procedure
    d) squalor

38. In Hindu mythology, _____ referred to a _____ to earth.
    a) autoclave .... reference
    b) dipsomania .... prayer
    c) divagation .... bowing

d) avatar .... descent

39. The lover of democracy has a(n) _____ toward total totalitarianism.

a) antipathy

b) empathy

c) antipode

d) petard

40. The _____ effects of the drug made her weary.

a) succint

b) spurious

c) soporific

d) supine

41. After seven hours of listening to his interminable story-telling, we finally escaped from the _____ old man.

a) evasive

b) garrulous

c) replenished

d) surreptitious

42. The one nice thing about the house is that it was situated on a _____ from which one could see all the city lights at night.

a) proboscis

b) promontory

c) proscenium

d) preponderance

43. Being very _____,he knew what was going on about him.

a) circumlocutory

b) caustic

c) choleric

d) circumspect

44. The chairman's _____ speech swayed the audience to favour his proposal.

a) cursory

b) bombastic

c) auxiliary

d) cogent

45. His _____ had no place in our serious conversation.

a) valence

b) decency

c) badinage

d) concatenation

46. With a less _____ expansion of the economy, we should make _____ progress toward stable price levels.

a) marked .... detailed

b) noticeable .... approximate

c) suitable .... infinite

d) rapid .... substantial

47. They talk a good deal about using _____

but deep down they seem to expect that society will treat them with _____ if they do so.

a) theology .... reverence

b) violence .... indulgence

c) intellect .... appreciation

d) machinations .... relish

48. He struggled to maintain his _____ in the face of the threatening mob.

a) fraternity

b) belligerence

c) umbrage

d) composure

49. Till his death he remained _____ in the belief that the world was conspiring against him.

a) ignominious

b) taciturn

c) obdurate

d) tantamount

50. The defendant was unjustly _____ as a criminal on the basis of the _____ evidence given by the paid informer.

a) lauded .... voluminous

b) deified .... partisan

c) stigmatized .... spurious

d) mitigated .... adverse

FORM B

1. FOOD : FUEL : : BODY : (a. gasoline b. mechanic c. logs d. engine)

2. (a. second b. minute c. time d. day) : HOUR : : YARD : FOOT

3. DUNGEON : (a. torture b. prison c. castle d. basement) : : CELLAR : HOME

4. (a. puzzle b. alternative c. label d. sphinx) : ENIGMA : : LABYRINTH : MAZE

5. 25 : 36 : : 49 : (a. 53 b. 63 c. 94 d. 64)

6. EXILE : TAX : : EXCOMMUNICATION : (a. pope b. exclusion c. canon d. tithe)

7. FLEECE : SHEEP : : PLUMAGE : (a. chest b. feather c. finery d. swan)

8. CYLINDER : MOTOR : : FOUNDATION : (a. brick b. house c. basis d. chassis)

9. DISCOVERY : SEARCH : : a) scalpel:operation
b) decision:trial
c) fly:bird
d) parade:march

10. JUNTA : POLITICAL : : a) team:successful

b) council:advisory

c) jury:secretive

d) parent:instructive

11. METAL : DROSS : : a) milk:cream

b) wound:scar

c) wheat:chaff

d) soap:lather

12. COLD : CONGEALMENT : : a) solidity:coagulation

b) light:refraction

c) electricity:generation

d) heat:incandescense

13. PODIUM : CONDUCTOR : : a) easel:artist

b) theatre:actor

c) typewriter:author

d) pulpit:preacher

14. GLAUCOMA : EYES : : a) equilibrium:eardrum

b) amnesia:memory

c) caries:decay

d) hemophilia:blood

15. PAINTING : ARTIST : : a) poem:writer

b) song:singer

c) cook:meal

d) car:driver

16. GRIZZLE : GRAY : : a) blanch:white

b) wilt:black

c) glower:red

d) weep:blue

17. IMMORTAL : DEATH : : a) infinite:limit

b) incomprehensible:wisdom

c) helpless:aid

d) inexhaustible:fund

18. DISTANCE : MILE : : a) liquid:pint

b) bushel:corn

c) weight:scale

d) ton:coal

19. PNEUMATIC : AIR : : a) atomic:nucleus

b) cosmic:universe

c) hydraulic:water

d) ultrasonic:speed

20. SIGN : STREET : : a) billboard:advertising

b) handshake:friendship

c) target:gun

d) title:story

Instructions

In this section, you will find quantitative questions. You do not need an advanced mathematics background to answer these questions. Very few of the questions require training beyond high school algebra and geometry.

Examples

1. The number 1729 is the sum of the cubes of two numbers. One of these numbers is 10. What is the other number?
   a) 17 b) 13 c) 9 d) 3

The answer is c) 9. 1729 - 1000 = 729. 729 is 9 cubed.

2. A certain type of siding for a house costs $10.50 per square yard. What does it cost for the siding of a wall 4 yards by 60 feet long?
   a) $800 b) $840 c) $2520 d) $3240

The answer is b) $840. Area of wall = 4 yards X 60 ft./3 = 80 sq. yd.. Cost = 80 X $10.50 = $840.

---

21. If all P are S and no S are Q, it necessarily

follows that:

a) all Q are S

b) all Q are P

c) no P are Q

d) some Q are P

22. The average of four numbers is 54. If one of the numbers is increased by 6, the average will remain unchanged if each of the other three numbers is reduced by:

a) 2

b) 1

c) 3/4

d) 4

23. If a hat costs $4.20 after a 40% discount, what was the original price?

a) $2.52

b) $4.60

c) $5.33

d) $7.00

24. A cylindrical oil tank is 1/3 full. If 30 more litres are added, the tank will be half-full. What is the capacity in litres of the tank?

a) 150

b) 160

c) 170

d) 180

25. A prime number is a number that can be divided only by itself and one. Which is <u>not</u> a prime number?

a) 23

b) 37

c) 53

d) 87

26. If $x = y + 1$ and $y = 3$, then $x/y =$

a) 4/3

b) 5/6

c) 3/4

d) 6/5

27. In a certain class, 65% of the students are taller than Judy and 32% are taller than Bill. What percent of the class is taller than Judy but not taller than Bill?

a) 3%

b) 33%

c) 35%

d) 68%

28. What is the value of rs in the equation $43\ rs + 17 = 77\ rs$?

a) -1/2

b) -2

c) 1/2

d) 2

29. A boy receives grades of 92, 88, 84 and 76 in four of his major subjects. What must he receive in his fifth major subject in order to average 85?

a) 85

b) 84

c) 86

d) 83

30. Which of the following fractions is more than 3/4?

a) 71/100

b) 15/20

c) 19/24

d) 35/71

Instructions

In the following section, you will be required to complete a sentence in which one or two words are missing and represented by blank spaces. It is necessary to select the word or words which best complete the meaning of the statement from the lettered words or sets of words.

Example

The Citizens Budget Commission criticized the proposed legislation as _____ and wasteful. a) helpful b) completed c) praiseworthy d) illogical

The correct answer is d) illogical.

---

31. The day will come when _____ will look back upon us and our time with a sense of superiority.
    a) prosperity
    b) antiquity
    c) ancestors
    d) descendants

32. Many young people, even from _____ backgrounds, show their _____ by opposing the Establishment.
    a) repressed .... visibility
    b) disadvantaged .... connection
    c) morose .... ingenuity
    d) affluent .... alienation

33. In spite of its limited _____, the magazine had a strong _____ on political thought in the country.
    a) appeal .... repression
    b) insights .... reminder

c) circulation .... influence

d) values .... survival

34. With a less _____ expansion of the economy, we should make _____ progress toward stable price levels.

a) marked .... detailed

b) noticeable .... approximate

c) suitable .... infinite

d) rapid .... substantial

35. The strenuousness of the 48-hour week is further _____ when it is compared with the schedule of other police forces in our Canadian cities.

a) inculcated

b) accentuated

c) demoralized

d) cauterized

36. He struggled to maintain his _____ in the face of the threatening mob.

a) fraternity

b) belligerence

c) umbrage

d) composure

37. Though he was realistic and pragmatic in most things, he was an ardent devotee of plays of _____.

a) satire

b) fantasy

c) realism

d) emotion

38. The problem of pollution must be _____ studies before we can overcome it.

a) primarily

b) virulently

c) adequately

d) monetarily

39. Matty wanted nothing more than to _____the pain.

a) subordinate

b) allegate

c) increate

d) alleviate

40. Under these circumstances, every word that is uttered must be dealt out _____ like the last rounds of ammunition in a besieged fortress.

a) ceremoniously

b) suddenly

c) endlessly

d) sparingly

41. We learned to think of the laws of nature as _____, never to be _____ without severe penalty.

a) esoteric .... enjoyed

b) inescapable .... accepted

c) invidious .... invoked

d) inexorable .... violated

42. She owes most of her success to her calm, measured, analytical attacks on the problems of advertising, making order out of _____.

a) chaos

b) austerity

c) procedure

d) squalor

43. An installment of a Dickens novel _____ the sale of an edition of the newspaper, for his _____ was unbounded.

a) guaranteed .... popularity

b) augmented .... charity

c) solidified .... fame

d) paralleled .... magnanimity

44. Historical experience should sober not only the _____, who think they have found the certain solution to our problems, but also the _____, whose solution is a certain return to the ancient faiths, which have always failed in the past.

a) agnostics .... atheists

b) materialists .... idealists

c) revolutionaries .... traditionalists

d) scientists .... philosophers

45. Feeling no particular affection for either of

his two acquaintances, he was able to judge their dispute very _____.

a) impartially

b) judiciously

c) immaculately

d) accurately

46. In our _____ to reason and logic we sometimes forget that goodness and beauty are also _____ criteria.

a) devotion .... valid

b) response .... objective

c) attention .... conflicting

d) homage .... insignificant

47. There was much _____ as to the _____ steps needed to reduce inflation, but little actual knowledge about it.

a) information .... activated

b) criticism .... typical

c) speculation .... specific

d) agitation .... recurrent

48. Actors are often very _____ since they must believe strongly in their own worth and talents.

a) laconic

b) reticent

c) unequivocal

d) egotistic

49. In legislative investigations of _____ subjects, there will always be great risks that any standards set up will yield or be circumvented in one way or another.

a) controversial

b) parsimonious

c) innocuous

d) subliminal

50. Her devotion to music _____ his own interest in an art he had once loved as a child.

a) reviled

b) revived

c) defiled

d) belied

Appendix B

Mood Adjective Check List

Mood Adjective Check List

Beside each of the adjectives listed below, please rate how you are feeling at the present time. Use the terms, MUCH, LITTLE, DON'T KNOW, and NO beside each adjective to indicate the extent to which each adjective describes your present feelings.

	Rating
jittery	
playful	
suspicious	
quiet	
detached	
defiant	
angry	
warm-hearted	
sad	
fearful	
carefree	
affectionate	
regretful	
distant	
rebellious	
clutched up	
skeptical	
placid	

remote _____

witty _____

kindly _____

sorry _____

dubious _____

still _____

Mood Adjective Check List

Individual adjectives are scored as follows: MUCH is scored as 3, LITTLE as 2, DON'T KNOW as 1, and NO as 0. Factor scores are obtained by summing the scores of the individual adjectives in the factor.

Factors:

Aggression: defiant, angry, rebellious

Anxiety: jittery, fearful, clutched up

Surgency: playful, carefree, witty

Social Affection: warm-hearted, affectionate, kindly

Depression: sad, regretful, sorry

Distrust: suspicious, skeptical, dubious

Quiet: quiet, placid, still

Detached: detached, distant, remote

Appendix C

Post-Test Questionnaire

Post-Test Questionnaire

We are interested in your personal reaction to the aptitude test which you have just completed. When we try to relate your performance on the aptitude test to your dreams, it may be important to know how you felt about the problems. Below you'll find a number of questions concerning the aptitude test. There are no right or wrong answers, but please consider each question carefully before you answer it.

You will notice that for each question, there is a pair of phrases, one phrase at each end of a seven (7) point scale. Please indicate for each pair of phrases the point along the continuum which best represents your feelings by circling the number which you feel corresponds to your reaction at this time.

1. When the problems on the test were first introduced, how confident were you that you'd be able to solve them?

1	2	3	4	5	6	7
no confidence						very confident

2. When trying to solve the problems, did you feel that it was important to do well on them?

1	2	3	4	5	6	7
not at all important						very important

3. Do you feel that your performance on the test is indicative of your intellectual ability?

1	2	3	4	5	6	7
not at all						very much

4. If you were asked to solve some more problems, similar to those on the test, how confident do you feel that you would be able to solve them?

1	2	3	4	5	6	7
not at all confident						extremely confident

5. How difficult did you find the test?

1	2	3	4	5	6	7
very difficult						very easy

6. How hard did you try to solve the problems and questions on the test?

1	2	3	4	5	6	7
tried my very hardest						did not try at all

7. How do you feel about your performance on the test?

1	2	3	4	5	6	7
not at all pleased						very pleased

8. Did you feel tired at the end of the test?

1	2	3	4	5	6	7
very tired						not at all tired

9. How did you feel during the test administration?

a)

1 2 3 4 5 6 7

very at ease very tense

b)

1 2 3 4 5 6 7

very calm very stressed

10. How frustrated did you feel while writing the test?

1 2 3 4 5 6 7

felt very frustrated did not feel frustrated at all

11. How successful did you feel at the end of the test?

1 2 3 4 5 6 7

very successful not at all successful

Appendix D

Post-Experimental Questionnaire

Post-Experimental Questionnaire

1. What do you think was the purpose of this experiment?

2. Do you feel that you were treated unfairly? If "yes", why?

3. What was the influence of the aptitude test on the opinion you had of your intelligence?

4. What was the effect of the aptitude test on your levels of confidence and ambition?

5. What relationship, if any, was there between the aptitude test and the collection of dreams?

6. What was the purpose of collection of dreams each night?

7. Did you have any prior knowledge concerning this experiment? If so, what was it?

8. During the past week, what events (both experimental and those happening in your life) stick-out in your memory? Try to recall on what day and when each of these events happened.

Appendix E

Dream Rating Manual

Dream Rating Manual for Scoring Dreams

Categories

- treatment incorporation
  - appearance of specific items
  - reference to treatment situation
- affect
  - level of affect in the dream
  - emotions
- activity
  - participation of the self
  - type of activity
  - general level of activity
  - level of activity of the self
- social interaction
  - aggression
  - friendly
  - sexual
  - number of characters in social interaction
- fortune
  - success
  - failure
  - environmental press
- bizarreness

vividness

change of sequence

TREATMENT INCORPORATION

appearance of specific items

Objects (TO): test questions
IBM sheet
pencil
table
chair
tape recorder, tape
questionnaire
mood checklist

Person (TP): experimenter
subject

Location (TL): enclosed room
long hallway

reference to treatment situation (TS))

any reference to Psychology or school

marks

Freud

rats

receiving phone calls

experiment

testing

time pressure

tape recording

verbal task

math task

sleeping

recording dreams

The presence or implied presence of a treatment situation in a dream is rated along the dimension of centrality. An item which is central to the dream should be rated C1, while an item which is not central to the dream should be rated C0.

Examples

i) I was working on a test at school.

ii) After writing some test, I decided to go to my friend's apartment.

In i), the treatment situation (testing) is central to the dream (C1). In ii), the test situation is not central to the dream (C0).

AFFECT

Level of Affect in the Dream (LA)

6-point scale

0 - no affect

1 - almost no affect

2 - small amount of affect

3 - moderate amount of affect

4 - much affect

5 - very much affect

Level of affect refers to the general degree of emotion displayed or implied in the dream. Affect may be either positive or negative in nature and attributed to the dreamer or a participant.

Examples

1 - almost no affect: "I remember not wanting to wake up because the cookies tasted so good."

2 - small amount of affect: "I remember this feeling of kind of feeling all tied up like I couldn't do anything."

3 - moderate amount of affect "I was getting excited at that scene because of the missiles coming and things were seeming to happen a little faster and all of a sudden, it changed and I was with my family and we were going with a few relatives to dinner and, we got to dinner and we were eating ice cream."

4 - much affect: "I was very relaxed, happy, and content.
Everything was warm and peaceful."
"It made me feel very creepy and sick."

5 - very much affect: "I was really disgusted. I remember being very very disgusted about that."

Emotions (E)

anger(AN) apprehension(AP) happiness(HA) sadness(SD)
confusion(CO)

0 - none

1 - almost no emotion

2 - small amount of emotion

3 - moderate amount of emotion

4 - much emotion

5 - very much emotion

When a specific emotion is displayed or implied in the dream, the degree of this emotion is rated using the 6-point scale outlined above.

Examples

anger(AN): annoyed, irritated, mad, provoked, furious, belligerent, incensed, indignant, enraged

apprehension(AP): fear, anxiety, guilt, embarrassment, horrified, frightened, scared, worried, concerned, panicky, alarmed, uneasy, upset, sorry, apologetic, regretful, ashamed, remorseful, terrified, nervous

happiness(HA): contented, pleased, relieved, amused, glad, relaxed, gratified, gay, wonderful, joyful, exhilarated, elated, cheerful

sadness(SD): disappointed, distressed, hurt, lost, miserable, hopeless, crushed, heartbroken, lonely, depressed

confusion(CO): surprised, astonished, amazed, puzzled, perplexed, strange, bewildered, conflicted, undecided, uncertain, doubtful, mystified, awestruck

ACTIVITY

Participation of the Self (PS)

There are three levels of participation of the self. Each dream must be rated for this category.

0 - dreamer is not in any way a participant

1 - dreamer observes himself in the dream

2 - dreamer is in the dream

i) dreamer is not in any way a participant

In this level of participation the dreamer is merely an observer of the dream. He is not in it nor does he see himself in it.

Examples: a)There was a ball game being played.

b)I could see someone skiing down the slope. It was as if I were watching a movie.

This level of participation should receive a rating of 0.

ii) dreamer observes himself in the dream

The dreamer is an observer of and a participant in the dream. He is watching himself participate in the dream.

Examples: a)I could see myself skiing down the slope.

b)I saw myself sitting in the stands watching a ball game.

This level of participation should receive a rating of 1.

iii) dreamer is in the dream

The dreamer is in the dream as if in real life. He is an active participant in the dream.

Examples: a)I was skiing.

b)I was sitting in the stands watching a ball game.

This level of participation should receive a rating of 2.

Type of Activity in the Dream (TA)

presence (1) or absence (0)

P(physical) - any voluntary movement

M(movement) - character changes physical location by self-propelled movements; anytime muscular activity stated or implied

L(location change) - by means other than by self-propelled muscular activity

V(verbal) - e.g., talking

E(expressive communication) - e.g., laughing, crying, scowling, smiling

S(visual) - e.g., see, read, notice, watch, view

A(auditory) - e.g., hearing or listening behaviour

C(thinking) - deliberate continued mental effort

General Level of Activity in the Dream (GA)

0 - no activity

1 - almost no activity

2 - small amount of activity

3 - moderate amount

4 - much activity

This category indicates the level of activity of everything in the dream except the dreamer. Thus, the amount of movement as well as the speed of movement of other people or objects in the dream should be taken into account. A dream containing a lot of people running or trains passing swiftly close by might receive a rating of 4; while a dream containing a few people walking or trains travelling in the distance might receive a rating of 2.

Level of Activity of the Self

0 - no activity

1 - almost no activity

2 - small amount of activity

3 - moderate amount

4 - much activity

This category involves the rating of the extent of activity engaged in by the dreamer in the dream as a whole.

SOCIAL INTERACTIONS (SI)

Aggression

A1 - hostility feeling

A2 - verbal

A3 - aggressive attempt

A4 - accusation-threat

A5 - theft-destruction

A6 - chase-capture

A7 - harm-weapon

A8 - aggressive-action-death

Friendly

F1 - felt only

F2 - verbal-gestural

F3 - gift-loan

F4 - assistance

F5 - social activity

F6 - physical activity

F7 - close relationship

Sexual Interaction

S1 - thoughts

S2 - propositions

S3 - necking

S4 - foreplay

S5 - intercourse

Aggression

A1 - hostility feeling - Covert feeling of hostility or anger without any overt expression of aggression.

Examples

i)I kept getting madder and madder at him but never said anything.

ii)I felt like hitting him but I didn't.

A2 - verbal - Aggression displayed through verbal

or expressive activity. Included are such activities as one character yelling or swearing at another or when a character criticizes or scowls at another.

Examples

i)I could hear the couple next door arguing.

ii)My father said I was a lousy driver.

A3 - aggressive attempt - This subclass covers all situations where there is an attempt by one character to reject, exploit, control, or verbally coerce another character. Such activity may be expressed through dismissals, demands, refusals, disobedience, or any other type of negativistic or deceitful behaviour.

Examples

i)She turned her back on her husband and walked out of the room.

ii)This fat lady insisted that the crying child finish all his supper.

iii)My roommate's parents wouldn't allow him to go to New York.

iv)I found out that my brother had lied about me to my teacher.

A4 - accusation-threat - An aggressive act in

which a serious accusation or verbal threat of harm is made against a character.

Examples

i)This old lady kept shouting that I was the man the police were looking for.

ii)Jim told this man if he didn't stop, he was going to punch him on the nose.

A5 - theft-destruction - An aggressive act which involves the theft or destruction of possessions belonging to a character.

Examples

i)My room eas all messed up and the TV was missing.

ii)He set fire to the farmer's barn.

iii)She threw her father's glasses into the lake.

A6 - chase-capture - An aggressive act which involves a character being chased, captured, confined, or physically coerced into performing some act.

Examples

i)I kept trying to run faster but the gorilla was catching up with me.

ii)The little baby had been kidnapped by someone.

iii)The police put the suspect in jail.

iv)He held my wrist and he pulled me along the street with him.

A7 - harm-weapon - An aggressive act which involves an attempt to physically harm a character. The attempt may be carried out through personal assault or through use of a weapon.

Examples

i)I slapped him in the face.

ii)These two boys were throwing stones at each other.

iii)He pointed a gun at me and told me to hurry up.

A8 - aggressive-action-death - An aggressive act which results in the death of a character.

Examples

i)This dark stranger sprang at the blonde woman and hacked her to pieces with a big knife.

ii)I squashed the bug with my foot.

Friendly

F1 - felt only - Friendliness is felt toward a character but it is not expressed overtly.

Examples

i)I felt so good inside just to be with her.

ii)I felt very sorry when I heard what happened to her.

iii)I thought that the new girl looked very attractive.

F2 - verbal-gestural - This subclass covers a wide variety of expressions of friendliness that may be conveyed through either verbal or gestural means. Included are such activities as welcoming, greeting, waving hello or goodbye, introducing one person to another person, smiling at someone, phoning or writing someone for a friendly purpose, and sympathizing with or praising someone.

Examples

i)He tooted the car horn in recognition as he passed me on the street.

ii)I called my father to tell him the good news.

iii)I complimented Jean on her new dress.

F3 - gift-loan - Friendliness expressed by offering a gift or loaning a possession to a character.

Examples

i)He gave me a book for my birthday.

ii)I let my brother borrow my car for the trip.

F4 - assistance - Friendliness expressed through extending assistance to a character or offering to do so. Included in this subclass are helping, protecting, and rescuing acts.

Example

i)I found out where she lived and took her home.

F5 - social activity - Friendliness expressed by taking the initiative in requesting a character to share in a pleasant social activity. Included are situations where one character requests another to accompany him to some event, asks for a date, and visits someone.

Examples

i)I phoned Judy to ask for a date.

ii)My roommate asked me to spend the weekend at his home.

F6 - physical contact - Friendliness expressed through socially acceptable forms of physical contact. Included in this

subclass are such acts as shaking hands, cuddling a baby, and dancing. Kissing and embracing are also included when they are clearly nonsexual in intent.

Examples

i)He began to pet the new puppy.

ii)I was so glad to see Mom that I gave her a big kiss.

iii)My brother gave me a pat on the shoulder.

F7 - close relationship - Friendliness expressed through a desire for a long-term close relationship with a character. Included in this subclass are getting married, becoming engaged, and falling in love.

Examples

i)I dreamed my girlfriend and I were getting married in this unusual-looking church.

ii)I gave her a beautiful engagement ring.

Sexual Interaction

S1 - thoughts - A character has sexual thoughts or fantasies about another character.

Example

i)I imagined what it would be like to sleep with Bo Derek.

S2 - propositions - A character makes sexual overtures to or "propositions" another character.

Example

i)This good-looking woman who was a stranger to me suggested we go to her apartment and make love.

S3 - necking - This subclass covers necking and "nonplatonic" kissing.

Example

i)And then my girlfriend kissed me for a long time.

S4 - foreplay - This subclass involves the various types of foreplay activities generally preceding intercourse.

Example

i)I dreamed I looked in the window across the street and I saw this man I didn't recognize fondling the neighbour lady's breasts.

S5 - intercourse - A character has or attempts to have sexual intercourse with another

character.

Example

i)My girl was willing and I was just getting ready to insert my penis when I woke up. It was a wet dream.

Number of Characters in Social Interaction (#C)

0 - solitary (e.g., dreamer alone)

1 - pair/couple (2 characters)

2 - group (>2 characters)

FORTUNE (F)

SU - success/winning

FL - failure/losing

Success (SU)

Examples

i)The exam was a tough one but I was determined to get a good grade. I wrote as fast as I could and put down all the examples I had memorized. I felt sure that I had done well on it.

ii)A man was chasing me with a gun. By running down some narrow dark alleys and climbing some high fences, I finally was able to

get away.

Failure (FL)

Examples

i)My father couldn't find his glasses although he looked high and low for them all over the house.

ii)I wanted to board this boat and kept trying to climb the ladder but every time I got near the top I slipped back into the ocean again.

Environmental Press (EP)

M - misfortune - bad things happen to a character

GF - good fortune - good things happen to a character

Misfortune(M)

M1 - environmental barrier or obstacle; character is late or unable to move

M2 - falling or danger of falling

M3 - environmental threat

M4 - accident or loss

M5 - injury or illness

M6 - death

Examples

M1: i)When we reached the river, we discovered that the bridge had collapsed so we couldn't get to the picnic grounds.

ii)As the truck bore down on me, I tried to run but found that my legs wouldn't move.

M2: i)I dreamed that I was falling and falling and never hit bottom.

ii)As I stood on the edge of the cliff, the rocks began to move and I was afraid I might fall.

M3: i)The wall began to crack and bulge out and I thought it was going to fall on me.

ii)The waves were very high and I was afraid the boat we were in was going to capsize.

M4: i)As I was driving down the mountain, my car crashed because of the icy road.

ii)My car had a flat tire.

M5: i)My mother lost her memory.

ii)He had a clubfoot.

M6: i)I was atttending my father's

funeral.

ii)I went up to the coffins and opened them. Lying in one box was my mother, in the other my sister, and in the third my brother. They all appeared to be dead.

Good Fortune(GF)

GF0 - absent

GF1 - present

Examples

GF: i)I was out hunting when a large herd of deer just seemed to appear from out of nowhere.

ii)I dreamed I found a lot of money.

BIZARRENESS (B)

1 - dream entirely true to life

2 - dream contains both real and unreal elements

3 - dream totally unreal

This category refers to the extent of "unrealness" of the dream.

Examples

i)I was floating on a cloud. I could see the earth far below.

ii)We were at a hot dog stand.
Joe was standing next to me and
eating some french fries.

iii)We were standing at a hot dog
stand. Joe was eating a clam
which was easily ten feet high.
He was carving chunks out of it
with an axe. I was standing
eating a hot dog. There were
a few other people around.

Example i) would receive a rating of 3, ii) a rating of 1, while iii) would receive a rating of 2 because it combines real and unreal elements.

VIVIDNESS (VN)

0 - vague or hazy dream with no detail
1 - dream with only a little detail
2 - some detail with a small degree of clarity
3 - moderate amount of detail and clarity
4 - much detail and clarity
5 - very much detail and clarity

This category refers to the degree and clarity of the dream.

Examples

i)There was a blur of colour, I think
it was colour, in front of me.
That's all I can remember.

ii) I made out the form of a person or animal in the distance.

iii) There was a person standing in the distance.

iv) I could see him standing there. He was wearing a hat, green I think, and a raincoat, but I could not make out his face.

v) He was standing quite close. I could make out a scar on his face and his tie was brown where it showed at the top of his overcoat.

vi) Even though he was standing a few yards away, I could see that his eyes were blue and encircled by heavy bags. His nose was hooked and I remarked at the number of hairs protruding from his nostrils.

The above examples would be rated in the order they appear, i) being given a rating of 0 and vi) a rating of 5.

CHANGE of SEQUENCE (CS)

This category refers to the break in the continuity of the dream. A dream which contains sequences which do not logically follow each other, or sequences which lack continuity because of implied but missing episodes between them should be included in this category.

Examples: i)I was at school. Suddenly, I was in my apartment. Next, I was at a race.

ii)I was preparing to go out. The next thing I know, I was speeding on my way in a car.

Example i) should receive a rating of 2 indicating two changes of sequence and ii) a rating of 1.

Those dreams showing no change of sequence should be rated 0.