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**The Relationship Between Waking and Dreaming Using
Multidimensional Dreams Analysis and
Personal Projects Analysis**

Naome Howe

A thesis submitted to the
Faculty of Graduate Studies and Research
in partial fulfillment of the
requirements for the degree of
Master of Arts.

Department of Psychology,
Carleton University,
Ottawa, Ontario

September, 1988

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Abstract

The purpose of this study was to investigate the relationship between waking and dreaming experience, using Personal Projects Analysis (PPA) and Multidimensional Dreams Analysis (MDA). A sample of 30 subjects completed the PPA both before and after maintaining a dream diary for approximately 3 weeks, during which they completed the MDA. The scales for waking and dreaming experience are comparable for various self-rated dimensions. Examples of these dimensions include importance, stress, value congruency, and affect intensity. Pattern similarity coefficients (r_p 's) indicated that, first, the pre- and post-project dimensional ratings were very similar, and secondly, the project and dream dimensional ratings were significantly different. For instance, dreams were experienced to be less typical of the subjects' self-identity than daytime concerns, less congruent with their current values, and more intense, both affectively and perceptually.

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Thanksgiving is in order. To my advisor, Dr. Alan Moffitt, who heartily embraced my ideas even before they had proven their value, and to my co-advisor, Dr. Robert Hoffmann, who has devoted his limitless statistical wizardry to the sometimes slippery motions of this research. Also, to Dr. Brian Little, whose combined force of research and world view has encouraged me to remember my knowledge of it.

And finally, to my husband, Leonard, who kept me here even as he braved every element of hardship I did to reach this goal. And to my son, Gene, my tiniest and most powerful inspiration.

It is plain foolishness to believe in ready-made systematic guides to dream interpretation, as if one could simply buy a reference book and look up a particular symbol. No dream symbol can be separated from the individual who dreams it, and there is no definite or straightforward interpretation of any dream. Each individual varies so much in the way that his unconscious complements or compensates his conscious mind that it is impossible to be sure how far dreams and their symbols can be classified at all.

- Carl G. Jung,

Man and his Symbols

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Table of Contents

Introduction	1
The Orderliness of Dreams	2
Relationship Between Dreaming and Waking Mentation	4
Relationship Between Dreaming and Waking Experience	8
Dreams and Psychological Adaptation	8
Relationship Between Current Concerns and Dreams	11
The Dual Function of Dreams	15
Validity of Dreamer's Assessment of the Dream	15
Multidimensional Dreams Analysis	19
Shortcomings of Current Dream Research	25
Method	28
Subjects	28
Procedure	28
Results	35
Comparing Dimensional Means for PPA and MDA	35
Frequencies and Means for PPA and MDA Matrices	35
Ease of Evaluation for MDA	35
Dimensional Means for PPA and MDA	35
Significant Differences Between PPA and MDA for Dimensional Means	37
Dimensional Composites for PPA and MDA	37
Pattern Similarity Coefficients Between PPA and MDA	40

Explanation of the Pattern Similarity Coefficient	40
Consistency of Ratings for (Pre)PPA and (Post)PPA	41
Mean Frequencies of Positive and Negative Pattern Similarity Coefficients	44
Dimensional Means for Pattern Similarity Coefficients in PPA/MDA Matrices	44
Content Category Analysis for Significant Negative Pattern Similarity Coefficients in PPA/MDA Matrices	48
Analyses of Variance to Investigate Sub-Groups	52
Individual Variation	52
Discussion	58
Examination of the Results	58
Comparing Dimensional Means for PPA and MDA	58
Pattern Similarity Coefficients Between PPA and MDA	63
Individual Variation	67
Suggestions for Future Research and Final Comments	75
References	80

List of Figures

1. Dimensional Means for Projects and Dreams	36
2. Dimensional Composites for Projects and Dreams	39
3. Dimensional Means for Pre- and Post- Projects	45
4. Dimensional means for Projects and Dreams Associated With Negative Pattern Similarity Coefficients	47
5. Subject #1's Dimensional Means for Projects and Dreams Associated With Negative Pattern Similarity Coefficients	54
6. Subject #2's Dimensional Means for Projects and Dreams Associated With Negative Pattern Similarity Coefficients	55
7. Subject #3's Dimensional Means for Projects and Dreams Associated With Negative Pattern Similarity Coefficients	56

List of Tables

1. Significant Differences Among Dimensional Means for (Pre)PPA, (Post)PPA, and MDA	38
2. Positive and Negative Frequencies for Pattern Similarity Coefficient Matrices	42
3. Mean Frequencies of Positive and Negative Pattern Similarity Coefficients (r_p 's)	46
4. Significant Differences Among Dimensional Means Associated With Negative Pattern Similarity Coefficients for PPA (Pre-/Post- Mean) and MDA	49
5. Content Category Definitions	50
6. Frequencies for Project Categories Indicating Significant Negative Pattern Similarity Coefficients (r_p 's) With Dreams	51

List of Appendices

A. Sample Assessment Package	89
B. Pascal Program to Analyze Summary Information	103
C. Waking and Dreaming Profiles for All Subjects	117

Introduction

A fundamental topic of interest in the area of sleep and dreaming is the functional relationship between dreaming and waking state. Do dreams have a definite psychological function? Some researchers claim that the answer to this question is "no". For instance, Hobson and McCarley (1977) maintain that dreaming simply reflects an epiphenomenon of the activated brain state of REM (rapid eye movement) sleep. Crick and Mitchison (1983) suggest that we dream to unlearn what the brain no longer is required to retain. In other words, during any given day the mind accumulates a certain amount of clutter which dreaming serves to discharge or clear.

It is clear that the dream may be studied either as a physiological event which may be indexed by REM sleep, or as a psychological event, which is commonly indexed by the dream report. This thesis will concentrate on the latter perspective.

The notion of whether or not dreaming and waking are related will be queried from a more affirmative standpoint than is sometimes found in the psychophysiological literature. Specifically, it is hypothesized that dreams are significant by nature of their relationship, either cognitively or affectively, to the daily concerns of the individual. Continuity of content between dreaming and waking, either manifest or latent, may or may not exist.

The focus of this study is the form and structure of one's dream experience, rather than the content or interpreted meaning of the dream. This represents a rare position in the field of dream research to date but potentially, it would seem, a highly fruitful one.

The Orderliness of Dreams

Contrary to the idea that dreams are random and chaotic, Domino (1976) provides evidence that people's descriptions of persistent and continuing qualities within themselves such as achievement and dominance as indicated by scores on the Edwards Personality Preference Schedule and the Adjective Check-List, correlate positively with judges' ratings of these same scales in the subjects' dream content. Kramer (1982) too maintains that dreams are orderly precisely because they show consistent patterns of the relationship between dream content and individual differences such as sex, age, and absence or presence of psychiatric illness. His own research also indicates that the dream is organized from night to night, across the night, and across the REM period, as based on dream report content.

Samson and De Koninck (1986) investigated the dream/waking relationship by analyzing the subjects' dreams with an extraversion scale derived from the Eysenck Personality Inventory (EPI), and then correlating these scores with the subjects' corresponding extraversion score

on the EPI. For example, the item "Are you usually carefree?" was modified to inquire, "Is the subject in the dream carefree?" These scores were then correlated with the subjects' corresponding extraversion score on the original EPI. They found a negative relationship between waking and dreaming extraversion for those subjects low in neuroticism and an insignificant positive correlation for those high in neuroticism. They suggest that for those low in neuroticism a complementary and potentially adaptive mechanism may be occurring in their dreams. At the very least, these individuals are exhibiting an orderly relationship between dreaming and waking, based on personality differences.

Dreams do not seem to reflect randomness when compared with waking thought, even if we hold the notion, as Foulkes (1983) does, that dreams reflect our conceptions of our actions and feelings rather than what we actually do and feel. Since the most frequently occurring character in dreams is the dreamer (Snyder, 1970), it would seem that dreams usually contain a character who is physically or psychologically identifiable as continuous with the dreamer's waking self. Furthermore, the orderliness of dreams is expressed in the sense that dreaming self-reference seems to be continuous not only with the physical self but with the active self during waking (Foulkes, 1985).

Because we are unable to study the dream directly, we

must necessarily rely on the dreamer to communicate the dream to us. Kramer (1982) provides four specific research examples that advance the notion that the dream event and the dream report are not only valid but correlated. First, eye movements and dream activity appear to be associated (Roffwarg, Dement, Muzio & Fisher, 1962). Secondly, eye movement density or autonomic variability during REM has been found to vary with the dream report (Kramer, Roth & Czaya, 1974). Third, muted dream reports result from muted density of eye movements due to drugs (Firth, 1972). Finally, incorporation experiments suggest a correlation between dream reports and the dream experience (Kinney, Kramer & Bonnet, 1981).

Relationship Between Dreaming and Waking Mentation

Certain aspects of waking and dreaming mentation appear to be related. Kramer, Roth & Palmer (1976) had 24 subjects give responses to 10 Thematic Apperception Test (TAT) cards which were scored along with the dreams. The results indicated a similarity in the intensity of dream content and TAT stories. Another study (Kramer, Roth, Arand & Bonnet, 1981) with 40 subjects required them to speak into a tape recorder on any subject of their choice for five minutes both prior to going to sleep and upon awakening in the morning. The verbal samples and dream reports were later scored for characteristics, descriptive elements, activities, environmental press, and emotions, according to

the Hall-Van de Castle Dream Content Scoring System. They found dream content and the waking psychological parameters to be significantly related, demonstrating a relationship between dreaming and waking thought.

Purcell, Mullington, Moffitt, Hoffmann & Pigeau (1986) suggest that dreaming is variable along a self-reflective process continuum, which intimates that dreaming represents a higher order cognitive activity on both functional and organizational levels, similar to waking state mentation. Self-reflectiveness may be generally defined as an examination of one's thoughts, feelings, and behaviors. At the lower level of the self-reflectiveness scale, the dreamer does not exist in the dream, objects are unfamiliar, and no people are present. At the highest level of the scale, the dreamer is able to consciously reflect on the fact that dreaming is taking place. With this technique, the manifest content of the dreams is not analyzed, yet the relationship between thought patterns in dreaming and waking state can be evaluated. This is done by categorizing dreams according to the developmentally ordered levels found on the self-reflective continuum, and comparing this with a parallel self-reflectiveness scale for waking state. Specifically, Mullington's research (1988) supports cross-state continuity for the process of self-reflectiveness in female frequent dream recallers and male infrequent recallers.

The associated cognitive properties found in waking and dreaming may also be found in Tomkins' (1979) script theory which explores how events that are personally significant, as well as personally significant memories, may determine some script categories. The specific cognitive structures organizing personally significant memories may be called affective scripts. Dreams also may be discussed in terms of script theory. For example, any given dream may remind the dreamer of a series of memories with similar goal properties and affective qualities, as if the dream and the memories were expressions of the same affective script. This relates to Brager's (1969) tenet of the dream being a form of emotional information processing. What is meant by this is that dreams help to integrate and organize new experiences into affective memory schemas that have proved successful in the past in handling such data.

Implications also exist for the script-theoretical approach for the assessment of treatment outcomes in clinical settings. With a content-analytic scheme derived from Tomkins' (1979) script theory, Carlson (1986) reported in one case study, after the subject had undergone three years of psychoanalytic psychotherapy, a significant increase in positive affect and a decrease in negative affect in posttreatment dreams. Indeed, the posttreatment dreams seemed to be more positive than the subject's pretreatment dreams.

Another cognitive theory which also includes a physiological description of dreaming processes is the vigilance theory (Ullman & Storm, 1986). This perspective presumes that a subsystem exists within the nervous system in the waking state which maintains a constant state of vigilance, at least tacitly. Specifically, the reticular activating system monitors sensory input, refers it to the cortex, receives signals back from the cortex, and may, if appropriate criteria are met, interrupt other neural activity. Regardless of one's initial state of arousal or where one's attention is focussed during waking state, this subsystem may be interrupted by an excitation from the periphery that is either sufficiently novel or sufficiently intense to surpass a given (presently unknown) threshold and alert the organism.

Therefore, while awake we are more likely to respond to novel or intense, rather than familiar stimuli to which we have become habituated. Ullman and Storm (1986) hypothesize that the processes involved in inspecting incoming data continue unabated during sleep, except that in the absence of peripheral excitation and an ongoing state of arousal, the material inspected originates only from cortical and subcortical activity. In addition, this inspection refers to the person's historical record in order to arrive at judgments about novelty. Considerations of intensity may be referred to affective components which, too, are a part of

the historical record.

Kihlstrom (1987) proposes that in order for ongoing experience, thought and action to become conscious, a link must be made between its mental representation and some mental representation of the self as agent or experiencer. Therefore, before one can discuss the adaptive function of dreams, or the meaning of dreams, or even the variables which influence dream recall, it is valuable to explore the cognitive, affective and behavioral association between dreaming and waking experience.

Relationship Between Dreaming and Waking Experience

Dreams and Psychological Adaptation

Given that dreams contain orderliness, and given that the dream experience and dream report may be seen to be related to each other, it is meaningful to examine how different theories and studies have approached the dreaming and waking relationship from a psychological perspective. Many of the current researchers in the field imply or state that dreaming may actually have an adaptive function in our daily lives.

For instance, Brown and Donderi (1986) found that by investigating remembered dreams and the relation between dreams and psychological self-report, support became evident of the possible connection between dreaming and psychological adaptation. Specifically, the results support two propositions about recurrent dreams. First, recurrent

dreamers indicate a systematic and statistically significant deficiency across a number of well-being measures. The measures of psychological well-being included the Eysenck Personality Inventory Neuroticism Scale, the State-Trait Anxiety Inventory Scale, the Beck Depression Inventory, the General Symptom Index of the Symptom Checklist, the Life Events Inventory, and the Personal Adjustment Scale of the Adjective Check-List. Secondly, past-recurrent dreamers, those who maintained cessation of a previously recurrent dream, achieved well-being and dream content scores which were significantly higher than recurrent dreamers, statistically higher than the nonrecurrent dreamer control group, and, surprisingly, higher than the population norms. The measures of recalled dream content included the Friendly and Aggressive Social Interactions Scale, the Emotions Scale, the Achievement Outcome and Environmental Press Scale, the Anxiety Scale, a number of scales measuring dreamer-involved hostility, and Kluger's Archetypality Scale.

Adaptive theories of dreaming generally try to address the consequences of dreaming. The basic tenet of Freud (1955) for example, was that the dream is the fulfillment of a wish. Jung (1964) referred to dreams as having either a prospective function or a compensatory function.

A more current example is Kramer (1978), who maintains that the dream is a selective affective modulator. He found

that from night to morning, mood decreases in intensity (level) and variability (decreased standard deviation). Besides the obvious explanation of this simply being a function of having been asleep, the affective change may indicate that perhaps dreams function as a selective emotional thermostat, acting as a psychological balancing mechanism for the individual. According to his theory, the various sleep stages in a general physiological sense contribute to this coherence, whereas dream content itself may relate more directly to the psychological effects of sleep.

Perhaps, for instance, dreams reflect changing roles in one's life. Lortie-Lussier, Schwab and De Koninck (1986) discovered that although working mothers experienced more unpleasant emotions, more male characteristics, and less residential settings than homemakers in their dreams, it was the homemakers that expressed greater overt hostility in their dream content. In addition, Cartwright (1986) found that there were both structural and content differences in the dreams of women who were experiencing depression in relation to their divorce, from those who were not; and differences of both of these from dreams of married controls living stable lives. These studies provide evidence for Rossi's (1985) position that our dreams reflect both our psychological state and the process of change or adaptation taking place within it.

Krippner (1986) has developed a personal mythology theory to explain how dreams seem to be connected with waking experience. Personal myths are defined as cognitive structures that give meaning to one's past, define one's present, and provide direction for one's future. Their function is to explain and guide one's experience; that is, to help one adapt. According to this perspective, dreams synthesize one's existing mythic structures with the data of one's life experiences. Some dreams strengthen old myths, others illustrate a counter-myth, and still others facilitate a cognitive interaction between old and new myths. Ullman and Zimmerman (1979) claim it is the dream's function to expose dysfunctional personal myths, illuminating the self-deceptive strategies one uses to avoid initiating a healthier pattern of behavior.

Relationship Between Current Concerns and Dreams

Klinger (1977) defines a current concern as the state of an individual between commitment to a goal, and either attainment of the goal or disengagement from it. It does not refer to brain processes, thoughts, or even actions necessarily, but to the hypothetical state underlying thoughts and actions during the experience of being committed to a particular incentive.

Some dream research deals with the hypothesis that people remain sensitive to concern-related cues even while asleep. An illustration of this is found in Cohen and Cox's

(1975) work where it was found that if some predicament was induced experimentally during the day, it was echoed in the dreams of the following night. Verdone (1965), too, reported that dreamers rated dream elements as most commonly being from events that occurred during the week preceding the dream. Cartwright's (1977) research supports the notion that dreams do not deal with the unimportant daily overload but instead with the more emotionally relevant aspects of current experience as it relates to the past. This seems to indicate that dreams do reflect those concerns that are significant to us at any given time. As Kuiken (1986) states, dreams seem to combine elements from recent and remote personally significant memories. Therefore, a number of researchers suggest that: ". . . rather than representing a hidden network of unconscious wishes, dreams may be a reflection of prominent concerns, emotions, and wishes that are part and parcel of our daily lives" (Koulack, 1987, p. 219).

Results by Hoelscher, Klinger and Barta (1981) indicate that activation of affective scripts during REM sleep prompts dreams in which significant memories are involved. Subjects were asked to identify significant concerns to which they were highly committed, through an adapted version of Klinger's Concern Dimension Questionnaire. During sleep, audio recordings of words or phrases descriptive of these pursuits were presented. These words were more likely to

prompt dream images with goal-related content than unrelated words or phrases.

It may be suggested that in a very practical sense, dreams serve both to help master stressful experiences and to periodically help in avoiding them (De Koninck & Koulack, 1975; Koulack, 1985). By dreaming of stressful waking events, we are trying to come to terms with them. However, this process of mastery insofar as it causes a certain focus on the stressful experience and the associated affect, is possibly disruptive in itself. If the disturbance becomes too great, the dreamer may avoid the disruptive dreams by replacing them with pleasant ones, called avoidance dreams. Perhaps this oscillation between mastery dreams and avoidance dreams continues till some resolution of the stress is obtained. Certainly such oscillation is likely to be difficult to cope with statistically, and the results of this study indicate less oscillation may actually occur than is speculated by De Koninck and Koulack. Perhaps it is the pleasant dreams, the ones they misleadingly refer to as avoidance dreams, that, in effect, facilitate this process of coping with stressful waking events. This notion will be elaborated upon in the Discussion section.

Of some relevance to this in waking state, Pennebaker's (1982) inhibition process model presents three central themes. First, inhibiting behavior such as failing to discuss an upsetting occurrence from one's past has both

short-term and long-term effects on a physiological level. Secondly, a consequence of inhibiting behavior is an increase in the amount one may ruminate about the topic being inhibited, or what may be termed obsessive thinking. And finally, confiding to someone about a traumatic event may help integrate the event into one's life, thereby reducing the physiological activity related to inhibition or obsessive thinking. It is intriguing to think that dreams, dream recall, and/or communicating one's dreams to others may have a part to play in the function of resolving and assimilating such experiences.

Greenberg and Pearlman (1975) posit that dreaming is associated with and perhaps a prerequisite for handling psychologically important events. In other words, dreaming may be an emotional problem-solving, adaptive process. To what extent dreaming is able to handle affect-related information to input problems and output solutions may vary with the level of affect involved. For example, if affect is too low the process may be imperceptible and if affect is extremely high, the process may break down. This suggests there may be an optimal level of affective arousal for dream recall to be detected as functionally important. Breger, Hunter and Lane (1971) found that dream content relates directly to real-life events that evoke moderately strong affect, such as impending elective surgery, as opposed to those evoking extreme affect, such as life-threatening

surgery.

The Dual Function of Dreams

Any of the above adaptive theories of dreaming may suggest either an assimilative or an accommodative function for dreaming as delineated by Piaget (1962). An assimilative view states that because the process of dreaming functions quite automatically outside the person's conscious awareness, recall is unnecessary and irrelevant. Regardless of whether or not the dream is remembered, it may achieve some corrective goal within the individual. Whereas all dreams are important for the accommodative view in the sense that they hold the potential to significantly impact one's life, this position maintains that recall is a necessary prerequisite for the dream to have any transforming effect.

Kramer (1982) contends that dreams may be both assimilative and accommodative in a functional sense. Those dreams that are recalled are perhaps related to more significant projects of the moment and thereby carry the potential for altering experience, either in themselves or in conjunction with a waking exploration. Most dreaming, however, would be continuing outside of awareness to achieve the more modest assimilative goals.

Validity of Dreamer's Assessment of the Dream

Verbal data and self-report measures when used during waking state for personality assessment have been

scrutinized for inaccuracies (Mischel, 1968). However, Burisch (1984), after reviewing more than a dozen comparative studies, recommends the use of deductive approaches above other strategies. Not only are they clearly superior in terms of communicability and economics but self-rating scales are narrowly but consistently more valid than questionnaire scales. Therefore, in waking state and presumably for dream reporting, it is demonstrated that, if observed scientifically and with care: ". . . Verbal data are not in the least epiphenomenal but instead are highly pertinent to and informative about subjects' cognitive processes and memory structures" (Ericsson & Simon, 1984, p. 220).

It is important, however, to point out the difficulties with dream report measurement from a content-analytic viewpoint. Four items will be delineated here (Kramer, 1982). First of all, the verbal nature of the dream report is problematic. Interpretation may be subjective in analyzing the information, and dream reports may vary according to the ability and sophistication of the dreamer. Indeed, the definition of the scoreable dream report may be difficult to ascertain. A related point is that the effect of dream report length on the type of measurement used will necessarily influence how the report is altered for scientific digestion. Finally, the methods of quantifying dream content, of which there are many, is an issue. One

major stumbling block in the study of dreams is that the validity and reliability of the measurement of dream reports has not yet been established. This is not to say that some, such as Hall & Van de Castle (1966), have not developed practical, reliable methods for quantifying the manifest content of dreams. However, to scientifically analyze the latent meaning of dreams, or to connect those dreams with waking state behaviors or activities remains a methodological challenge in the field of sleep. The present study addresses this concern by attempting to measure the dreamer's own experience of the dream, rather than either latent or manifest dream content. It is believed that: "Ultimately, one's personal mythology will be most usefully understood in the language and images one uses when he or she thinks about his or her life" (Krippner, 1986, p.460[325]).

Other factors that may influence the dream report include: setting, whether it be home or laboratory; method of awakening, whether it be natural, telephone, alarm or some other method; context of interpersonal situation as in the experimenter's relationship to the subject; different times of night and stages of sleep; method of recording the dream report; and subject variables in terms of ability to experience, recall and report dreams.

It is interesting to note here that informal observations in the Sleep Laboratory at Carleton University

indicate that the dream reports provided by subjects appear to be genuine. Some examples are in order. In Purcell's study (1987), it became evident that even when the demand characteristics were obvious, the dream reports failed to be significantly affected. One group was explicitly told that the investigator was looking for lucid dreams, and although they had more lucid dreams than the other groups, they did not generate a great deal more. Furthermore, in Mullington's study (1988), subjects were telephoned at 4:00 a.m. daily to give a verbal dream report until they produced two dreams, and yet the low recallers still were either unable to or did not choose to fabricate their dreams. In the present study as well, it does not seem likely that subjects would feel obligated to produce dream reports if they did not dream, since it was emphasized that they need not worry if they could not remember their dreams, and that they would be paid for their participation regardless of the number of dream reports they submitted.

As far as the recording of the dream report is concerned, we must be cognizant of the fact that a double shift exists. Sensorimotor to verbal sensory modes, and asleep to awake state may distort dream experience, although it is not known to what extent. A number of factors will, however, alter the actual nature of the dream report. For instance, there are advantages to writing one's dreams down as opposed to recording them verbally. The most obvious

advantage is that the subject may be inhibited to speak about certain dreams, which would certainly alter the report. One also eliminates the further apprehension experienced by some people to being tape recorded. It may further be an advantage to have people write down their reports to encourage more logical recordings, even though the report will necessarily be limited by the subjects' written vocabulary and writing facility. This is not expected to be a major concern with the university sample, nor is it particularly relevant given the sort of dream analysis to be instigated in this study.

Ullman and Storm (1986) emphasize the intensely private and personal experience of dreams. Only the individual can determine whether specific dreams are significant, and what constitutes that significance. Moreover, whether or not a researcher takes notice of the dreamer's account may affect other aspects of the study of dreams in ways that can either reinforce a proposed theory, or cast serious doubt on tentative explanations of the phenomenon of dreams.

Multi-Dimensional Dreams Analysis

The completed study represents an investigation of the application of Personal Projects Analysis (PPA) methodology to dream experience via a scale that has been named the Multi-Dimensional Dreams Analysis (MDA). PPA procedures have been shown to be a valuable tool in examining different dimensions of human experience in waking consciousness such

as mood states, health status, life-satisfaction or quality of life, and personal efficacy (Little, 1985).

It should be explained that Lederman did a study in 1980 to look at the correlation between PPA indices and dream recall measures. She found little correlation. However, a number of factors might help to explain these results. First, the PPA format itself has been modified and refined since her study was undertaken. In fact, the MDA could hypothetically be used independently of PPA to focus exclusively on the dream context. Secondly, no dream journals were collected to observe possible associations between personal projects provided and dream content. Most importantly, PPA was administered once only and was not employed in any direct manner with dreaming or dream reporting. This study expected to observe the possible relationship between dreaming and waking experience in a more systematic and thorough manner to determine more conclusively whether or not such an affiliation exists.

Subjects were asked to evaluate their dreams in a parallel fashion to that applied to waking projects. There are advantages to such an approach in that most dream research to date is limited by restrictions in the categories of evaluation and quantification available, lack of subject input in the quantification of dream experience, state specificity of quantification tools, or a combination of all three of these. Using MDA, it becomes possible to

include subjective information for a series of general categories in a procedure which will assess both waking and sleeping experience. This allows for comparison of the subjects' evaluation of their experience across state boundaries. The following section will more specifically describe the shortcomings of dream research to date and the advantages of using MDA. First, a description of the source of this technique is in order.

The methodology of PPA was created and developed by Little (1983). The personal project in this context is defined as any extended set of personally relevant actions. Thus, the personal project utilized as the unit of analysis, reflects cognitive, affective, contextual, and behavioral aspects of human conduct. The notion of current concerns or significant events is operationalized, and since this notion is repeatedly referred to in current dream research, it seems an appropriate technique for this study.

Emmons (1986) conceptualizes goals in terms of personal strivings which refer to those things individuals are characteristically trying to accomplish through their behavior. This perspective was thought to be less appropriate for the present study because it tends to exclude mundane and repetitive projects, or other peripheral concerns that may also be connected to one's dream experience. A primary concern during the course of this endeavour was the attempt to avoid interpreting how dreams

should be discussed and reflected upon. Presuming that dreams might relate better to strivings than projects seems to be at best a premature suggestion, and at worst, an insult to those who fail to dream in such vast terms.

PPA is an integrated set of assessment components which allows one to explore the content, structure, dynamics, and impact of the everyday pursuits and goals of an individual. Projects may be banal or all-absorbing commitments. Again, projects may be central or peripheral concerns. They may also be self-initiated, or forced upon one, although it is the subject who will ultimately define the projects, and rate how they are experienced on a number of variables.

During the standard administration of PPA, subjects are asked to generate their current personal projects in their own terms using short phrases. In the MDA, the dream log corresponds to this list in the sense that it provides information that reflects individual differences in both content and syntax. Once ten projects are chosen for PPA, they are rated on a scale from 0 to 10 on a set of dimensions which coincide with a broad range of current concerns in psychology, as well as ones relevant specifically to dream research. These dimensions will be described in greater detail in the Method section.

Methodologically, these ratings are usually analyzed in one of two ways, through normative analysis, where the individual's project characteristics are compared with the

appropriate norm group, or ipsatively, where patterns of relations among the ratings are analyzed within the single case with no attempt at normative comparison. There are also "with whom" and "where" columns which help tap into the social ecology of the individual.

Five major dimensions have emerged from factor analyses (Little, 1986), which correspond to important issues in psychology generally and in dream research, particularly. These factors include:

1. Project Meaning - having worthwhile pursuits. Reliable correlations have been found between these dimensions, and indices of life satisfaction or perceived quality of life. This factor relates to the dimensions of enjoyment, value congruency, self-identity, importance and absorption. A number of researchers' perspectives previously mentioned such as Cartwright's (1977) view that dreams seem to deal with the more emotionally relevant aspects of one's current experience, and Snyder's self-referential view, which focuses on the notion that dreams reflect that which is congruent to one's sense of self, is easily operationalized by using MDA.

2. Project Structure - having manageable projects. The dimensions of initiation, control, time adequacy, and negative impact have been found to be correlated with Paulhus' Locus of Control assessment device. For the purposes of this study, it is interesting to note that this

factor is related to the Dream Control Scale as developed by Purcell (1987).

3. Project Community - having supportable projects. The dimensions that this factor corresponds with include project visibility, and others' view of the importance of our projects. This area relates to dream research less than the other factors, although it potentially holds important information for cultural and developmental perspectives on dreaming. Whether or not dreaming is supported in our society is a question of value if it appears that dreams do, in fact, have a positive, adaptive function in our lives. In this regard, we may again refer to Pennebaker's (1982) inhibition process model.

4. Project Stress.

This factor relates to the stress, difficulty, and challenge dimensions and for the topic of dreaming, maps directly onto various perspectives on how dreams are associated with emotionally relevant aspects of one's daily experience. (Cartwright, 1977; Kuiken, 1986; Domino, 1976).

5. Project Efficacy - having accomplishable projects. Progress and outcome dimensions are referred to by this factor. Again, this factor may be seen to be associated with Purcell's (1987) concept of dream control. Presumably, the greater the degree of control over one's dreams, the greater the efficacy with which one is able to affect one's progress within the dream, as well as one's likelihood of

successfully completing the dream. For this study, however, the inherent progress and outcome of the dream experience was of interest, as opposed to the resulting progress and outcome experienced after effecting any form of dream control.

Shortcomings of Current Dream Research

Much of the research done on the psychological function of dreams has been based on content-analyzed dream reports that have been correlated with orthodox trait assessment devices, such as the Eysenck Personality Inventory as mentioned in Samson and De Koninck's study (1986). The ultimate purpose of these scales is to facilitate the ascription of valid psychological predicates to people (Little, 1986). Disadvantages do exist, however.

First, many psychological assessment devices along with many dream report scales utilize units of analysis which are neither subject-generated, evocative, nor analyzable at the individual level. Granted, the dream report itself is subject-generated in the sense that the dreams are self-nominated by the subject and phrased in the subjects' own idiomatic style. The problem arises, however, when the dream content is interpreted by a third party and then compared with typical test items drawn from conventional normative inventories.

Also, while many dream report analyses are both intricate and thorough in their attempt to pull out

important information from the dream report, few assessment devices encourage subjects to convey the information regarding their dreams that they deem to be important. The purpose of this is to avoid contaminating an objective viewpoint. However, it may be possible that some of the information omitted as a result of this orientation is of some value to the overall interpretation which ensues.

It is clear that one of the major advantages of MDA and PPA is that the assessment units are both ecologically representative and temporally extended. Therefore, while the researcher is comparing the subjects' dream experience with their experience of current projects, the very personal and timely context of their lives comes into focus. Rich sources of information are provided that may be quite helpful, whereas in most traditional assessment vehicles, the units of analysis are used only as the means to ascribe valid predicates to persons. Such approaches not only limit the knowledge gained about the dream experience but require a more indirect and oblique format, and consequently a greater requirement for making inferences in one's conclusions.

Most conventional means of studying dreaming and the relationship between dreaming and waking are, to some extent, ineffective since the units of analysis used fail to be systemically integrative. For instance, in PPA, middle level molarity units of analysis are utilized, rather than

focussing on the molecular level such as frequency of low level behaviors, or the molar level such as core values. Methodologically speaking, this is optimal because it allows access to both molar and molecular levels of human conduct without calling for premature inferences. A suggestion on how this might be achieved with MDA will be provided in the Discussion section.

Also, rather than requiring a number of different measurement techniques to explore cognitive, affective and conative functioning in the experience of dreams; the one integrative approach is multi-functional and interconnected, rather than sectoral in nature. One of the most blatant shortcomings of current dream research is the fact that discrete measurement tools are used for waking and dreaming states which frequently have radically different metrics. The systemic advantage of MDA is that different psychological variables are measured via the same set of eliciting units and that indeed, a directly comparable tool of inquiry is used for two different states of consciousness.

Method

Subjects

The subjects were 30 summer students registered in Psychology courses at Carleton University. The sample was comprised of 22 females and 8 males. Seventeen subjects (56.7% of the sample) represented high dream recallers and 13 (43.3% of the sample) represented medium dream recallers. The subjects ranged in age from 16 to 36 years, with a mean age of 24.4. Payment of \$40.00 was provided for their participation in the study.

Procedure

Each subject received an envelope containing: informed consent form, demographic sheet inquiring the subjects' sex, age, dream recall rate, and consistency of dream recall, (pre)Personal Projects Analysis, Dreams Analysis (MDA), and (post)Personal Projects Analysis. See Appendix A for sample assessment package.

The subjects were not given specific information about the purpose of the study. It was simply explained that the research intends to explore the nature of dreaming. A brief description and definition of Personal Projects was provided verbally, as were the subsequent procedures of the experiment.

The general procedure for the standard format of Personal Projects Analysis has been explained in the

Introduction, however, brief explanations of the specific dimensions follow:

1. Importance - how important each project is to you at the present time.
2. Enjoyment - how you enjoy working on each project.
3. Difficulty - how difficult you find it to carry out each project.
4. Visibility - how visible each project is to the relevant people who are close to you, that is how aware are they that you are engaged in this project.
5. Control - how much you feel you are in control of each project.
6. Initiation - how much you feel responsible for having initiated each project.
7. Stress - how stressful it is for you to carry out each project.
8. Time-Urgency - how much you feel a sense of urgency in respect to the completion of each project. Even though a project may be receiving adequate time, its completion could seem urgent.
9. Outcome - what you anticipate the outcome of each project to be (success and failure are the extremes).
10. Self-Identity - how typical of you each project is.
11. Others' View - how important each project is seen to be by relevant people who are close to you.

12. Value Congruency - to what extent is each project consistent with the values which guide your life.

13. Positive Impact - how much you feel that each project helps the others.

14. Negative Impact - how much you feel that each project hinders the other projects.

15. Progress - how successful you have been in a project so far.

16. Challenge - to what extent each project is demanding and challenging to you.

17. Absorption - to what extent you become engrossed or deeply involved in a project.

18. Otherworldly - to what extent each project is extraordinary on a spiritual, intellectual or imaginative level.

19. Affect Intensity - to what extent each project is emotionally intense.

20. Perceptual Intensity - to what extent each project is intense on a sensory level via sight, sound, touch, etc.

The above standard design was administered both before and after maintaining the dream log, to observe any possible change in the subjects' project systems over a 3 week period. The (pre)PPA was completed in the presence of the investigator after which the subjects were told to take the rest of the envelope home with them, until they returned to submit everything and complete the (post)PPA. The MDA

included material for numbering, dating, and recording the dreams. They were instructed to record all the dreams they remembered immediately upon awakening in the morning. The number for each dream report corresponds to the dream number found on the MDA matrix form. They were instructed to rate the dream (or dreams if more than one was recalled) on the provided dimensions (as was done for PPA) immediately after recording the dream. This was done every morning for 3 weeks or 10 dreams, whichever came first. The subjects were asked to telephone the investigator to set up an appointment to complete the experiment if they recorded 10 dreams before the 3 week time limit. They were reminded that for most items, the important issue was their experience during the dream as opposed to the action found in the dream, or the experience of any of the dream characters.

The dimensions are described again as follows to account for this change in cognitive orientation, and with modifications when necessary and appropriate:

1. Importance - how important the dream was experienced to be at the time.
2. Enjoyment - how you enjoyed dreaming the dream.
3. Difficulty - to what extent you experienced difficulty in your dream.
4. Visibility - to what extent you feel comfortable conveying this dream (i.e. making it visible) to the relevant people who are close to you.

5. Control - to what degree you experienced a general sense of control during the dream.

6. Stress - how stressful you experienced the dream to be.

7. Time-Urgency - to what degree you experienced a sense of urgency or hurry during the dream.

8. Outcome - what you experienced the outcome of the dream was or might have been.

9. Self-Identity - how typical of you this dream was experienced to be.

10. Others' View - how important or interesting this dream would be seen to be by relevant people who are close to you.

11. Value Congruency - to what extent this dream was experienced to be consistent with the values which guide your life.

12. Progress - how successful you experienced yourself to be in this dream.

13. Challenge - to what extent this dream was experienced to be demanding and challenging.

14. Absorption - to what extent this dream was experienced to be engrossing or deeply absorbing.

15. Otherworldly - to what extent this dream was experienced to be extraordinary on a spiritual, intellectual or imaginative level.

16. Affect Intensity - to what extent this dream was

experienced to be emotionally intense.

17. Perceptual Intensity - to what extent this dream was experienced to be intense on a sensory level via sight, sound, touch, etc.

18. Ease of Evaluation - how easy it is for you to rate this dream using the dimensions provided.

The scales used for waking projects and dream experience are directly comparable for 17 dimensions. The dimensions of otherworldly, affect intensity, and perceptual intensity were added to the original PPA for the pre- and post- versions of the scale, as they were to the MDA. The otherworldly dimension helps to operationalize the concept of novelty referred to by Ullman & Storm (1986), while the affect intensity and perceptual intensity dimensions specify and define their concept of intensity.

Three dimensions were deleted from the MDA because they were thought to be irrelevant to one's general experience when reflecting upon dreams. Initiation is unlikely as an appropriate dimension for the simple fact that little reason exists to believe that subjects feel responsible for their dreams. Positive impact and negative impact were deleted similarly because there is little likelihood of the subjects being aware of one dream influencing another in any direction, whether it be positive or negative. The ease of evaluation dimension was added to the MDA matrix to investigate whether the MDA process itself was difficult for

subjects engaged in dream experience reflection. Finally, the original dimension of time-adequacy in PPA was replaced with the less commonly used dimension of time-urgency. It seems a more appropriate dimension to use in relation to dream experience because although one might not experience a dream as containing adequate or sufficient time to be completed, it is quite likely one may experience a sense of urgency or hurry within a dream.

Therefore, the modified version of PPA that comprises the MDA for dream experience and the modified original version of PPA for waking projects were kept as comparable as possible given the specific requirements mentioned above. Specifically, the MDA altered one dimension (time-urgency), deleted three dimensions (initiation, positive impact, and negative impact), and included four new dimensions (otherworldly, affect intensity, perceptual intensity, and ease of evaluation).

Results

Comparing Dimensional Means for PPA and MDA

Frequencies and Means for PPA and MDA Matrices

Out of a sample of 30 subjects, a total of 294 projects were scored on the (Pre)PPA, 289 projects on the (Post)PPA, and 238 dreams on the MDA. The mean frequencies corresponding to these groups are 9.8 pre-projects, 9.6 post-projects, and 7.9 dreams, respectively.

Ease of Evaluation for MDA

Dimension #18, ease of evaluation, which was included in the MDA matrix, demonstrated a sample mean of 6.8 with a standard deviation of 1.69. The Pearson product-moment correlation of ease of evaluation with perceptual intensity was found to be .38 across subjects when the subject means for each dimension was used [$t(28) = 11.5$, $p < .001$]. This indicates that the ease of evaluation varies according to how intensely the dream is experienced perceptually; i.e. the greater the perceptual intensity, the easier it is to evaluate the dream with the dimensions provided. A dream by dream correlation was also performed for these two dimensions ($r = .31$).

Dimensional Means for PPA and MDA

The dimensional means for projects and dreams are compared in Figure 1. The visual representation clearly manifests a discrepancy between waking experience and dream

Figure 1. Dimensional means for projects and dreams.

Note. The numbers on the horizontal axis refer to the dimensions as follows:

1. Importance.	10. Others' View.
2. Enjoyment.	11. Value Congruency.
3. Difficulty.	12. Progress.
4. Visibility.	13. Challenge.
5. Control.	14. Absorption.
6. Stress.	15. Otherworldly.
7. Time-Urgency.	16. Affect Intensity.
8. Outcome.	17. Perceptual Intensity.
9. Self-Identity.	

experience on virtually all the dimensions. The dream profile indicates lower mean ratings on all the dimensions except for visibility, stress, progress, absorption, otherworldly, affect intensity, and perceptual intensity.

Significant Differences Between PPA and MDA for Dimensional Means

The means and standard deviations as well as the significant differences among dimensional means for (Pre)PPA, (Post)PPA, and MDA are listed in Table 1. Paired sample t-tests comparing the points on the graph in Figure 1 were done to determine which dream dimension means were different from project dimension means. None of the pre- vs. post- project mean differences were significant, however, the pre-/dream and post-/dream matrices do exhibit significant differences. For the sample as a whole, 22 t-tests proved to be statistically significant. Dimensions that failed to express significant mean differences for either pre-/dream or post-/dream matrices were difficulty, stress, progress, challenge, and absorption.

Dimensional Composites for PPA and MDA

Dimensional composites for projects and dreams are pictorially represented in Figure 2. The profiles are noticeably different, with the dream profile being primarily lower, as it is in Figure 1. The structure and efficacy composites are especially different from the projects profile. Of all the composites, community appears to be

Table 1

Significant Differences Among Dimensional Means for (Pre)PPA,
(Post)PPA, and MDA

<u>Dimension</u>	<u>Pre-</u>		<u>Post-</u>		<u>Dream</u>	
	<u>Mean</u>	<u>StDev</u>	<u>Mean</u>	<u>StDev</u>	<u>Mean</u>	<u>StDev</u>
Importance ^{1,2}	7.77	1.07	7.87	1.07	5.97	2.28
Enjoyment ^{1,2}	5.97	1.63	5.93	1.91	4.47	1.68
Difficulty	5.33	1.24	5.80	1.42	5.53	1.46
Visibility ¹	5.60	1.69	6.03	1.67	7.13	2.19
Control ^{1,2}	7.43	1.79	7.23	1.33	4.13	1.55
Stress	5.33	1.32	5.33	1.42	5.70	1.58
Time-Urg. ^{1,2}	6.47	1.38	6.23	1.33	5.00	2.02
Outcome ^{1,2}	7.83	0.99	7.87	1.31	4.63	1.63
Self-Id. ^{1,2}	6.93	1.26	7.23	1.30	5.97	1.81
Others' V. ^{1,2}	6.47	1.68	6.37	1.56	4.87	1.81
Value Con. ^{1,2}	7.97	1.33	7.77	1.48	5.90	2.06
Progress	5.03	1.81	4.63	1.63	5.07	1.53
Challenge	6.43	1.30	6.43	1.61	5.97	1.56
Absorption	6.70	1.18	6.90	1.47	7.57	1.36
Otherwor. ²	3.47	1.98	3.07	2.45	4.43	2.21
Affect In. ^{1,2}	5.03	1.25	5.43	1.92	6.33	1.77
Perc. In. ^{1,2}	5.47	1.98	5.50	2.35	6.83	1.72

¹ Paired sample t-tests for (Pre)PPA vs. MDA significant at $p \leq .01$.

² Paired sample t-tests for (Post)PPA vs. MDA significant at $p \leq .01$.

Figure 2. Dimensional composites for projects and dreams.

Note. The composites incorporate specific dimensions as follows:

1. Meaning = enjoyment, value congruency, self-identity, importance, and absorption.
2. Structure = control and time-urgency.
3. Community = visibility and others' view.
4. Stress = stress, difficulty, and challenge.
5. Efficacy = progress and outcome.

most consonant for waking and dreaming experience. The composites and their corresponding mean ratings (in parentheses) follows: **meaning** includes **enjoyment, value congruency, self-identity, importance, and absorption** (PPA = 7.1, MDA = 5.9); **structure** includes **control and time-urgency** (PPA = 6.8, MDA = 4.8); **community** includes **visibility and others' view** (PPA = 6.1, MDA = 5.9); **stress** includes **stress, difficulty, and challenge** (PPA = 6.6, MDA = 5.6); and **efficacy** includes **progress and outcome** (PPA = 7.1, MDA = 5.1).

Pattern Similarity Coefficients Between PPA and MDA

Explanation of the Pattern Similarity Coefficient

The device chosen for measuring the resemblance of project profile patterns and dream profile patterns is the pattern similarity coefficient (Cattell, Coulter & Tsujioka, 1966). This technique enables one to measure distance in a general and comparable manner, which is extremely convenient for the present data. Essentially, the pattern similarity coefficient or the r_p behaves in the same general way as r in terms of values; i.e. varying from 1 for complete agreement of profiles, to 0 for no relation, and to -1 for a completely inverse relationship. In actuality, the value of -1 is approached but not reached, since the ends of the distribution are ill defined and asymptotic. Consequently, the distribution reflects some asymmetry in the form of positive skewing, which is derived from a skewed chi square

distribution. A listing of the Pascal program used to calculate these statistics is contained in Appendix B.

Although this procedure is similar to the Pearson product-moment correlation, it takes into account the elevation or level of the score profile. For instance, it is possible for a dream and project to exhibit exactly the same shape, and yet have very different numeric elements, that is, dissimilar profile levels. Therefore, the pattern similarity coefficient or r_p views profiles in terms of their shape, level, and steepness of profile.

For the present sample a probability of .01 is attained with a positive pattern similarity coefficient of +.44 or a negative one of -.34. Table 2 delineates the frequencies of positive and negative pattern similarity coefficients in all the matrices.

Consistency of Ratings for (Pre)PPA and (Post)PPA

Pearson product-moment correlations were generated between various pre- and post- PPA summary statistics to obtain the following results. The mean of the pre- pattern similarity coefficients is highly correlated with the mean of the post- r_p 's ($r = .64$, $p < .001$). This reflects the subjects' similarity and consistency in terms of what they produce on the PPA. For example, subjects who have a high pattern similarity coefficient on average within their project system before maintaining the dream log, also indicate a high pattern similarity coefficient on average

Table 2

Positive and Negative Frequencies for Pattern Similarity
Coefficient Matrices

S #	<u>Pre-/Post-</u>			<u>Pre-/Dream</u>			<u>Post-/Dream</u>		
	+	-	Diff	+	-	Diff	+	-	Diff
1	49	51	-2	33	47	-14	34	46	-12
2	53	47	6	38	52	-14	39	51	-12
3	51	49	2	14	36	-22	10	40	-30
4	53	47	6	49	51	-2	44	56	-12
5	48	52	-4	34	66	-32	48	52	-4
6	62	38	24	21	49	-28	17	53	-36
7	59	41	18	42	58	-16	42	58	-16
8	56	44	12	31	69	-38	31	69	-38
9	43	37	6	13	19	-6	11	29	-18
10	50	50	0	58	42	16	45	55	-10
11	26	16	10	15	21	-6	22	20	2
12	50	50	0	33	67	-34	38	62	-24
14	59	41	18	4	26	-22	5	25	-20
15	35	35	0	11	29	-18	10	18	-8
17	50	50	0	24	36	-12	12	48	-36
18	56	44	12	35	45	-10	36	44	-8
19	35	35	0	9	21	-12	6	15	-9
20	56	44	12	44	56	-12	54	46	8
21	67	33	34	21	19	2	13	27	-14
22	42	59	-16	53	47	6	44	56	-12
23	65	35	30	52	48	4	51	49	2
24	47	53	-6	40	60	-20	35	65	-30
25	52	48	4	52	48	4	55	45	10
26	48	52	-4	39	31	8	32	38	-6
27	52	48	4	43	57	-14	46	54	-8
28	46	54	-8	37	33	4	22	48	-26
29	56	44	12	40	40	0	45	35	10
30	64	36	28	44	56	-12	43	57	-14
31	44	36	8	21	79	-58	21	59	-38
32	53	47	6	49	41	8	39	51	-12
Avg	50.9	43.8	7.1	33.3	45.0	-11.7	31.7	45.7	-14.0
StDev	8.9	8.4	11.4	14.6	15.5	15.8	15.2	13.9	13.4
N	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Sqrt(n)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
SE	1.6	1.5	2.1	2.7	2.8	2.9	2.8	2.5	2.5
t			3.4			-4.1			-5.7

Note. Subjects #13 and #16 constitute missing data.

table continues

S #	<u>Pre</u>			<u>Post</u>			<u>Dream</u>		
	+	-	Diff	+	-	Diff	+	-	Diff
1	48	42	6	56	34	22	28	28	0
2	46	44	2	50	40	10	44	28	16
3	44	46	-2	42	48	-6	10	10	0
4	52	38	14	60	30	30	44	46	-2
5	50	40	10	52	38	14	50	40	10
6	64	26	38	50	40	10	24	18	6
7	44	46	-2	50	40	10	50	40	10
8	50	40	10	48	42	6	48	42	6
9	32	24	8	56	34	22	8	4	4
10	50	40	10	48	42	6	54	36	18
11	18	12	6	42	0	42	28	2	26
12	46	44	2	46	44	2	66	24	42
14	44	46	-2	48	42	6	2	4	-2
15	52	38	14	22	20	2	8	4	4
17	38	52	-14	56	34	22	20	10	10
18	44	46	-2	48	42	6	30	26	4
19	54	36	18	18	22	-4	6	0	6
20	54	36	18	48	40	8	56	34	22
21	58	32	26	48	42	6	8	4	4
22	46	44	2	62	28	34	52	38	14
23	62	28	34	50	40	10	50	40	10
24	56	34	22	42	48	-6	38	52	-14
25	44	46	-2	50	40	10	44	46	-2
26	52	38	14	44	46	-2	26	16	10
27	48	42	6	48	42	6	50	40	10
28	42	48	-6	44	46	-2	24	18	6
29	46	44	2	48	42	6	30	26	4
30	42	48	-6	48	42	6	40	50	-10
31	72	18	54	38	18	20	48	40	8
32	38	52	-14	52	38	14	36	36	0
Avg	47.9	39.0	8.9	47.1	36.8	10.3	34.1	26.7	7.3
StDev	9.7	9.4	14.7	8.9	10.2	11.3	17.3	15.9	10.5
N	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Sqrt(n)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
SE	1.8	1.7	2.7	1.6	1.9	2.1	3.2	2.9	1.9
t			3.3			5.0			3.8

within their project system after maintaining the dream log. Figure 3 illustrates the stability of PPA from pre- to post-.

Mean Frequencies of Positive and Negative Pattern

Similarity Coefficients

The mean frequencies of positive and negative profile similarity coefficients for all possible matrices are listed in Table 3. There were significantly more positive coefficients than negative coefficients when pre- and post-PPA coefficients were computed [$t(29) = 3.4$, $p < .01$], which again reinforces the notion of PPA's consistency and similarity from pre- to post-. Also, within the singular matrices (pre- only, post- only, MDA only), significantly more positive coefficients were found. However, the pre-/dream and post-/dream matrices show significantly more negative coefficients. The pre(PPA)/MDA matrix indicates that $t(29) = 4.1$, $p < .001$; similarly, the post(PPA)/MDA matrix indicates that $t(29) = -5.7$, $p < .001$.

Dimensional Means for Pattern Similarity

Coefficients in PPA/MDA Matrices

Because PPA/MDA matrices indicate a significant number of negative pattern similarity coefficients, dimensional means were compared for only those PPA/MDA matrices showing significantly negative r_p 's (see Figure 4). This graph represents a more precise picture of what is noticed in Figure 1; i.e. that the profiles for waking and dreaming

Figure 3. Dimensional means for pre- and post- projects.

Note. The numbers on the horizontal axis refer to the dimensions as follows:

1. Importance.	10. Others' View.
2. Enjoyment.	11. Value Congruency.
3. Difficulty.	12. Progress.
4. Visibility.	13. Challenge.
5. Control.	14. Absorption.
6. Stress.	15. Otherworldly.
7. Time-Urgency.	16. Affect Intensity.
8. Outcome.	17. Perceptual Intensity.
9. Self-Identity.	

Table 3

Mean Frequencies of Positive and Negative Pattern Similarity
Coefficients (r_p 's)

<u>Matrix</u>	No. Positive <u>r_p's</u>	No. Negative <u>r_p's</u>	Difference Between + and - <u>r_p's</u>	<u>t</u>
Pre-	47.9	39.0	8.9	3.3*
Post-	47.1	36.8	10.3	5.0**
Dream	34.1	26.7	7.3	3.8*
Pre-/Post-	50.9	43.8	7.1	3.4*
Pre-/Dream	33.3	45.0	-11.7	-4.1**
Post-/Dream	31.7	45.7	-14.0	-5.7**

Note. Pre- refers to (Pre)PPA, Post- refers to (Post)PPA,
 and Dream refers to MDA, respectively.

* $p < .01$.

** $p < .001$.

Figure 4. Dimensional means for projects and dreams associated with negative pattern similarity coefficients.

Note. The numbers on the horizontal axis refer to the dimensions as follows:

1. Importance..	10. Others' View
2. Enjoyment.	11. Value Congruency.
3. Difficulty.	12. Progress.
4. Visibility.	13. Challenge.
5. Control.	14. Absorption.
6. Stress.	15. Otherworldly.
7. Time-Urgency.	16. Affect Intensity.
8. Outcome.	17. Perceptual Intensity
9. Self-Identity.	

experience are dissimilar. To determine which dimensions were significantly different, paired sample t-tests were performed (see Table 4). Most of the same dimensions found to be significantly lower for dreams than projects in Figure 1 apply here, however, the dimensions of time-urgency and visibility no longer reach statistical significance. Also, Table 1 did not include dimensions that were significant at a probability level of .05 whereas in Table 4, these dimensions are included as indicating significant differences (importance, stress, absorption, and affect intensity, specifically).

Content Category Analysis for Significant Negative
Pattern Similarity Coefficients in PPA/MDA Matrices

To determine the breakdown of content categories for projects significantly related to dreams, the frequencies for a post-hoc grouping of categories (see Table 5), indicating significant negative r_p 's with dreams, is provided in Table 6. Results of a chi-square test of independence between project categories and sample sub-groups of gender demonstrate that the males differ from females in terms of their distribution of frequencies: males versus females, $\chi^2 (7, N = 30) = 41.76, p < .001$. It appears that the "social" category is approximately twice the size for females as it is for males, the "errands and estate" category comprises about one-quarter of the affected projects for females but none of the projects for males, and

Table 4

Significant Differences Among Dimensional Means Associated
With Negative Pattern Similarity Coefficients for PPA
(Pre-/Post- Mean) and MDA

<u>Dimension</u>	<u>Project</u>		<u>Dream</u>	
	<u>Mean</u>	<u>StDev</u>	<u>Mean</u>	<u>StDev</u>
Importance ²	7.44	1.71	5.83	2.90
Enjoyment ¹	6.01	2.47	3.76	2.31
Difficulty	4.76	2.48	6.06	3.03
Visibility	6.08	2.03	6.69	2.88
Control ¹	8.01	1.24	2.99	1.78
Stress ²	4.45	2.13	6.19	2.82
Time-Urg.	5.91	2.30	5.23	3.23
Outcome ¹	8.24	1.36	4.09	2.47
Self-Id. ¹	7.77	1.44	4.84	2.88
Others' V. ¹	6.38	1.84	3.36	2.10
Value Con. ¹	7.99	1.62	4.59	3.07
Progress	5.13	2.17	3.97	2.29
Challenge	5.36	2.58	5.93	2.69
Absorption ²	6.25	1.86	7.55	1.74
Otherwor. ¹	2.89	2.09	4.96	2.79
Affect In. ²	5.07	2.06	6.54	2.56
Perc. In. ¹	5.29	2.22	7.02	2.05

¹ Paired sample t-tests for PPA vs. MDA significant at $p \leq .01$.

² Paired sample t-tests for PPA vs. MDA significant at $p \leq .05$.

Table 5

Content Category Definitions

1. Social projects include those related to interpersonal, family, boy-girl friends, sports, community (e.g. volunteer work), travel.
2. Intrapersonal projects include those related to the self or to planning activities and are usually self-improvement oriented (e.g. stop smoking).
3. Academic projects include those related to school or preparation for school.
4. Finance projects include those related to money, loans, debts, saving, and investing.
5. Occupational projects include those related to jobs whether part- or full-time, and also those related to career plans or revisions.
6. Errands and estate projects include those related to home maintenance and repair including cooking, and also those related to day-to-day errands (e.g. get shoes fixed, pick up eye glasses).
7. Exercise projects include those related to "working out" such as jogging and aerobics but does not include sports such as baseball.
8. Other projects include those related to recreation, music (either spectating or creating), hobbies/artistic pursuits, spiritual, reading, and pets.

Table 6

Frequencies for Project Categories Indicating Significant
Negative Pattern Similarity Coefficients (r_p 's) With Dreams

<u>Categories</u>	<u>(Pre) PPA</u>		<u>(Post) PPA</u>	
	<u>F(n=22)</u>	<u>M(n=8)</u>	<u>F(n=22)</u>	<u>M(n=8)</u>
Social	19 (33.33%)	3 (15.00%)	26 (35.62%)	6 (17.14%)
Intrapersonal	5 (8.77%)	5 (25.00%)	3 (4.11%)	0 (0.00%)
Academic	6 (10.53%)	3 (15.00%)	11 (15.07%)	10 (28.57%)
Finance	4 (7.02%)	2 (10.00%)	7 (9.59%)	3 (8.57%)
Occupational	2 (3.51%)	2 (10.00%)	6 (8.22%)	4 (11.43%)
Errands & Estate	16 (28.07%)	0 (0.00%)	16 (21.92%)	0 (0.00%)
Exercise (not sports)	2 (3.51%)	0 (0.00%)	1 (1.37%)	1 (2.86%)
Other	3 (5.26%)	5 (25.00%)	3 (4.11%)	11 (31.43%)
Total # Projects	57	20	73	35

Note. Column percents are indicated in parentheses.

the "other" category is approximately five times more evident for males than for females.

Analyses of Variance to Investigate Sub-Groups

Summary information included average r_p 's, average absolute values for r_p 's, average negative r_p 's, and average positive r_p 's.. High/medium rate of recall groups were compared for these statistics, as were male/female groups. One-way Analyses of Variance (ANOVA) were performed with two levels of independent variables (sex and recall), but no significant differences were found as a function of these variables. Due to the small number of subjects in each sub-group, two-way analyses were not done to look at interactions.

Individual Variation

The means of the dimensional scores associated with significantly negative pattern similarity coefficients found in the PPA/MDA matrices were introduced to create ipsative representations of the waking and dreaming profiles for each subject (see Appendix C). These graphs manifest the specific form of individual differences found in the project/dream relationships. The number of projects and dreams contributing to the profiles is provided for each subject. Only three subjects (#11, #19, and #24) failed to exhibit significant negative pattern similarity coefficients. The mean level of significance for the negative r_p 's between projects and dreams for all subjects is $-.40$, the mean number

of projects affected is 6.7, and the mean number of dreams affected is 3.3.

To exemplify the individual variation displayed within the present sample of subjects, the project/dream profiles associated with significant negative t_p 's for subjects #1, #2, and #3 have been included as Figures 5, 6, and 7. Subject #1 displays very different profiles for waking and dreaming experience, particularly for the dimensions of self-identity, others' view, and value congruency, which were all rated lower than dreams. Also, most of this subject's dreams were rated lower than the projects, unlike subject #2 for which most of the dreams are rated higher, especially the dimensions of visibility, progress, absorption, otherworldly, affect intensity, and perceptual intensity. Subject #3 exhibits an erratic profile of extremely high and extremely low ratings on both projects and dreams, with many of them being highly dissimilar. For this individual, it was three of the dimensions mentioned above for subject #2 (absorption, otherworldly, affect intensity) that, rather than being rated higher or lower than projects were actually rated most similarly to waking experience.

Therefore, although the sample on average reflects a pattern of dissimilarity between ratings of waking and dreaming experience, the specific form of the profiles shows a great deal of individual variation. This is in spite of the fact that the subjects are generally consistent with

Figure 5. Subject #1's dimensional means for projects and dreams associated with negative pattern similarity coefficients.

Note. Subject #1 had 8 projects and 2 dreams contributing to these profiles. The numbers on the horizontal axis refer to the dimensions as follows:

1. Importance.	10. Others' View.
2. Enjoyment.	11. Value Congruency.
3. Difficulty.	12. Progress.
4. Visibility.	13. Challenge.
5. Control.	14. Absorption.
6. Stress.	15. Otherworldly.
7. Time-Urgency.	16. Affect Intensity.
8. Outcome.	17. Perceptual Intensity.
9. Self-Identity.	

Figure 6. Subject #2's dimensional means for projects and dreams associated with negative pattern similarity coefficients.

Note. Subject #2 had 3 projects and 5 dreams contributing to these profiles. The numbers on the horizontal axis refer to the dimensions as follows:

1. Importance.	10. Others' View.
2. Enjoyment.	11. Value Congruency.
3. Difficulty.	12. Progress.
4. Visibility.	13. Challenge.
5. Control.	14. Absorption.
6. Stress.	15. Otherworldly.
7. Time-Urgency.	16. Affect Intensity.
8. Outcome.	17. Perceptual Intensity.
9. Self-Identity.	

Figure 7. Subject #3's dimensional means for projects and dreams associated with negative pattern similarity coefficients.

Note. Subject #3 had 2 projects and 1 dream contributing to these profiles. The numbers on the horizontal axis refer to the dimensions as follows:

1. Importance.	10. Others' View.
2. Enjoyment.	11. Value Congruency.
3. Difficulty.	12. Progress.
4. Visibility.	13. Challenge.
5. Control.	14. Absorption.
6. Stress.	15. Otherworldly.
7. Time-Urgency.	16. Affect Intensity.
8. Outcome.	17. Perceptual Intensity.
9. Self-Identity.	

regard to an overall statistical divergence between waking and dreaming.

Discussion

As mentioned earlier, the purpose of this study has been to investigate and describe the relationship between waking and dreaming experience. In the context of dreaming, a number of studies have been performed for the purpose of testing what is commonly referred to as the "continuity hypothesis" and the present study may easily be compared to this perspective.

In a normative sense, this study indicates that the subjects' experience was altered during dreaming to create dreaming and waking profiles that were actually quite divergent rather than continuous. Cognitively and affectively, the subjects were predominantly dissimilar in their experience, although there is a good deal of individual variation overall and for any given subject there may be specific dimensions that expressed continuity. Possible interpretations and examples will be provided under subsequent headings.

Examination of the Results

Comparing Dimensional Means for PPA and MDA

One of the most encouraging findings was that the subjects experienced their dreams to be relatively amenable to evaluation by the Multidimensional Dreams Analysis. Although the format of Personal Projects Analysis was maintained to a large degree, initially it was unclear

whether a modified version of the scale would be practicable for describing dream experience. Fortunately, the MDA presentation was received and applied with virtually no resistance in terms of execution and this in itself is a valuable outcome of the study. It indicates that subjects are able to evaluate their own experience of dreaming on a scale comparable to that used for the waking state.

It is suggested that in future studies, it would be valuable to include for all subjects the obligatory project of "participating in the experiment". Perhaps more information about the process of recording and rating dreams in general could be acquired. It is interesting to note, however, that only one subject out of 30 voluntarily included "participation in the study" as a project, although one individual did dream about the initial meeting attended to receive instructions regarding the study.

The stability of PPA also represents a positive result. Being descriptive and exploratory in nature, no separate control groups were created for this study. Because all the subjects maintained a dream log, if the differences between pre- and post- dimensional means had been significant, it would have been difficult to know where to attribute the change. In this case, however, it appears that participating in the MDA portion of the study failed to influence the subjects' evaluations on their PPA. In the present study PPA undoubtedly proved to be reliable as demonstrated by the

close proximity between pre- and post- profiles.

Having established that MDA is a relatively viable instrument and that PPA is relatively reliable, it is possible to make comparisons between the two scales. Very different outlines are produced as shown by the difference in dimensional means for PPA and MDA.

The present study supports Kramer's (1978) theory that the dream is a selective affective modulator, although Kramer maintains that affective experience during waking state decreases as a result of dreaming. For the current study, affect intensity and perceptual intensity are significantly higher for dream experience leading one to suspect that perhaps there is some sort of psychological balancing mechanism taking place. Dimensional means for affect intensity and perceptual intensity are 6.3 and 6.8 respectively, both significantly higher than projects. The project dimensional mean for affect intensity is 5.2, and the project mean for perceptual intensity is 5.5, based on an average of pre-/post- means.

Value congruency may be lower for dreams because of a tendency to pre-screen projects (which is impossible with dreams) through a sort of value mesh, only engaging in pursuits with some degree of value congruency. Surprisingly, the sample dimensional mean for otherworldly is only 4.4 for dreams, although it is higher than the mean rating for projects. The fact that dreaming is a separate experience

within imagination does not mean it is experienced as necessarily more abstract or extraordinary.

Because of the small sample size, it was not appropriate to do factor analyses with the dimensional composites. However, by comparing the dimensional means for the MDA scale that match composites previously delineated for PPA, it is apparent that **structure** and **efficacy** are both a full two points lower on average for dream experience than for waking experience. Perceiving a sense of control in the day, for example, does not predict or imply that this will be felt during a dream. It is in fact more common for the experience of being in control to fade substantially during most dreams. Therefore, it appears that the **structure** of projects and dreams contrast. It is also more likely for subjects to sense a lack of progress in their dreams, and to feel dreams will have less positive outcomes. This suggests that in general, subjects felt more competent in the day than while dreaming.

It is important to note that **stress**, however, does not represent a strong disparate composite and that, of all the composites, **community** appeared to be closest. **Visibility**, one of the dimensions that contributes to the composite of **community**, was altered somewhat for the MDA in which it is worded) "to what extent you feel comfortable [underline added] conveying this dream" rather than, "how visible each project is [underline added] to the relevant people". For

dream experience, it is not necessary to actually communicate the dreams to others to rate the dream on visibility whereas for projects, the communication must presumably take place. Perhaps if the wording for the MDA were maintained in its original form, a more accurate reflection of the cultural norms for expression of dreams would be generated. The composite of community might then reflect a greater dissimilarity between waking and dreaming. In waking state, people are not necessarily reticent about communicating their projects to others. Regarding dreams, it may be that people are, overall, hesitant about revealing them to others.

A study conducted on depressive affect and PPA (Howe, 1986), investigated the role of what was termed "special projects", pursuits that are felt to be uplifting and intrinsically rewarding. Relevant to the present study is the finding that factor analyses of significant project dimension loadings revealed a meaning factor which included the special dimension along with those of visibility, absorption, and value congruency. The meaning composite presented for MDA exhibited a lower mean generally than for PPA. Specifically, dreams were rated as more absorbing in general and less value congruent. By including special as a dimension on the MDA, the issue of what separates the quality of specialness (or play) in projects from that found in dreams may be explored. The results of this investigation may then be tested for sub-groups such as depressives to test

the theory of adaptation. Criterion measures such as mood states, symptom checklists, and rated life-satisfaction would also provide valuable information in this area, as would doing an uplifting/depressive affect comparison.

It may be interpreted that coping mechanisms include some portion of an individual's cognitive experience that is within the dream experience; i.e. separate from a more usual sense of values and self-identity. Perhaps dreaming constitutes a more flexible form of play. Although frequently less enjoyable than projects, dreams may allow boundaries to be extended which, in itself, may be psychologically adaptive or at least beneficial. The meaning factor corresponds to the idea of having worthwhile pursuits or dreams. Dreams may be experienced as absorbing and worthwhile despite their seemingly conflicting nature with one's "true" self.

Pattern Similarity Coefficients Between PPA and MDA

It may be helpful to explain the practical difference between pattern similarity coefficients and dimensional means. Although the average r_p for the pre-/post- matrix is insignificant (i.e. not significantly similar or dissimilar), the dimensional averages are positively correlated (i.e. similar). The average r_p is a combination of individual r_p 's which are created on a project by project basis, rather than averages. As such, it is the project by project r_p 's that are either significantly positive or significantly negative.

This does not contradict the overall similarity of the dimensional profiles, even though within these dimensional means, positive and negative r_p relationships exist.

Again, we have confirmation of the stability of PPA as a measure between pre- and post-. Those with a high r_p on a pre- project will generally be expected to show a high r_p on a post- project. Since we are using the r_p as an important indicator for PPA/MDA matrices, it is reassuring to see this consistency for PPA, and it affirms the viability of PPA as a comparative tool in this context.

What continues to be somewhat nebulous however is the precise psychological meaning of statistically significant negative pattern similarity coefficients. Further research looking at personality correlates and special groups is expected to assist in revealing the source of the negative r_p . In brief, positive coefficients show similarity in content (whether manifest or symbolic), whereas negative coefficients can have various implications. Therefore it is important not to bypass observance of specific dimensions, and ultimately specific dreams and projects, when interpreting the data.

It is intriguing to examine specific negative r_p differences and to speculate on why they might vary. Absorption is rated higher for dream experience possibly because there is nothing else to distract one's attention, whereas in waking state, all manner of peripheral stimuli may

interfere with an individual's involvement. Note that this idea relates to the vigilance theory previously discussed (Ullman & Storm, 1986). The dimension of **otherworldly** may be rated higher for dream experience because dreaming exists within imagination, a psychological environment where anything can conceivably transpire. **Affect intensity** and **perceptual intensity** may be higher because dreams seem to refer to experience more directly, unlike waking state which can be experienced in a complex manner through various conscious thought processes.

It must be emphasized that the overall perspective of this study differs from the usual approach found in dream research. For instance, the present study focused on the content of projects significantly related to dreams, rather than the customary method of analyzing the content of dreams and then deducing how to interpret its relationship with waking state.

Other approaches may be taken, however. Future research might explore daytime correlates of the dimension of **otherworldly**, for instance, to see what is expected for dreams in terms of content.

Or, investigators might wish to further quantify the relationship between projects and dreams for those negative coefficients by classifying the categories in terms of higher order construct sets. For example, it may be determined that a given dream and project are both statistically dissimilar,

but otherwise similar on some other level, such as both relating to family, or both exhibiting violent images. However, although quantifying content categories in this form may show continuity, it is hypothesized that literal dream content may not be as important from a scientific viewpoint, as the daytime content categories specified for the significant negative r_p 's.

The content category analysis for this sample is engaging. It could be speculated that males spend more time in leisure and recreation activities, particularly in this age group, while females spend more time running errands and maintaining the home. Nevertheless, it could also be that males do have errands and estate projects, but may not include them in their project systems. Perhaps, too, males simply do not dream in a significantly dissimilar manner to their errands and estate projects. Males also show a dramatic decrease in their number of intrapersonal projects from pre- to post- (from 25% to 0.0%) that are associated with negative coefficients. What causes such inconsistent results between the two PPA/MDA matrices is a complex question that can best be answered once the psychological meaning of negative r_p 's, in general, is further understood.

The fact that no differences were found between waking concerns and dreams as a function of dream recall might indicate that it is the idiosyncratic qualities of people's lives that ultimately reflect individual differences in this

area. Just as plausible, it would seem, is the notion that a larger sample is necessary to cull out the meaningful group differences. The MDA may help to establish norms for dreams through the study of larger samples. Besides collecting multidimensional ratings on dream experience, multivariate regressions and factor analyses on the resulting data may then be performed.

Individual Variation

Understanding the difficulty of pinning down the meaning of the significant r_p 's is best exemplified by giving examples of individual differences. It is interesting to note that individual variation is also indicated by the frequency of projects and dreams related. For instance, a subject may have one project related to many dreams, or one dream related to many projects. Why this variability occurs needs further study.

As mentioned earlier, subject #1 rated dreams lower on the dimensions than projects, generally. Again, we are referring to those projects and dreams that are expressing significant negative pattern similarity coefficients. The following is an example of a dream that is negatively related to the pre-project of housecleaning (-.38).

I dreamt that my family and I were in a car on the ferry somewhere. When the ferry docked and we were driving off the wharf, something happened and our car plunged into 200 ft. of water. We all got out but my son. I

just couldn't seem to understand how he didn't surface with us.

In the dream I was crying and crying and angry with myself because I had an intuition and didn't heed the warning.

This subject favoured 0's and 10's as ratings for this particular dream and project. Not surprisingly, many of the dimensions were opposite for the waking project of housecleaning and this dream. Both were rated as 0 for enjoyment and others' view.

It should not be inferred that somehow the act of housecleaning is directly connected to the subject's fear for a drowning son. Still, this individual does not include as a project, "concern for my son's safety and well-being"; a project that would presumably be statistically similar (i.e. a coefficient equal to or greater than $+0.44$) to this dream. What is clear is that the subject's experience of housecleaning does contrast highly with her experience of this particular dream. By looking at this particular relationship we begin to see not only how the individual project and dream differ, but how waking experience and dreaming experience, as a whole, may differ.

Subject #2 rated dreams higher than projects on most dimensions especially absorption, otherworldly, affect intensity, and perceptual intensity. The following is an example of a dream related to the pre-project of getting up

in the morning in a good mood (-.43).

I'm at this huge building - with this girl - I'm not sure I know who it is - a girlfriend maybe? We want an elevator, but the elevators are not normal. We get into this elevator - the buttons don't start at the ground, but at some NR floor and go up from some higher #. I want floor 34, and the elevator goes up, but it doesn't stop at the floor, something is wrong, and the elevator shakes and keeps going up. I start pushing buttons to make it stop, I start turning around in this elevator, but it gets smaller and smaller - like a round tube, I don't know if this girl would fit in this elevator with me - she starts to panic - I push more buttons - then the elevator stops - I grab for the top of this tube-like elevator and I see we are dangling from the outside of this old brick building - now the roof - I see rubber hanging from the elevator and us swinging. I scream for help - there is a window nearby and I reach for it - I see about 2 people in this small window - in a dirty apartment - I scream for help and ask what went wrong - they say some problem with the elevator but help me into the room - which all of a sudden turns out to be what seems my uncle's old and new house. All my relatives - aunt, uncle, mom, dad, cousin are sitting around a long dining table - and I am standing to the side of them - they are smiling at me and pleased to see me - I turn

around and see through the open wall to the backyard with the pool - but it is smaller than usual - and the fence on the left is gone and a wall is there. It is so different -and I comment. My dad says to me your uncle changed the look - and planted grape vines there - only for himself. Then I look to my right and I see my cousin standing there with a big grin on her face eating a cookie - I walk towards her, but past her into this big field - or park - just like the one in front of my apartment building. I see all these people playing baseball - I turn around and see not my uncle's house, but my apartment building. I decide to play baseball - so I have a bat in my hand - and I find a ball - and I hit some back and forth to this figure - way out in the field - near the river - as I get closer I see I'm playing with a dog. It hits one far to the left of me and I watch it roll up against a tree. I walk to go pick it up - passing all these people playing baseball.

This subject's dreams were very long (all others were longer than this example) and generally refer to a number of shifting scenes and activities. It would be difficult indeed to conclude that this particular dream is significantly dissimilar to the project of getting up in the morning in a good mood, without the techniques of MDA and PPA. The dream and project are extremely similar on two dimensions however; **difficulty** and **stress**. Thus, it is important not to conclude

that continuity is a fallacy or does not exist between waking and dreaming. However, the multidimensional approach implies that more of what is cognitively and affectively experienced within an individual is different between the two states of consciousness, despite similarity displayed on any specific dimension such as stress.

Subject #3 has a very erratic profile as mentioned and a dream is presented here which indicates a negative pattern similarity coefficient with the post-project of time with Todd (-.43).

In this dream I was home at my parents for a weekend. While I was there Todd's father and sister called to find out if I was going to come and visit them. They asked me if I cared about them, and I said, "Of course, I love you. You two are great." They then went on to say that Todd seemed not to care for them anymore, as he never wrote, called or came to visit. When we were returning back to Ottawa, I kept having this idea that the house had been broken into. When we arrived home (at a house which I didn't recognize), the door was open, but inside there was a few people (whom I didn't recognize) holding a birthday party for me. We needed something from the store, so I offered to go to the store. On the way back, there was a man with a stocking over his head standing on the street in front of the Mayfair. He had a gun and was taking everyone's money

72
as they went by. I had \$60 in my purse, which he took from me. I was wondering in my mind, what was taking the police so long to get there.

This dream is very stressful for the subject unlike the project it relates to. For the project, she experiences relative ease, control, positive outcome, value congruency, and progress. Whether or not the fact of Todd being in the dream means there is something subconscious that she needs to pay attention to with regard to the project of spending time with Todd, is hard to say. I do think however that the practical implications for this sort of analysis is great in a clinical setting, and that, through collaboration with the subject (or client), more information of the dream's specific relevance in terms of content, can be gleaned.

The demonstrated study does not, however, confirm Cartwright's (1977) nor Kuiken's (1986) view that dreams tend to reflect emotionally significant aspects of current concerns, at least directly. Perhaps in terms of dream content some continuity may be found other than the positive re's, however, if the individual does not experience dreams and daily concerns similarly then it may be suggested that dreams are not for all intents and purposes reflecting current experience. For example, the subject may have one project about Todd and one dream about Todd, and yet experience the daytime event and the nighttime event very differently, similar and prominent though the content may be.

In the present study, many dreams were recorded that seemed more impressive subjectively than the examples provided. The purpose of this discussion is not to conclude that dreams failing to express statistical significance with the method imposed here are useless and ineffectual. However, the emphasis is placed upon the significant coefficients as one scientifically reasonable place to begin the search for connecting dream experience with waking experience. Other dreams may be rated as being extremely important to any given individual, and for that reason alone, warrant attention in a research, clinical, or personal situation.

In terms of pattern similarity coefficients, the positive ones are, it seems, easier to interpret. For example, subject #30 displays a $+0.59$ relationship between the post-project of golf and the following dream.

The Vietnam War was raging in downtown Ottawa. I was a medic/soldier. It was New Year's Eve, a truce was on and everyone was partying downtown. It was very hot and the parties were outside. All of a sudden we were in the middle of a fire fight. Everywhere bombs exploded, fire raged and people screamed in terror. It stopped. When I turned around my best friend (the Sgt. from "Tour of Duty") was dead. I broke down and cried saying: "Who's going to watch over me now? How long can I expect to live now?"

The next thing I know I'm at my grandparents' place and grandfather's drunk again. Two beautiful blondes pick me up and as we drive away I kept saying, "I have to be back at the line by 5 o'clock."

Playing golf and the above dream are extremely similar on every single dimension. They are identical for value congruency (a rating of 7), absorption (a rating of 10), and perceptual intensity (a rating of 10). This subject does not find playing golf enjoyable despite its relative importance. It is stressful despite its high rating on self-identity. It is not progressing well and it is extremely challenging. In talking to this subject and reading his other dreams, it became apparent that he is attracted to a challenge, and also that he frequently attends to military themes both during waking and in his dreams (he often dreamt about war weapons or movie stars that were in war shows). It seems relatively easy to perceive a continuity quality between this dream and golf. Perhaps some of the more turbulent needs the subject harbours are fulfilled in the action of playing golf. Again, even though the psychological relationship seems more obvious and plausible for positive coefficients, such speculations are simply that, interesting though they are. Still, the possibility of joining forces with the individual clinically in a therapeutic setting to scrutinize the PPA/MDA matrices is a potentially valuable endeavour for therapists and scientists alike.

Suggestions for Future Research and Final Comments

There are a number of research components available in the Personal Projects Analysis Kit that might prove useful in future enquiry. For instance, the open dimensions of "with whom?" and "where?" could be dissected to observe patterns between waking and dreaming. This might include observing focal (few people) vs. diffuse (many people) social networks in the dreams, and place networks (e.g. dreaming about childhood locations or totally unfamiliar places).

Project cross-impact matrices could be used to determine whether the individual experiences the dreams as having a positive, negative or neutral impact upon the projects and to what extent. It is generally assumed in Western culture that dreams do not forcefully affect people's lives. This method represents one way to investigate whether or not this is empirically supported. It may also be valuable to have the subjects provide a global rating for each dream of the extent to which it is perceived to be related to each daytime project, and then ask them why they produced that rating. Moderator variables such as age, sex, and personality variables such as extraversion and locus of control, should also be included to determine their level of contribution to different results.

A procedure called the project laddering technique would be interesting to apply to dreams for left laddering values, as it would compel subjects to explicate how they perceive

the value distance between themselves in waking state and during dreaming. Core or terminal values might be tracked by asking repeatedly the question, "Why do you think you had this dream?", rather than the laddering question for PPA, which is, "Why are you engaged in this project?" When the questions may no longer be answered, it can be said that a core value has been reached.

It would also be interesting to unpack the data further to see the pattern of correlations among the dimensions. For example, it is common to find with PPA that stress and control are negatively correlated to a notable degree. Is this the case for MDA and if not, are other specific dimensions related? This sort of analysis can be done normatively or ipsatively, either with the means of ratings or with the restricted individual ratings themselves.

De Koninck and Koulack (1975) claim that dreams help both to master stressful experiences and to avoid them; and sometimes disruptive or mastery dreams are avoided by the replacement of pleasant or avoidance ones. Although the dimension of stress is higher for dreams on average, we can not conclude that stressful dreams are, in a parallel sense, constituting mastery over stressful daytime concerns, or even that it is the most important variable to look at. It may, indeed, be speculated that so-called avoidance dreams facilitate the process of coping with stressful waking events indirectly, rather than the confrontational "mastery" dreams

which, in themselves, may be disruptive and stressful.

At any rate, such questions are now potentially more empirical in nature rather than being strictly theoretical. Perhaps Jung (1964) is correct with his theory of compensation and the idea that dreams also reflect the "shadow", the unconscious opposite of what the individual stresses in his consciousness. It is only now that the methodology for studying dreams may be sophisticated enough (and, paradoxically, simple enough) to begin to respond to such a theme in a multidimensional and precise manner. Most importantly, the present study seems to render some essential information in the study of dreams; the dream world is not experienced like the daytime world. Furthermore, this experience is unlikely to be an artifact of the subjects' response habits, because the pre- to post- ratings on projects appear to be consistent over time.

In conclusion, it may be beneficial to reiterate and emphasize some of the concepts this study does not assert. First, dreams do not equal projects. Therefore, the fact that dreaming and waking profiles differ does not imply that individuals turn into veritable strangers while asleep. It simply points to the change in cognitive and affective experience. It follows then that negative pattern similarity coefficients should not be interpreted as dreams and projects being opposite entities, rather, they are significantly dissimilar based on 17 different ratings provided for each

Recorded dream and project.

Secondly, it should not be interpreted that negative r 's are the sole relationships between dream experience and waking experience worthy of consideration. Although it is suggested they are a reasonable place to begin, it should be emphasized that other dreams may also be meaningful to a dreamer, clinician, or researcher based on criteria having nothing to do with dimensional correlates or coefficients. Multidimensional Dreams Analysis is not meant to be a restrictive or conclusive approach to the understanding of dreams and their relationship with waking life.

Related to the last point is the notion that MDA is not a technique for dream interpretation, even when positive coefficients are presented. Although collaboration with the dreamer may reveal important information regarding specific statistical relationships, MDA is primarily the analysis of dreams from a process-oriented as opposed to a goal-oriented view. This may, ultimately, prove to be the most illuminating perspective, too, for understanding the function of dreams.

Finally, although the most prevalent result of the current study is that dream experience and waking experience are different, it is important to note that based on specific dimensions within individual matrices, continuity may appear to be supported. However, the term continuity should be used with caution because even if a specific project and dream are

rated identically on stress for instance, it can only be stated that the dream and project are continuous on that dimension (i.e. they are both stressful). It may not be concluded that the project and dream represent continuity overall.

Of course, if a dream and project were rated exactly the same on every dimension, it would be reasonable to say continuity is expressed. Based on the 30 subjects tested in this study, however, such absolute continuity failed to occur, which leads to the conclusion that the concept of continuity remains a multidimensional issue. The relationship between dream experience and waking experience is made slightly less mysterious perhaps by the stated approach and results. Hopefully, this study will also create a new climate within which new questions are presented.

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Appendix A

Sample Assessment Package

INFORMED CONSENT FORM

I, _____, agree to participate in a study on dreaming for which approximately 4 hours in total will be required, conducted by Naome Howe under the supervision of Dr. Alan Moffitt. The procedure of this experiment has been fully explained to me, and upon completion I can expect to be paid \$40.00. Such payment will not be made if I withdraw my participation at any time prior to completion of the study.

I also understand I may withdraw from the experiment at any time and that the results and my identity will be kept in strictest confidence.

Name (print): _____

Signature: _____

Witness: _____

Date: _____

Date: _____

S# _____

Sex _____

Age _____

- Typically, how often do you remember your dreams upon awakening in the morning? (check one)

_____ Rarely, once a month or less.

_____ Infrequently, one to four times a month.

_____ Sometimes, one to two times per week.

_____ Often, three to five times per week.

_____ Almost always, every morning with rare exceptions.

Rate how consistent your dream recall rate has been over the last six months. (circle one)

1

2

3

4

5

Extremely
variable

Somewhat
variable

Quite
stable

Subject # _____

(PRE) PERSONAL PROJECTS ANALYSIS

We are interested in studying the kinds of activities and concerns that people have at different stages of their life. We call these personal projects. All of us have a number of personal projects at any given time that we think about, plan for, carry out, and sometimes (though not always) complete.

Here are some examples of projects:

Completing my English essay.
Trying to help Gary get along better with others.
Overcoming fear of meeting new people.
Trying to finish the book Allan gave me.
Taking a trip to Ottawa.
Cutting the grass.
Finding a part-time job.
Redecorating my bedroom.
Trying to clarify my religious beliefs.
Losing ten pounds.
Making a birthday present for my friend.

We are also very interested in finding out how people feel about these personal projects, how enjoyable they are, and so on. We would appreciate it if you could begin by just writing down in the next ten minutes as many personal projects as you can that you are engaged in or thinking about at the present time - remember these are not necessarily formal projects, or important ones - we would prefer you to give us more of the everyday kinds of activity or concerns that characterize your life at present.

THE FORMAT WAS IDENTICAL FOR (POST) PPA

List of Projects

Please go ahead and write down as many as you can in ten minutes.

Now copy the projects in as brief a form as possible on PAGE 6. Just make your description long enough to keep each project clearly in mind. As you can see, there is space for 10 projects. If your initial list contains more than 10, select the 10 that you are most likely to engage in over the next month or so. If you wrote down fewer than 10, see if you can think of several more, or break down some of those you listed into several projects. It is important for everyone to try to fill in 10 projects.

In columns 1 to 20 please rate each one of your projects using any number from 0 to 10 on the following dimensions. Remember that numbers between 0 and 10 can also be used.

1. Importance: how important each project is to you at the present time. Use 10 if the project is very important to you and 0 if it is not at all important to you.
2. Enjoyment: how you enjoy working on each project. Use 10 if you enjoy it a great deal and 0 if you do not enjoy it at all.
3. Difficulty: how difficult you find it to carry out each project. Use 10 for a project that you find very difficult to carry out and 0 for one that you do not find difficult at all.
4. Visibility: how visible each project is to the relevant people who are close to you, that is how aware are they that you are engaged in this project. Use 10 for a project which is very visible to those around you and 0 for a project which is not at all visible to those around you.
5. Control: how much you feel you are in control of each project. Use 10 for a project over which you feel in complete control and 0 for a project over which you feel you have no control at all.
6. Initiation: how much you feel responsible for having initiated each project. Use 10 if you feel fully responsible for having initiated a project and 0 if you feel you have taken no part whatsoever in initiating a project.
7. Stress: how stressful it is for you to carry out each project. Use 10 if a project is very stressful to carry out and 0 if a project is very relaxing to carry out.
8. Time-Urgency: how much you feel a sense of urgency in respect to the completion of each project. Even though a project may be receiving adequate time, its completion could seem urgent. Use 10 if the completion of a project seems very urgent and 0 if the completion of a project does not seem urgent at all.

9. Outcome: what you anticipate the outcome of each project to be. Use 10 if you think that a project will be extremely successful and 0 if you think that a project will turn out to be a total failure.

10. Self-Identity: how typical of you each project is. Use 10 if a project is very typical of you and 0 if it is not at all typical of you.

11. Others' View: how important each project is seen to be by relevant people who are close to you. Use 10 if a project is seen by others as very important and 0 if it is seen as not important at all.

12. Value Congruency: to what extent is each project consistent with the values which guide your life. Use 10 if a project is totally consistent with your values and 0 if a project is totally at odds with them.

13. Positive Impact: how much you feel that each project helps the others. Don't worry whether it hinders or not, we'll get to that on the next dimension. Use 10 to indicate that a project greatly increases your chances of working on other projects and 0 to indicate that a project has no positive effect.

14. Negative Impact: how much you feel that each project hinders other projects. Use 10 to indicate that a project seriously hinders your chances of working on other projects and 0 to indicate that it does not have any negative effect.

15. Progress: how successful you have been in a project so far. Use 10 to indicate that you have been very successful and 0 to indicate that you have had no success at all.

16. Challenge: to what extent each project is demanding and challenging to you. Use 10 if a project is most challenging and 0 if it is not challenging at all.

17. Absorption: to what extent you become engrossed or deeply involved in a project. Use 10 if you generally get absorbed in an activity and 0 if you tend to be uninvolved when doing it.

18. Otherworldly: to what extent each project is extraordinary on a spiritual, intellectual or imaginative level. Use 10 if a project is extremely otherworldly and 0 if it is extremely worldly, i.e. commonplace or ordinary.

19. Affect Intensity: to what extent each project is emotionally intense. Use 10 if a project is extremely emotional and 0 if it is unemotional.

20. Perceptual Intensity: to what extent each project is intense on a sensory level via sight, sound, touch, etc. Use 10 if a project is very intense perceptually and 0 if it has little or no perceptual intensity.

In column 21, please write down the names of the other people involved in each project with you. You may use only first names, but include the initial of the last name to differentiate people who share the same first name. If there is no one else involved in a project with you, leave the corresponding space blank.

In column 22, please indicate the setting in which you would most likely or most typically carry out each project. Some projects may not be taking place in any particular setting, in which case you would leave the corresponding space blank.

Pre-Personal Project Matrix

List of Projects	1	Importance	1
	2	Enjoyment	2
	3	Difficulty	3
	4	Visibility	4
	5	Control	5
	6	Initiation	6
	7	Stress	7
	8	Time-Urgency	8
	9	Outcome	9
	10	Self-Identity	10
	11	Others' View	11
	12	Value Congruency	12
	13	Positive Impact	13
	14	Negative Impact	14
	15	Progress	15
	16	Challenge	16
	17	Absorption	17
	18	Otherworldly	18
	19	Affect Intensity	19
	20	Perceptual Intensity	20
	21	With Whom	21
	22	Where	22

DREAMS ANALYSIS

Immediately upon awakening, record any dream(s) you can remember on the sheet(s) provided. Please note that only one dream is used per sheet and that each dream should be dated. If you have more than one dream, use more than one sheet. If you recall no dreams, record nothing and try again the next morning.

Immediately after recording the dream(s), go to page 4 to rate your dream(s) in the row which corresponds to the number given your dream at the top of the sheet where you recorded it (1, 2, 3, etc.). In columns 1 to 18 please rate your dream(s) using any number from 0 to 10 INCLUSIVE on the following dimensions. Remember that numbers between 0 and 10 can also be used.

1. Importance: how important the dream was experienced to be at the time. Use 10 if the dream was experienced as very important to you and 0 if it was experienced as not at all important to you.
2. Enjoyment: how you enjoyed dreaming the dream. Use 10 if you enjoyed it a great deal and 0 if you did not enjoy it at all.
3. Difficulty: to what extent you experienced difficulty in your dream. Use 10 for a dream in which a great deal of difficulty was experienced and 0 if no difficulty was experienced at all.
4. Visibility: to what extent you feel comfortable conveying this dream (i.e. making it visible) to the relevant people who are close to you. Use 10 for a dream which you would feel very comfortable making visible to those around you and 0 for a dream which you would not at all feel comfortable making visible to those around you.
5. Control: to what degree you experienced a general sense of control during the dream. Use 10 for a dream in which you experienced a strong sense of control and 0 for a dream in which you experienced no sense of control.
6. Stress: how stressful you experienced the dream to be. Use 10 if a dream was experienced to be very stressful and 0 if a dream was experienced to be very relaxing.
7. Time-Urgency: to what degree you experienced a sense of urgency or hurry during the dream. Use 10 if a dream was experienced to be very urgent and 0 if a dream was not experienced as urgent at all.

8. Outcome: what you experienced the outcome of the dream was or might have been. Use 10 if your experience was of an extremely positive outcome and 0 if your experience was of an extremely negative outcome.

9. Self-Identity: how typical of you this dream was experienced to be. Use 10 if a dream was experienced as very typical of you and 0 if it was experienced as not at all typical of you.

10. Others' View: how important or interesting this dream would be seen to be by relevant people who are close to you. Use 10 if a dream would be seen by others as very important and 0 if it would be seen as not important at all.

11. Value Congruency: to what extent this dream was experienced to be consistent with the values which guide your life. Use 10 if a dream was experienced to be totally consistent with your values and 0 if a dream was experienced to be totally at odds with your values.

12. Progress: how successful you experienced yourself to be in this dream. Use 10 if you experienced yourself to be completely successful in the dream, 0 if you experienced yourself to be a total failure, and 5 if you were not present in the dream or if you experienced yourself to be neither successful nor unsuccessful.

13. Challenge: to what extent this dream was experienced to be demanding and challenging. Use 10 if a dream was experienced to be extremely challenging and 0 if it was experienced to be not challenging at all.

14. Absorption: to what extent this dream was experienced to be engrossing or deeply absorbing. Use 10 if you felt deeply absorbed in the dream and 0 if you felt uninvolved during the dream.

15. Otherworldly: to what extent this dream was experienced to be extraordinary on a spiritual, intellectual or imaginative level. Use 10 if a dream was experienced to be extremely otherworldly and 0 if it was experienced to be extremely worldly, i.e. commonplace or ordinary.

16. Affect Intensity: to what extent this dream was experienced to be emotionally intense. Use 10 if a dream was experienced to be extremely emotional and 0 if it was experienced to be unemotional.

17. Perceptual Intensity: to what extent this dream was experienced to be intense on a sensory level via sight, sound, touch, etc. Use 10 if a dream was experienced as very intense perceptually and 0 if there was little or no

perceptual intensity.

18. Ease of Evaluation: how easy it is for you to rate this dream using the dimensions provided. Use 10 if it is extremely easy and 0 if it is extremely hard.

Again, remember that any number may be used between 0 and 10, as well as 0 and 10.

Remember, for most items we are interested in your experience during the dream, as opposed to the action found in the dream or the experience of any one of the dream characters.

In column 19 please write down names of the people involved in the dream, including yourself. You may use only first names, but include the initial of the last name to differentiate people who share the same first name. If there are no people involved in a dream, leave the corresponding space blank.

In column 20 please indicate the setting(s) in which your dream took place. If the setting is not clear or identifiable, leave the corresponding space blank.

Record your dreams and complete the form described above for three weeks or when 10 dreams have been recorded, whichever comes first. If you do record 10 dreams before the three-week time limit, please call Naome Howe at the Sleep Lab (564-4349) for further instructions. You may also call this number at any time if you have any questions or concerns about what you are doing.

Dream Matrix

List of Dreams		
Dream 1	Importance	1
Dream 2	Enjoyment	2
Dream 3	Difficulty	3
Dream 4	Visibility	4
Dream 5	Control	5
Dream 6	Stress	6
Dream 7	Time-Urgency	7
Dream 8	Outcome	8
Dream 9	Self-Identity	9
Dream 10	Others' View	10
	Value Congruency	11
	Progress	12
	Challenge	13
	Absorption	14
	Otherworldly	15
	Affect Intensity	16
	Perceptual Intensity	17
	Ease of Evaluation	18
	With Whom	19
	Where	20

DREAM # 1

Subject # _____

Date: _____

FORMAT IS REPEATED FOR SUBSEQUENT 9 DREAMS

Appendix B

Pascal Program to Analyze

Summary Information

(written by Dr. Robert Hoffmann,
Carleton University, Ottawa)

```

PROGRAM pscmake;      {program to analyze PPA and MDA thesis
                        data standardized for each dimension
                        This is the big one that will do the
                        major job. What it expects to see in
                        each data file is
                        npre projects
                        ndreams
                        npo projects
                        For each project it will look for 20
                        dimension scores. For each dream it
                        will look for 18 dimension scores
                        uses file of filenames for input
                        SPECIFICALLY, this program will output
                        to a text file the dimension scores
                        for pre, dream, and post project
                        common dimensions for SPSS work
                        later}

```

```

uses crt, printer;

```

```

CONST chisq:ARRAY [1..19] OF REAL = (1.39,2.37,3.36,
4.35,5.35,6.35,7.35,8.34,9.34,10.34,11.34,
12.34,13.34,14.34,15.34,16.34,17.34,18.34,
19.34);

```

```

TYPE

```

```

    answerarray=ARRAY[1..8] OF REAL;
    datavector=ARRAY[1..20] OF REAL;
    workarray=ARRAY [1..23,1..20] OF REAL;
    resarray=ARRAY[1..23,1..23] OF REAL;

```

```

VAR

```

```

    fout,fnms,fin:TEXT;
    fnms,fnin,fnout:STRING;
    i,j,k,l,m,n,np,nn:INTEGER;
    a,b,c:CHAR;
    mean,stdev:REAL;
    prtsumon,prton:BOOLEAN;
    answers:answerarray;
    comdata,prproj,poproj,dproj:workarray;
    stemp:workarray;
    predrm,podrm,prepo:workarray;
    preprojcor,preprojps:resarray;
    dprojcor,dprojps:resarray;
    poprojcor,poprojps:resarray;
    prepocor,predrmcor,podrmcor:resarray;
    prepops,predrmpps,podrmpps:resarray;
    nprepo,npredrm,npodrm,ndreams,npre,npo:INTEGER;

```

(*****)

```
PROCEDURE summary(VAR answers:answerarray; VAR npos,nneg,  
                  ncofs:INTEGER;datain:resarray; rowstart,  
                  rowend,colstart,colend:INTEGER);
```

(Comment: answers are as follows,

1. mean
2. st.dev.
3. abs mean
4. abs st. dev.
5. max
6. min
7. posavg
8. negavg).

VAR

i,j,k,n,nn,np:INTEGER;

x,y,z,sumx,sumx2,nsinx,psinx,asinx,asinx2,max,min:REAL;

BEGIN

nsinx:=0;

psinx:=0;

asinx:=0;

asinx2:=0;

max:=-1000;

min:=1000;

sumx:=0;

sumx2:=0;

n:=0;

np:=0;

nn:=0;

FOR i:=rowstart TO rowend DO (row counter)

BEGIN

FOR j:=colstart TO colend DO (col counter)

BEGIN

IF (datain[i,j]<>1.0) THEN

BEGIN

sumx:=sumx+datain[i,j];

sumx2:=sumx2+SQR(datain[i,j]);

n:=n+1;

asinx:=asinx+ABS(datain[i,j]);

asinx2:=asinx2+SQR(ABS(datain[i,j]));

IF datain[i,j] > 0 THEN

BEGIN

psinx:=psinx+datain[i,j];

np:=np+1;

END;

IF datain[i,j]<0 THEN

BEGIN

nsinx:=nsinx+datain[i,j];

nn:=nn+1;

END;

```

        IF datain[i,j]>max THEN max:=datain[i,j];
        IF datain[i,j]<min THEN min:=datain[i,j];
    END;
END;
END;
answers[1]:=sumx/n;
WRITE('n= ',n,' ');
ncofs:=n;
npos:=np;
nneg:=nn;
answers[2]:=SQRT(((n*sumx2)-(sumx*sumx))/(n*(n-1)));
answers[3]:=asumx/n;
answers[4]:=SQRT(((n*asumx2)-(asumx*asumx))/(n*(n-1)));
answers[5]:=max;
answers[6]:=min;
answers[7]:=psumx/np;
answers[8]:=nsumx/nn;
END;

(*****)

PROCEDURE makeprepo(data1,data2:workarray;
    VAR dataout:workarray; nrow1,nrow2:INTEGER);

VAR
    i,j,k:INTEGER;

BEGIN
    FOR i:=1 TO nrow1 DO
        BEGIN
            FOR j:=1 TO 20 DO
                BEGIN
                    dataout[i,j]:=data1[i,j];
                END;
            END; {pre block has been loaded into combined array}
        FOR i:=1 TO nrow2 DO
            BEGIN
                FOR j:=1 TO 20 DO
                    BEGIN
                        dataout[i+nrow1,j]:=data2[i,j];
                    END;
                END; {post block has been added into combined array}
            END; {of makeprepo}
        END;

(*****)

PROCEDURE makeprojdrm(data1,data2:workarray;
    VAR dataout:workarray; nrow1,nrow2:INTEGER);

VAR
    i,j,k:INTEGER;

BEGIN
    FOR i:=1 TO nrow1+1 DO
        BEGIN

```



```

k:=0;
FOR j:=1 TO 20 DO
  BEGIN
    k:=k+1;
    IF j=7 THEN k:=k-1;
    IF j=14 THEN k:=k-1;
    IF j=15 THEN k:=k-1;
    dataout[i,k]:=data1[i,j];
  END;
END; {project file has been loaded into combined array}
FOR i:=1 TO nrows2+1 DO
  BEGIN
    FOR j:=1 TO 17 DO
      BEGIN
        dataout[i+nrows1,j]:=data2[i,j];
      END;
    END; {dream data should be loaded into combined array}
END; {of makeprojdrm}

```

(*****)

```

PROCEDURE loadata(VAR datain:workarray;
                  nrows,ncols:INTEGER);

```

```

BEGIN
  FOR i:=1 TO nrows DO
    BEGIN
      FOR j:=1 TO ncols DO
        BEGIN
          READ(fin,datain[i,j]);
        END;
      READLN(fin);
    END; {data has now been read in}
  END; {of loadata}

```

(*****)

```

PROCEDURE dumpresarray(datain:resarray;
                       nvars,nblock1,nblock2:INTEGER);

```

```

VAR
  i,j,rownumber:INTEGER;

```

```

BEGIN
  IF nvars < 13 THEN
    BEGIN
      FOR i:=1 TO nvars DO WRITE(i:6);WRITELN;
      FOR i:=1 TO nvars DO
        BEGIN
          WRITE(i:2);
          FOR j:=1 TO nvars DO
            BEGIN
              WRITE(datain[i,j]:6:2);

```

```

        END;
        WRITELN;
    END;
END
ELSE
BEGIN
    rownumber:=0;
    FOR i:=1 TO nblock1 DO WRITE(i:6);WRITELN;
    FOR i:=1 TO nvars DO
        BEGIN
            rownumber:=rownumber+1;
            WRITE(rownumber:2);
            FOR j:= 1 TO nblock1 DO
                BEGIN
                    WRITE(datain[i,j]:6:2);
                END;
            WRITELN;
        END;
    IF NOT prton THEN
        BEGIN
            WRITE(CHR(7));
        END;
        CLRSCR;
        FOR i:=(nvars DIV 2)+1 TO nvars DO WRITE(i:6);WRITELN;
        FOR i:=1 TO nvars DO
            BEGIN
                WRITE(i:2);
                FOR j:=(nvars DIV 2)+1 TO nvars DO
                    BEGIN
                        WRITE(datain[i,j]:6:2);
                    END;
                WRITELN;
            END;
        END; {of if then else}
    IF prton THEN
        BEGIN
            IF nvars <13 THEN
                BEGIN
                    FOR i:=1 TO nvars DO WRITE(LST,i:6);WRITELN(LST);
                    FOR i:=1 TO nvars DO
                        BEGIN
                            WRITE(LST,i:2);
                            FOR j:=1 TO nvars DO
                                BEGIN
                                    WRITE(LST,datain[i,j]:6:2);
                                END;
                            WRITELN(LST);
                        END;
                    END;
                END {of if nvars<13}
            ELSE
                BEGIN
                    rownumber:=0;
                    WRITELN(LST,'BLOCK 1\BLOCK 1');
                    FOR i:=1 TO nblock1 DO WRITE(LST,i:6);

```

```

WRITELN(LST, '      AVG');
FOR i:=1 TO nvars-1 DO
  BEGIN
    IF (i=nblock1+1) THEN
      BEGIN
        rownumber:=0;
        WRITELN(LST, '
_____
_____');
        WRITELN(LST, 'BLOCK 2\BLOCK 1');
        WRITELN(LST);
      END;
      rownumber:=rownumber+1;
      WRITE(LST, rownumber:2);
      FOR j:= 1 TO nblock1 DO
        BEGIN
          WRITE(LST, datain[i,j]:6:2);
        END;
        WRITE(LST, datain[i, nvars]:6:2);
        WRITELN(LST);
      END;
      WRITELN(LST);
      WRITELN(LST, '*****
*****');
      WRITELN(LST, 'BLOCK 1\BLOCK 2');
      FOR i:=1 TO nblock2 DO WRITE(LST, i:6);
      WRITELN(LST);
      rownumber:=0;
      FOR i:=1 TO nvars-1 DO
        BEGIN
          IF (i=nblock1+1) THEN
            BEGIN
              rownumber:=0;
              WRITELN(LST, '
_____
_____');
              WRITELN(LST, 'BLOCK 2\BLOCK 2');
              WRITELN(LST);
            END;
            rownumber:=rownumber+1;
            WRITE(LST, rownumber:2);
            FOR j:=nblock1+1 TO nvars-1 DO
              BEGIN
                WRITE(LST, datain[i,j]:6:2);
              END;
              WRITELN(LST);
            END;
          END; {of if then else}
        END; {of if printer is requested}
      END; {of dumpresarray}

      (*****

PROCEDURE dumpworkarrayi(datain:workarray;

```

```

                                nrows,ncols:INTEGER);

BEGIN
  WRITE(' ');
  FOR i:=1 TO ncols DO WRITE(i:3);
  WRITELN;
  FOR i:=1 TO nrows DO
    BEGIN
      WRITE(i:4);
      FOR j:=1 TO ncols DO
        BEGIN
          WRITE(datain[i,j]:3:0);
        END;
      WRITELN;
    END; {preproject data has now been read in}
  IF prton THEN
    BEGIN
      WRITE(LST, ' ');
      FOR i:=1 TO ncols DO WRITE(LST,i:3);
      WRITELN(LST);
      FOR i:=1 TO nrows DO
        BEGIN
          WRITE(LST,i:4);
          FOR j:=1 TO ncols DO
            BEGIN
              WRITE(LST,datain[i,j]:3:0);
            END;
          WRITELN(LST);
        END; {of nrows loop}
      END; {of printer output}
    END; {of dumpworkarrayi}

    (******)

  PROCEDURE dumpworkarrayr(datain:workarray;
                           nrows,ncols,nblock1,nblock2:INTEGER);

  VAR rownumber:INTEGER;

  BEGIN
    FOR i:=1 TO ncols DIV 2 DO WRITE(LST,i:7);
    WRITELN(LST,'BLOCK 1');
    rownumber:=0;
    FOR i:=1 TO nrows DO
      BEGIN
        IF (rownumber=nblock1) THEN
          BEGIN
            WRITELN(LST);
            rownumber:=0;
            WRITELN(LST,'BLOCK 2');
          END;
          rownumber:=rownumber+1;
          WRITE(LST,rownumber:2);
          FOR j:=1 TO nblock1 DO

```

```

        BEGIN
            WRITE(LST,datain[i,j]:7:3);
        END;
        WRITELN(LST);
    END;
    WRITELN(LST);WRITELN(LST,' ':70);WRITELN(LST);
    FOR i:=nblock1+1 TO ncols DO WRITE(LST,i:7);
    WRITELN(LST,'BLOCK 1');
    rownumber:=0;
    FOR i:=1 TO nrows DO
        BEGIN
            IF (i=nblock1) THEN
                BEGIN
                    WRITELN(LST);
                    rownumber:=0;
                    WRITELN(LST,'BLOCK 2');
                END;
                rownumber:=rownumber+1;
                WRITE(LST,rownumber:2);
                FOR j:=nblock1+1 TO ncols DO
                    BEGIN
                        WRITE(LST,datain[i,j]:7:3);
                    END;
                    WRITELN(LST);
                END;
            END;
        END; {of dumpworkarrayr}

    (*****)

    PROCEDURE standardize(array1:workarray;
                           VAR sarray1:workarray;
                           nrows,npart1,npart2,ncols:INTEGER);

    VAR
        row,i,j,k:INTEGER;
        t1,t2,t3,t4,mean,sd:REAL;

    BEGIN
        FOR i:=1 TO ncols DO
            BEGIN
                t1:=0;
                t2:=0;
                row:=0;
                FOR j:=1 TO nrows-1 DO
                    BEGIN
                        IF (j<>npart1) AND (j<>npart2) THEN
                            BEGIN
                                row:=row+1;
                                t1:=t1+(array1[j,i]);
                                t2:=t2+(SQR(array1[j,i]));
                            END;
                        {of include only raw data rows}
                    END;
                END;
                mean:=t1/row;
                sd:=SQRT(((row*t2)-(t1*t1))/(row*(row-1)));
            END;
        END;
    END;

```

```

    FOR j:=1 TO nrows DO
        BEGIN
            IF (sd<>0) THEN
                sarray1[j,i]:=(array1[j,i]-mean)/sd
            ELSE sarray1[j,i]:=0;
            END; {of all rows in given column}
        END; {of all columns}
    END; {of procedure standardize array}

    (*****

FUNCTION corel(vec1,vec2:datavector; n:INTEGER):REAL;

VAR
    sumx,sumx2,sumy,sumy2,sumxy:REAL;
    num,den,den1,den2,npts,temp:REAL;
    i,j,k:INTEGER;

BEGIN
    sumx:=0;
    sumx2:=0;
    sumy:=0;
    sumy2:=0;
    sumxy:=0;
    FOR i:=1 TO n DO
        BEGIN
            sumx:=sumx+vec1[i];
            sumx2:=sumx2+(SQR(vec1[i]));
            sumy:=sumy+vec2[i];
            sumy2:=sumy2+(SQR(vec2[i]));
            sumxy:=sumxy+(vec1[i]*vec2[i]);
        END;
    npts:=n;
    num:=(npts*sumxy)-(sumx*sumy);
    den1:=(npts*sumx2)-(sumx*sumx);
    den2:=(npts*sumy2)-(sumy*sumy);
    den:=SQRT(den1*den2);
    temp:=num/den;
    corel:=temp;
    IF (i=j) THEN
        BEGIN
            WRITELN('correl is ',temp:8:2);
            READLN;
        END;
    END; {of function corel}

    (*****

PROCEDURE cormatrix(datain:workarray;VAR dataout:resarray;
                    nrows,ncols:INTEGER);

VAR
    ind,nx,ny,i,j,k,l,m,n:INTEGER;

```

```

xvec,yvec:datavector;

BEGIN
  FOR i:=1 TO nrows DO  {pre project counter}
    BEGIN
      FOR j:=1 TO nrows DO  {another pre project counter}
        BEGIN
          FOR k:=1 TO ncols DO
            BEGIN
              xvec[k]:=datain[i,k];
              yvec[k]:=datain[j,k];
            END;
            dataout[i,j]:=corel(xvec,yvec,ncols);
          END; {j loop}
        END; {i loop}
      END; {correlate a matrix procedure}

      (*****

PROCEDURE pscmatrix(datain:workarray;VAR dataout:resarray;
                    nrows,ncols:INTEGER);

VAR
  i,j,k,l,m,n:INTEGER;
  sarray:workarray;
  sumds:REAL;

BEGIN
  FOR i(rows):=1 TO nrows DO
    BEGIN
      FOR k(comparison row):=1 TO nrows DO
        BEGIN
          sumds:=0;
          FOR j(cols):=1 TO ncols DO
            BEGIN
              {get sum of differences for row i vs row k}
              sumds:=sumds+(SQR(datain[i,j]-datain[k,j]));
            END;
            dataout[i,k]:=((2*chisq[ncols-1])-sumds)/
              ((2*chisq[ncols-1])+sumds);
          END; {of comparison row counter}
        END; {of first row counter}
      END; {of pscmatrix}

      (*****

PROCEDURE genmeans(VAR datain:workarray;
                    nrows,ncols:INTEGER);

VAR
  tot:REAL;

BEGIN
  FOR j:=1 TO ncols DO

```

```
BEGIN
    tot:=0;
    FOR i:=1 TO nrows DO
        BEGIN
            tot:=tot+datain[i,j];
        END;
    datain[nrows+1,j]:=tot/nrows;
END; {pre-project averages have been calculated}
END; {of genmeans}

(*****)

PROCEDURE start;

BEGIN
    TEXTCOLOR(LIGHTRED);
    TEXTBACKGROUND(BLACK);
    CLRSCR;
    a:='n';
    IF (a='y') OR (a='Y') THEN prton:=TRUE ELSE prton:=FALSE;
    CLRSCR;
    a:='n';
    IF (a='y') OR (a='Y') THEN prtsumon:=TRUE
    ELSE prtsumon:=FALSE;
END; {start}

(MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM)

BEGIN                                     (MAIN PROGRAM)
    start;
    fnout:='d:\nh\spssinfo.txt';
    ASSIGN(fout,fnout);
    REWRITE(fout);
    IF PARAMCOUNT=0 THEN
        BEGIN
            WRITE('Enter filename of names ');
            READLN(fnnms);
        END
    ELSE
        fnnms:=PARAMSTR(1);
    ASSIGN(fnms,fnnms);
    RESET(fnms);
    REPEAT (until no more names in file)
    READLN(fnms,fnin);
    fnin:='a:'+fnin+'.txt';
    ASSIGN(fin,fnin);
    RESET(fin);
    READLN(fin,npre);
    READLN(fin,ndreams);
    READLN(fin,npo);
    CLRSCR;
    WRITE('READING ');
    TEXTCOLOR(WHITE);
    WRITE(fnin);
```



```

TEXTCOLOR(LIGHTRED);
WRITE('pre-project':15);
loadata(prproj,npre,20);
WRITE('dream data':15);
loadata(dproj,ndreams,18);
WRITELN('post-project':15);
loadata(poproj,npo,20);

```

```

(CREATING COMPOSITE ARRAYS)

```

```

WRITELN('MEANS');
genmeans(prproj,npre,20);
genmeans(dproj,ndreams,18);
genmeans(poproj,npo,20);
npre:=npre+1;
ndreams:=ndreams+1;
npo:=npo+1;
nprepo:=npre+npo;
npredrm:=npre+ndreams;
npodrm:=npo+ndreams;
WRITE('COMPOSITES');
WRITE('pre/post matrix':20);
makeprepo(prproj,poproj,prepo,npre,npo);
WRITE('pre/dream matrix':20);
makeprojdrn(prproj,dproj,predrm,npre,ndreams);
WRITELN('post/dream matrix':20);
makeprojdrn(poproj,dproj,podrm,npo,ndreams);
genmeans(prepo,nprepo,20);
genmeans(predrm,npredrm,17);
genmeans(podrm,npodrm,17);
nprepo:=nprepo+1;
npredrm:=npredrm+1;
npodrm:=npodrm+1;

```

```

WRITELN(fout,fnin);
i:=npre;
FOR j:=1 TO 17 DO WRITE(fout,predrm[i,j]:3:0);
WRITELN(fout);
i:=npre+ndreams;
FOR j:=1 TO 17 DO WRITE(fout,predrm[i,j]:3:0);
WRITELN(fout);
i:=npo;
FOR j:=1 TO 17 DO WRITE(fout,podrm[i,j]:3:0);
WRITELN(fout);
CLRSCR;
dumpworkarrayi(predrm,npredrm,17);
CLRSCR;
dumpworkarrayi(podrm,npodrm,17);

```

```

CLOSE(fin);
UNTIL EOF(fnms);
WRITE('Hit <CR> to end');
CLOSE(fout);
CLOSE(fnms);

```

READLN;
END.

Appendix C

Waking and Dreaming Profiles
for All Subjects

Subj 1

(8 projects, 2 dreams)

Subj 2

(3 projects, 5 dreams)

Subj 3

(2 projects, 1 dream)

Subj 4

(7 projects, 4 dreams)

Subj 5

(10 projects, 2 dreams)

Subj 6

(7 projects, 3 dreams)

Subj 7
(12 projects, 6 dreams)

Subj 8
(6 projects, 4 dreams)

Subj 9
(3 projects, 1 dream)

Subj 10
(7 projects, 8 dreams)

Subj 12
(5 projects, 6 dreams)

Subj 14
(5 projects, 2 dreams)

Subj 15

(4 projects, 2 dreams)

Subj 17

(5 projects, 1 dreams)

Subj 18

(2 projects, 2 dreams)

Subj 20
(18 projects, 3 dreams)

Subj 21
(9 projects, 2 dreams)

Subj 22
(10 projects, 1 dream)

Subj 23

(18 projects, 2 dreams)

Subj 25

(7 projects, 7 dreams)

Subj 26

(10 projects, 3 dreams)

Subj 27

(9 projects, 5 dreams)

Subj 28

(4 projects, 3 dreams)

Subj 29

(2 projects, 2 dreams)

Subj 30

(6 projects, 1 dream)

Subj 31

(2 projects, 6 dreams)

Subj 32

(4 projects, 6 dreams)

END

06107.89

FIN