AN ETHOLOGY OF COGNITIVE AND AFFECTIVE PROCESSES

By

JOE LESTER CONNER

Bachelor of Arts
Northwestern Oklahoma State University
Alva, Oklahoma
1971

Master of Science
Oklahoma State University
Stillwater, Oklahoma
1975

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Thesis Approved:

Robert J. Weber
Thesis Adviser

Larry F. Bean

Phillip J. McKinney

Donald N. Brown

Norman N. Durham
Dean of the Graduate College

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CHAPTER I

INTRODUCTION AND LITERATURE REIVEW

In the present study both substantive problems (such as how certain cognitive and affective processes behave over time) and methodological problems (such as how an ethological approach to observation can be utilized to supplement more traditional methods of controlled experimentation) will be explored.

Weber and Conner (1976) have recently advocated an ethological approach to the study of cognitive processes such that an assessment of processes of general significance to individuals and which occur in the natural environment can be identified and delimited. They argue that there are many important cognitive behaviors that cannot be studied in the laboratory. A similar argument has been made by Neisser (1967). Weber, Wegmann, Ruder, and Younger (1974), Weber, Wegmann, Younger, and Mallue (1975), and Weber and Conner (1976), for example, have used the method of self-monitoring to study self-knowledge of frequency of insight behavior (sudden vivid understanding of the structure of problems). It is speculated that insight experiences are the result of forming connections between previously isolated pieces of information in long-term memory (and perhaps short-term memory). It is possible that frequency information such as that obtained in the Weber et al. studies of insight is indicative of a baseline for such complex waking behaviors that are essentially nonvoluntary and are very difficult to produce in

a laboratory setting.

The key to ethological studies of cognitive behaviors and private experience in general seems to lie in identifying events which are easily discriminable by the self-observer, and which are representative of fundamental processes. In addition, a willingness to yield partially on the requirements of objectivity is required if such methods are to gain acceptance (Weber and Conner, 1976). As these authors point out, all data may be ordered on a degeneracy scale, such that the self-monitoring methods of data collection would be viewed as fitting on a continuum of degeneracy ranging from experimental observation, which is low in degeneracy, to impressionistic sociological data on the high end of the degeneracy scale. The self-monitoring method probably produces data that is somewhere between these extremes.

The present study will examine the effects of time; a naturally occurring social unit (married couples); reciprocal influence on focus of attention (the continuum between perceptual stimulation and internal cognitive stimulation); intensity of attention (mental effort); and affect (mood, anxiety, hostility, and depression). The method of interval self-monitoring (recordings made at selected time periods and used when the behavior under study is not discrete) will be used in this study (Mahoney and Thoresen, 1974).

In addition, frequency information will be obtained of judged time orientations of real time thought content, i.e., ongoing cognitive processes will be identified as to time orientation. Finally, an argument for the validity of the self-monitored data will be made if any of the variables demonstrate rhythmicity similar to that observed by other investigators utilizing more objective measures.

Methodological Considerations

Ethology is at once a method of study characterized by naturalistic observation and an approach to understanding behavior in terms of evolution and adaptiveness (Bateson, 1968). Thus, ethologists have been involved traditionally both with intra-species comparison in attempts to determine the function of behaviors and simultaneously with methods of observation in the natural environment. An ethological investigation of such psychological processes as cognition and affect should then be concerned with methods of observation and the adaptive significance to the individual of such processes. It should be noted that adaptation occurs at both the level of the species, as in reproduction, and at the level of the individual, as in responding (Anderson, 1975).

First, consideration will be given to methodological problems inherent in naturalistic observation and in particular as they pertain to the observation of internal private events by self-observers. An observer in a natural setting can simply write or record what the subject is doing or saying. Using a written method requires that the observer direct most of his attention to the actual writing process and hence attention directed toward actual behavior will be restricted (Mischel, 1968). This method may appear to be very meaningful, but is severely limited by the difficulty in quantifying such descriptions, and also by the fact that the observer is required to attend to perceptual events at the same time that he is attempting to retain previous events in short-term memory. It is known that people can recall only a very limited number of items which have just been presented to them (Norman, 1976). When the events to be observed are internal, such as sensations, the self-observer who chooses simply to describe these events either

verbally or by written record may be hindered by the same problems that confront the observer of overt events.

In addition to the problems of restricted attention in recording and the difficulties of retention, the observation of internal events in this manner is likely to be highly impressionistic. This is due to the fact that internal events have no clear topography as in the case of most external events, e.g. running. Indeed, these problems and the failure to find solutions to them were instrumental in the refutation of introspection by experimental psychologists. A partial solution to the problems of written accounts of real-time events is found by identifying and defining 'target-behaviors', then giving examples of the behaviors to be included and excluded from the defined categories; it is then a matter of recording the occurrence of the behavior in real-time (Lipinski and Nelson, 1974). This procedure reduces both the requirement of attending to the recording itself and of retaining previous events. In the case of external behavior this also enables inter-observer reliability coefficients to be computed. In the manner suggested for observing external events, internal events can be identified, defined, and categorized. The problems of attending to recording and retention are minimized when all the self-observer has to do is discriminate the occurrence or nonoccurrence of the event and check it on a response form.

Although the reliability of self-observed internal events cannot be directly assessed, it can often be assessed by correlating the reported event with an observable event (McFall, 1970). For instance, the presence of self-reported sexual fantasy may be correlated with physiological arousal. This is the familiar strategy of positing

intervening variables which could afford prediction of effects on observable behaviors, if indeed the intervening variable is to be useful (Jeffrey, 1974). There has been a long tradition in psychology as well as in other social sciences to rely on expert external observers for data collection. Indeed, deviations from this format have been tantamount to heresy. The standard of this tradition is the inter-observer reliability coefficient. The higher the coefficient, the more confidence is placed in the reality of the behavior under observation. Jones (1972) discusses an ethological view of this model: "Practical experience, usually in the field, of both good and bad observers is one of the factors predisposing ethologists to skepticism over too great a reliance on inter-observer reliability as a way of evaluating the reality of items to be recorded. The rare bird that two experts spot and identify as it flies past (and which they collect the next day) is made no less real by the fact that ten other observers didn't notice it or couldn't identify it."

Although it is difficult to ascertain the reliability of self-monitored internal events and caution should be exercised, such considerations should not preclude the use of this method because procedures are available for enhancing the reliability of such data. Gottman and Leiblum (1974) suggest the use of extended observation periods covering two weeks or more. Jeffrey (1974) suggests periodic checks and restatement of response definitions to correct for definitional drift. Mahoney and Thoresen (1974) suggest the use of interval self-monitoring for use with high frequency or nondiscrete responses. Testing subjects prior to the monitoring period on proper response classification gives an index of intersubject reliability, thus affording the opportunity

to screen out subjects who do not meet a predetermined level of classification accuracy. Also, more confidence can be placed in self-monitored data that was collected with convenient unobtrusive instruments (Weber and Conner, 1976). Finally, self-monitoring has a practical advantage over external observation in that it affords a simple and direct method of observing private events.

A methodological problem which often results from the undertaking of an ethological study has to do with the economy of observation. In particular, there are practical limits to the number of subjects to be used. It is exceedingly difficult to monitor or observe large numbers of subjects for any extended amount of time. In the case where the subject serves as the observer, extended observation over time requires considerable effort as well as incentive. The present study was undertaken with the knowledge that a large sample of individuals would be economically infeasible and hence the decision was made to include only four subjects. Given this limitation on sampling, the subjects in the present study do not compose a random sample. At first glance this may seem to severely limit the generalization of the findings of this study. To the extent that information about intersubject variability in performance will be minimal, the general applicability of findings is indeterminate. However, generalizations about behavior rest equally upon an adequate sampling of situations (Dukes, 1968).

Because the present study used subjects who were instructed to observe their behavior for fifteen days at hourly intervals and who were also instructed not to interrupt their normal routines, it represents a sizable, if not representative, sample of situations of these subjects' environment. Brunswik (1956) states that; "proper sampling of situations

and problems may in the end be more important than proper sampling of subjects, considering the fact that individuals are probably on the whole much more alike than are situations among one another." (p. 39)

Small samples of subjects may also be beneficial when a process is studied over time. For instance, Lacey (1958) found a great deal of stability within individuals over time with regard to their physiological response pattern to stress, but no consistent general patterning of responses across subjects was found (Gottman, 1971). Budzynski, Stoyua, and Adler (1970) found a high correlation between self-rated severity of headaches over time and electromyographic recordings within subjects, which is in sharp contrast to the low correlations between physiological and self-report measures across subjects. (Chambers, Hopkins, and Hopkins, 1968). As pointed out by Sidman (1952), mean curves used to determine functional relations are not necessarily of the same shape as individual curves.

The final methodological considerations is the treatment of data collected over time. As has been amply demonstrated, data which is collected across time often is serially dependent or autocorrelated and the conventional analysis of variance procedures do not effectively take into account this dependency. This problem has often discouraged experimenters from designing experiments which require collecting data over time (Gottman, McFall, and Barnett, 1969). As these authors explain, the problem of serial dependency is particularly important when the effects of some experimental treatment are to be distinguished from noise in a nonrandom fluctuating time series. In line with these problems, the method of time series analysis has been advocated by several authors: Holtzman, 1967; Gottman, McFall, and Barnett, 1969;

Campbell and Stanley, 1970; and Glass, Willson, and Gottman, 1975. This method also holds considerable promise for making generalizations from studies using small subject examples, especially when combined with quasi experimental designs (Campbell and Stanley, 1970).

In addition to providing powerful inferential tools for use with formal time series experiments, the time series design also provides an opportunity to study concomitant variation (the correlation between two or more variables over-time), which provides the first level of causal inference (Glass, Willson and Gottman, 1975). As Bateson (1968) points out, ethological studies which include more than one observed variable over-time can play an important role in setting up hypotheses which can be tested experimentally, i.e., when the variables are temporally correlated. The study of concomitant variation yields the most information in the negative case; when two variables are uncorrelated over-time. It is very unlikely that the two are causally connected (Glass, et.al., 1975). These authors state: "It is true that concomitant variation does not necessarily imply causation, but it is also true that neither does anything else; causal connection is never demonstrated; rather rival hypotheses which militate against confidence in a causal claim are successively eliminated." In a strict sense, the study of concomitant variation is not a true experiment in that one variable is not an independent variable and the other a dependent variable, rather the variables in a natural experiment are predictor and criterion variables (Anderson, 1971). In the time series experiment where concomitant variation is studied, one of the variables may be used to predict fluctuations in the other; this is the method of finding lead indicators (Gottman, 1971). This method can be used when the objective

is merely to find good predictors, e.g. electromagnetic changes in the atmosphere which precede earthquakes. It can also serve a heuristic function by suggesting possible causal connections.

The methodological problems discussed thus far serve to illustrate both the advantages and disadvantages of studying phenomenon over time and in the natural environment. The use of self-observers to monitor their own internal processes, the use of small subject samples, and the special requirements of managing data which is collected over time have been discussed. It is contended that these methods, although requiring caution in their application, can be extremely useful in the study of processes like cognition in the natural environment. Such methods confront directly the problem of establishing ecological validity for the phenomenon psychologists study, and the problem of determining the characteristics of behavior which have general significance to individuals (Brunswik, 1956; Weber and Conner, 1976).

The present study will use and demonstrate the method of interval self-monitoring in the natural environment and over an extended period of time. This approach will afford the opportunity to study covert events (cognition and affect) as they vary across time in the natural environment.

Substantive Considerations

Time and a Naturally Occurring Social Unit

Strictly speaking, there are no manipulated independent variables under which the variables of mood, focus of attention, intensity of attention, anxiety, hostility, and depression will be observed. Rather the natural ordering variable of time will serve for the major

comparisons both in the general sense of the question: "do any of the sampled variables differ from time A to time B?," and in the specific sense, "do any of the variables differ as a function of what day of the week it is or what hour of the day it is?" In addition, the influence of one spouse's behavior on the other's behavior will be determined by the extent to which their sampled variables covary across time as well as by the effect the spouse's presence has on the variables.

Considerable evidence exists for systematic changes in human behavior over time, particularly in the form of rhythmic activity. For instance, within a twenty-four hour period circadian rhythms have been observed in body temperature, endocrine secretion, kidney function, blood pressure, pulse rate, plasma volume, cardiac output, cerebral function as measured by electroencephalogram, reaction time, pain sensation, subjective measures of fatigue, activation as assessed by questionnaire, mental tests such as quick arithmetic, memorization, vigilance tasks, maze-tracing, and numerous other behaviors (Conroy and Mills, 1970). Evidence for rhythmic activity within shorter periods (ultraradian rhythms) has been found. For instance, awareness of external and internal events exhibit 90 to 100 minute rhythms (Broughton, 1975). Longer rhythms such as the menstrual cycle have been known for centuries. Diurnal rhythms are often referred to as circadian rhythms but, in a more specific use refer to rhythmic fluctuations in behavior during the normal sixteen hour waking period. Many of the rhythms mentioned by Conroy and Mills (1970) were observed during normal waking periods and can be more properly referred to as diurnal rhythms. The presence or absence of an hour to hour rhythmic activity in any of the variables sampled in this study will be assessed by way of autocorre-

lating mood, thought reference or focus of attention, and mental activity or intensity of attention for each subject on a randomly selected days recording, resulting in twelve autocorrelations. In addition, periods of the day analysis will be used to assess the presence of rhythmic activity.

Recent application of systems analysis principles to social units such as the marital unit have stressed the reciprocal control one spouse's behavior exerts over the other spouse's behavior and how in effect such communication functions as negative feedback to maintain some implicit or explicit state of system adjustment (stability in the couple). Patterson and Cobb (1971) have identified coercion in a marital unit as a special form of dyad interchange in which both persons provide aversive stimuli to control the behavior of the other. Patterson and Reid (1970) found, based on observed family interactions, a median correlation of .65 between the proportion of aversive interactions given and received. This indicates a reciprocity of controlling stimuli. Observation in everyday experience suggests that married couples develop abbreviated signals to communicate their feelings or desires to one another. Evidence exists for the entrainment (an endogenous rhythm adjusts to an external rhythm or change) of biological rhythms of individuals living together. McClintock (1971) proposed an olfactory stimuli as mediating the observed phenomenon of women living together tending to menstrate simultaneously. Nonverbal stimuli are frequently proposed as a means by which much human communication is transacted. Expressive movements such as smiling, raised eyebrows, frowning, and eye contact, are examples of stimuli which convey meaning to the receiver of the nonverbal messages (Hinde, 1975). It is apparent

that numerous avenues and opportunities exist for communicating one's desires and feelings in human interaction and it has been suggested that individuals living together become particularly aware of one anothers messages. How these messages effect the private experience of individuals in social units such as the marital unit is an empirical question. Therefore, the present study will attempt to determine the extent to which a marital unit regulates or effects such private behaviors as mood, focus of attention, and intensity of attention of individuals.

Mood

Mood has been used to refer to how an individual feels in general (most of the time) or how one feels within the constraints of a limited time reference (how one feels today, this morning, or now). The assessment of mood in both instances has relied heavily on psychometric devices such as a list of adjectives which are presented to the subject with instructions to rate or check the ones which best describe his/her mood (Lorr, Daston, and Smith, 1967; Zuckerman, Lubin, Vogel, and Valerius, 1964; McNair and Lorr, 1964). These instruments are usually multidimensional in that several dimensions of mood are assessed simultaneously, e.g. anxiety, depression, cheerfulness, and friendliness. Simple unidimensional scales have been used less frequently (Gottman and Lieblum, 1974). These scales simply require the subject to rate his mood on a scale ranging from bad to good.

The present study will use both an adjective checklist, the Multiple Affect Adjective Checklist (Zuckerman and Lubin, 1970) and a simple unidimensional scale to assess mood. The checklist, to be self-

administered at the end of a day, will afford measures of anxiety, hostility and depression. The checklist was included because such "states" as anxiety, hostility and depression may covary with other variables like focus of attention. Singer and Rowe (1962) found a significant positive correlation between the frequency of daydreaming and Cattell's Total Anxiety score. Internal focus of attention could be expected to contain instances of daydreaming. Mood as rated on the unidimensional scale will afford hourly measures of affect which can then be studied as a concomitant of the other measures to be obtained hourly. The Today Form of the MAACL requests the subjects to check the adjectives which best describe his or her mood now (Zuckermann and Lubin, 1970). This form will be used in the present study.

Taub and Berger (1974) found diurnal variation in mood as assessed by adjective checklist. These authors found that positive moods were significantly elevated at noon and late afternoon and conversely, negative mood was significantly diminished at these periods. This variation followed closely the observations made by Kleitman (1963) of subject-paced task performance with peak performances occurring 4-8 hours after awakening. Thayer (1967) observed diurnal variation in activation and deactivation as measured by the Activation-Deactivation Check List. This check-list discriminates four general aspects of activation; general activation, general deactivation, deactivation, and high activation. Thayer reports significant correlations between the factors of general activation/deactivation and physiological measures; composite scores of skin conductance and heart rate.

Both the MAACL and mood ratings will be made in the natural environment and in real time. The MAACL requires the subjects to affix labels

(adjectives) to their subjective experience of moods as they are experienced in real time. This is a rather complicated task and considerably more abstract than a task which requires only that the subject discriminate whether a feeling is occurring or not. Such a procedure has unknown validity (Taub and Berger, 1974). For instance, description alone of negative and positive mood states have been shown to effect subsequent mood ratings MAACL, writing speed, decision time, and spontaneous verbalizations (Velten, 1968). Hence, simply reading words such as sad or blue and then deciding if they apply to current or present mood may be highly reactive. The measures obtained by such instruments as the MAACL, therefore, must be interpreted cautiously.

In contrast to psychometric assessment of mood, the unidimensional mood scale to be used in the current study represents a considerable simplification. It requires the subject to determine only if he/she feels good or bad at hourly intervals and then to make a numerical estimate of the extent of the feeling. The validity of the mood scale is of course open to criticism, but it would seem that such a scale requires less abstraction then differentially labeling affective processes. The use of the two different methods of assessing affective states in the current study should net information on the validity of measured affect by self-observers in general by providing a set of converging measurement operations (Webb, Campbell, Schwartz, and Sechrest, 1966).

Mood as assessed by the MAACL and the unidimensional mood scale will thus be used to determine if affect concomitantly varies with such cognitive variables as focus of attention. In addition, the mood scale response will be examined for diurnal rhythmicity.

Focus of Attention, Intensity of Attention and Time Orientation

Attention is a fundamental process of cognition which has received considerable study (Norman, 1976). A basic distinction can be made between two general classes of stimuli to which one can attend, internal stimuli and external stimuli. This distinction has been made in the case of stimuli relevant to thought. Antrobus (1968) and Singer (1974) have distinguished between thoughts which occur independent of external stimulation (stimulus-independent thought) and thoughts which are related to external stimulation (stimulus-dependent thought). The focus of ones attention in the natural environment may then be either internal or external stimuli, or it may be divided between these two extremes.

Another fundamental dimension of information processing concerns whether attention is allocated sequentially or in parallel (Kahneman, 1973). A subjects report of what he/she is attending to may be best represented as a continuum between these two dimensions of attention and between the predominate source of stimulation, whether internal or external. Everyday experience indicates that our attention is frequently divided among concurrent activities, e.g. driving to work and thinking about what needs to be done at work. Indeed, in a familiar environment (low frequency of novel stimuli or relatively free of non-predictable events) attention may frequently be experienced as divided between concurrent activities. Kahneman (1973) also presents evidence that attention is likely to be unitary (applied sequentially) under conditions of high arousal and is likely to be divided (parallel) under conditions of low arousal.

In the natural environment one might expect that most of the daily

tasks engaged in by individuals are in some sense routine, familiar and relatively simple, and hence, less demanding of attentional effort or mental effort (low arousal). Intensity of attention may be viewed as varying between two extremes, from extreme concentration or intense mental effort to mind wandering, daydreaming, or very little mental effort. The present study will require the subjects to decide to what they are attending and then to rate their experience of the extent of mental effort or intensity of attention in real time at hourly intervals.

Time of day has been demonstrated to effect self-reports of concentration and in particular to follow diurnal rhythms frequently found for various performance and physiological variables (Taub and Berger, 1974). Concentration or lack of concentration as depicted by individual's experience of mental effort should then demonstrate some of the features of diurnal rhythmicity, e.g. post lunch drop. This possibility will be examined in the present study.

Singer and Rowe (1962) found a significant correlation between the frequency of daydreaming and Cattell's Total Anxiety Score. Singer (1974) has defined daydreaming as stimulus independent thought. In the present study one might expect an internal focus of attention to be more frequently associated with the mood measure of anxiety on the MAACL. This possibility will be investigated as well as the relationships between intensity of attention and the mood measures.

If one is attending to internal stimuli such as in reminiscing, these stimuli might properly be classified as having reference to events in the subject's past. If the internal event is something like planning one's future action, then it might properly be classified as having a future orientation. In the case of past and future oriented

internal events there is also a dimension of how far into the past or future. For instance, one may be reminiscing about a conversation that occurred at lunch an hour ago, or about a childhood event that occurred years ago. Likewise, one could be thinking (internal event) about an appointment in an hour or about next summers' vacation. The time orientation of cognitive processes such as daydreaming have received little or no attention in the literature. The present study will attempt to investigate temporal orientation in the natural environment.

Antrobus, Singer, Goldstein, and Fortgang (1970) suggest that the internal event daydreaming may have several functions: 1) it is a cognitive process that enables the individual to anticipate or plan his/her future; 2) it may serve to relieve boredom or, 3) it may have self-entertainment value. Clearly such an activity requires the retrieving of a large number of items of information about one's past and one's future.

In summary, internal events may have neither a past nor future orientation, they may be perceived as being related to on-going external events (present), or they may have no discernible orientation at all; as in thinking about a number. External events which are being attended to are clearly represented in the present.

Statement of Purpose

The present study will attempt to answer several questions as to the effects of time, couple systems, and dependency between the affective processes of mood, anxiety, hostility, and depression, and the cognitive processes of focus of attention and intensity of attention.

The specific questions addressed are as follows:

1. Does mood, focus of attention, or intensity of attention differ in regard to mean values and in regard to standard deviation values from day to day or from hour to hour? Anxiety, hostility, and depression scores will be analyzed only for the effects of days as these scores were obtained only on a daily basis.
2. Does mood, focus of attention, or intensity of attention differ in regard to either means or standard deviation as a result of the specific day of the week? In other words, do these variables behave differently in relation to what day of the week it is? This same question will be asked in regard to the specific period of the day. That is, do any of the variable behave differently in relation to what period (morning, afternoon, early evening, late evening) of the day it is? MAACL scores will again be analyzed for days only.
3. Do individuals in the couples influence one anothers covert behavior? Specifically, does the physical presence of the spouse effect the mood, focus of attention, intensity of attention, anxiety, hostility, or depression of the other spouse? Do the same behaviors in couple systems covary systematically over time? That is, is there any evidence of entrainment of covert behaviors within the couple system?
4. Do the variables of mood, focus of attention, intensity of attention, anxiety, hostility, or depression covary over time? That is, are any of these behaviors concomitantly related? Data from both individuals and combined subjects will be

examined.

5. How frequently are the thoughts which are recorded at hourly intervals either past, present, or future oriented? Also, how often are these thoughts judged to have no time orientation.
6. Finally, are the variables of mood, focus of attention, or intensity of attention sequentially dependent over time? In other words, do past values of these variables influence systematically the future behavior of the same variable?

Data Analysis

The basic analyses will consist of a series of single factor repeated measures analysis of variances and a series of two factor repeated measures analysis of variances. Although time series analysis is a promising tool, conventional repeated measures analysis of variance is adequate if the observations over-time can be shown to be independent or in the case where the experimenter is interested in sequence effects (Winer P. 518, 1971). If time is the independent variable as is the case in the present study, then the effects of interest will be sequential effects and repeated measures analysis of variance is adequate.

In addition, spouse reciprocity and concomitant variation will be assessed by a series of correlations for spouse pairs. Specifically, question one in the preceding section will be answered by analyzing the effects of the 14 days and 14 hours by means of the single factor (14 levels) repeated measures analysis. Question two will be answered by use of several two factor repeated measures analysis of variances with specific days of the week and periods of the day comprising the two

factors (7 and 4 levels) repeated measures analysis. Question three will be answered by computing a series of product moment correlation coefficients between spouse pairs. Rhythmicity or sequential dependence will be assessed by autocorrelating (lag 1) the variables for each spouse on a randomly selected day. Time orientation responses will be treated by a description of frequency and not as a function of time or concomitant variation.

CHAPTER II

METHOD

Subjects

Two married couples were selected to serve as subjects in the present investigation. The husbands in the couples are both graduate students in Psychology at Oklahoma State University and the wives in the couples work at full-time jobs. Neither couple has children. As mentioned previously, a study like the present one involves considerable commitment on the subject's behalf and an incentive sufficient to make the effort worthwhile. For these reasons graduate students and their wives were selected based on their expressed desire to participate in the study and the lessened demands on available research funds. Each couple received thirty dollars at the end of the fifteen day monitoring period. The mean age of the husbands was 27 years, and the mean age of the wives was 23.5 years. Subjects will be referred to as male 1, couple 1, female 1, couple 1, male 2, couple 2, and female 2, couple 2.

Sampled Variables

Mood, focus of attention, intensity of attention, time orientation and a check of whether the spouse was present or absent was assessed on an hourly basis at the sound of a buzzer for a period of fifteen days with a maximum of 240 possible hourly responses per variable over the fifteen day period.

Mood was assessed by requiring the subjects to rate their mood on a scale from 0 to 9 hourly. Zero represented a mood as bad as the subject would feel on a normal day and nine represented a mood as good as the subject would feel on a normal day (See Appendix "A" for definitions). Good and bad moods were defined in this manner in an attempt to minimize a subject's reluctance to rate his/her mood as either extremely good or bad. Terms such as terrible mood or great mood were avoided.

Focus of attention or thought reference was assessed by requiring subjects to indicate on what his/her attention was primarily focused. As mentioned, this variable was conceptualized as comprising a continuum between total attention to external stimuli and total attention to internal stimuli. A scale was constructed with 0 representing total attention to internal stimuli and 9 representing total attention to external stimuli. Hence, intermediate values were possible and were defined as the experience of attending to more than one source of stimulation. As was noted, it is a common experience to be engaged in more than one task at a time; e.g., driving and thinking. The subjects were given definitions and examples of both internal and external stimuli and also examples of split or divided attention (See Appendix A). Subjects were instructed to try to determine their primary focus of attention or thought reference when they were not absolutely sure that they were attending solely to an internal or external stimulus. Focus of attention was assessed hourly.

Intensity of attention or mental effort was assessed hourly by means of a ten point rating scale identical to the ones used to assess mood and focus of attention. A value of zero was taken to mean the absence of mental effort as in mind wandering or the experience of a

"blank mind", while a value of nine was defined as the experience of mental effort as in extreme concentration (See Appendix A).

Time orientation was assessed hourly and was defined as the past, present, or future orientation of the subject's thought content at the time an interval timer sounded (See Appendix A). Subjects first were required to briefly describe their behavior at that time and their thought content at that time. From this written record, subjects were to judge whether the content of their thoughts was past, future, or present oriented, or had no specific time orientation. If the thought was judged to be either past or future oriented they were then to estimate how far into the past or future the thought content referred. For instance, if the subject was thinking about lunch and the present time was 9 a.m., this thought would be classified as future and concerned with an event that would happen three hours later. To estimate the temporal distance of a past or future thought, subjects were provided with a scale for thoughts rated past or future that contained temporal distances beginning an hour from the time the interval timer sounded and extending with hourly increments to a residual category of greater than twelve hours from now (See Appendices A and B).

Spouse presence was assessed by having the individual simply check whether the spouse was physically present at the time the timer sounded (Appendix B).

The Today Form of the MAACL was taken once at the end of each of the fifteen days. It was taken after the last hourly recordings were made and before subjects retired in the evening. Instructions for the MAACL and the test itself are given in Appendix F. Raw scores from the MAACL scales were converted to standard scores by using a table of norms

for college students (Zuckerman and Lubin, 1970).

Ordering Variable of Time

Time of day and day of week were used for the major comparisons of the various sampled variables. Time of day and day of week were used in two different ways to assess their effects on the cognitive and affective variables in this study. First, all fourteen days (the first day of monitoring was dropped as it was designated a practice day) served as fourteen levels in the single factor repeated measures analysis of variance. Hence, two Sundays, Mondays, Tuesdays, Wednesdays, Thursdays, Fridays and Saturdays were encompassed in the monitoring period. The first assessment of the effects of days was not concerned with specific days of the week, but rather with the effects of days in general. In other words, the first questions were concerned with the stability and lability of cognitive and affective processes across days irrespective of what day it was. This analysis was intended to answer the question of whether the sampled variables changed in the sense of mean differences and in the sense of whether the behaviors changed in variability from day to day. Assessment of variability change was possible only for the variables of mood, focus of attention and intensity of attention, as these were assessed hourly. A measure of a days' variability was made possible in the form of the standard deviation. When an analysis of variance was used to assess standard deviation differences all four subjects were included, hence, differences will represent differences in mean standard deviations. Anxiety, hostility, and depression scores from the MAACL were only available as means across all four subjects.

In the same manner as day to day change was assessed, hour to hour change was assessed for the variables of mood, focus of attention, and intensity of attention. Subjects were provided with response booklets in which sixteen forms were provided for hourly recordings each day. Sixteen hours of wakefulness was assumed to be an average day for most people. Subjects were encouraged to fill out as many of the sixteen response forms as possible for each day. In addition, the timers that were provided were to be set for the nearest clock hour. For instance, if the subjects arose in the morning at seven-thirty, they were instructed to set their timer for eight a.m. and then for each hour thereafter. Hence, recordings were synchronized with clock hours. It was found that the subjects in the present study most often made more recordings beginning at 9 a.m. and ending at 10 p.m.; hence, fourteen hours of useable data was obtained. These fourteen hours served as the levels of the second series of single factor repeated measures analysis of variances. The question here is, does mood, focus of attention, or intensity of attention change in mean value or in variability (standard deviation) from hour to hour? This analysis is similar to the days analysis described previously in that the particular hour of day is unimportant. It should be noted that the MAACL scores could not be analyzed in this fashion since they do not represent hourly measures.

The second way in which days and hours are used is in the specific sense of how a particular day or period of the day differentially effects mean values of mood, focus of attention, or intensity of attention and variability (standard deviation) of these variables. These analyses were undertaken to investigate the influence of the routine working week on cognitive and affective processes, and to examine the

data for evidence of rhythmicity in the waking day. Again, change in MAACL scores can only be assessed for mean value and for days of the week, and is treated in a separate analysis. As mentioned previously, the fourteen days contained two of each of the days of the week, e.g. two Mondays, and two Saturdays. This enables the like days to be combined in a test for change in the sampled variables as a function of specific days of the week. Thus, the relevant data becomes means of the variables across subjects across like days, e.g. the Sunday means versus the Tuesday means. Likewise, for assessing the variability the relevant data become standard deviations of the variables across subjects and across like days.

To combine the hours factors with the days factors required that the hours of the day be combined into four blocks or periods of the day. For example, the ratings of mood, focus of attention, and intensity of attention were each combined into a morning period, an afternoon period, an early evening period, and a late evening period. Each period contained three hourly ratings, e.g., the morning period included the 10 a.m., 11 a.m., and 12 noon recordings. Hence, the relevant data for the two factor (seven days x 4 periods) repeated measures analysis of variance becomes the means and standard deviations of each of the periods and the two like days, netting six observations per block and per subject. Time will be used to investigate the stability/lability in the sampled variables of mood, focus of attention, intensity of attention, anxiety, hostility, and depression over time and to investigate any effects on these variables due to specific days of the week or periods of the day.

Apparatus

As mentioned previously, the reliability of self-monitored data can be improved if the recording devices are convenient and simple to use. In an attempt to make recording as simple as possible, each subject was provided with a supply of fiteen response booklets each containing sixteen separate response forms for each hourly recording. The booklets were numbered consecutively and a place was provided for date and name of the subject on the cover of each booklet. The booklets and response form measured 14 cm x 11 cm and could be folded for carrying in a pocket or purse. Each response form was also consecutively numbered. In addition to providing a space to write the behavior and thought taking place at the moment the buzzer sounded, a space was provided for recording the time. Each form contained one mood rating scale, one thought reference or focus of attention scale, one mental activity or intensity of attention scale, one time orientation scale, a space to indicate no time orientation if applicable and a space for recording the presence or absence of the spouse. In addition to the response forms, each booklet contained four pages of abbreviated instructions and response definitions (See Appendix C). The abbreviated instructions and definitions were taken from the complete instructions (See Appendix B) and the complete response definitions (Appendix A). Each subject was provided with both the complete instructions and definitions as well as the abbreviated instructions and definitions in the booklets.

The subjects were also provided with fifteen copies of the MAACL affixed with the Today Form instructions on each copy (Appendix F).

Finally, each subject was provided with a small (42mm diameter)

spring would interval timer, (Swiss made Endura Memo Minder, Laboratory Supplies Company, Inc.). The timers were calibrated from 0 to 120 minutes with reliable increment settings of five minutes duration, e.g. five, ten, fifteen, twenty, etc. Each timer had a key ring attachment and a set of instructions. The timers had to be reset after each recording by manually setting the timer to the one hour position. The buzzer alarm had a duration of approximately four (4) seconds.

Procedure

A meeting was arranged between the couples and the experimenter on a Friday evening before the fifteen day monitoring period was to begin. At this meeting all the materials required for the experiment were given to each individual. This included fifteen response booklets, complete instructions and definitions, fifteen MAACL forms, and an interval timer. As several colors were available for the timers (red, white, and black) each subject was allowed to select the timer of choice. They were told at this time that they could keep the timers as part of their payment of participating in the experiment.

The instructions were then read and the subjects followed on their copies of the instructions (Appendix B). They were told that they would have to keep on their person the interval timer and the proper response booklet for all of the waking day and for the entire fifteen day period. They were encouraged to make their recordings in real-time and as soon after the timer sounded as possible. They were also encouraged to engage in all their normal daily activities throughout the monitoring period. In the event that a recording was missed for some reason, e.g., taking a bath or shower, they were instructed to skip that recording in

the booklet and to reset their timer to the nearest clock hour. It was suggested that missing a recording should be rare as recording intervals were long enough for most daily activities such as taking a shower. All subjects were instructed to set their timers each morning to the nearest clock hour; for example, if they arose at 7:30 A.M., they were to set their timers for 8 A.M., thus their first recording would be made thirty minutes after arising in the morning. Each subsequent recording then would be made at hourly intervals and in synchrony with clock hours. After the instructions were read, questions were solicited. After questions were answered, the subjects were asked to follow the response definitions and examples as they were read by the experimenter. (Complete response definitions and examples are given in Appendix A.) After the reading of response definitions and examples, and the answering of questions, the subjects were each given ten (10) response forms which had examples of thought and behavior different from those that had been discussed. From these examples they were asked to classify first the thought reference or focus of attention, then the mental activity or intensity of attention which was likely to be experienced for such a thought, then the time orientation of the thought (whether the content was present, past, future, or had no time orientation). The subjects were encouraged to read the examples of behavior as well as thought and were told that the behavior might help determine the proper classification. The ten examples are given in Appendix E.

As mentioned earlier, another way to enhance the reliability and validity of a procedure such as the present one is to provide test examples of the behaviors to be observed and classified and to set a criterion of agreement that must be met before an observer is selected.

The ten examples given the subjects in the present study provided such a test. A criterion of agreement was set at seventy per cent (70%) for all items and for all four subjects. There was a combined agreement of ninety-seven and five-tenths per cent (97.5%) for all four subjects on the examples of thought reference or focus of attention. There was only one divergent classification on these items. For mental activity or intensity of attention there was a combined agreement of ninety-five per cent (95%). Finally, ninety per cent (90%) agreement was obtained for the time orientation examples. It should be noted that both thought reference or focus of attention and mental activity or intensity of attention were scored based on absolute ratings; i.e. any response equal to or less than a four was scored as being a classification of internal thought reference and mind wandering; similiarly, any response equal to or greater than a five was scored as being classification of external thought reference and concentration.

After the test examples were given, the subjects were informed that the experimenter would make periodic phone contact with them throughout the monitoring period. No specific number of contacts or time of contact was designated, rather contacts were made at various times with the exception of the first day. On the first day both couples were contacted for purposes of answering questions and checking on the function of the timers. Both couples were contacted four times, including the first day, during the fifteen day period. Upon calling, one couple after the first day, the husband reported that his timer had failed on three separate occasions; at this time the experimenter made a visit to their home to replace the defective timer. Subjects were encouraged to call the experimenter if difficulties arose (no

calls were made).

The subjects were encouraged to discuss with one another their responses for only the first day of monitoring, this was done in an attempt to further classification accuracy. After the first day the subjects were instructed not to talk about their responses or to show their response booklets to one another for the remaining monitoring period. Subjects were not informed that their first day's recording would be dropped in the subsequent data analysis.

Finally, the subjects were excused and thanked for their willingness to participate in the experiment.

On the sixteenth day, the experimenter made separate visits to each couple's home to collect their response booklets and MAACL forms. At this time, the experimenter asked for comments on the experiment and informed the subjects of when they could expect their payment. (Payment was made four days later). They were also informed that they would subsequently be given a post-experiment questionnaire.

The post-experiment questionnaire (see Appendix D) was given two and one half weeks later. Despite this delay all subjects reported having no difficulty in filling out the questionnaire. The questionnaire attempted to assess the convenience of the apparatus, the appropriateness of the incentive, the difficulty of classifying the sampled variables, and how closely the instructions were followed.

CHAPTER III

RESULTS

The principle results of this study are contained in seven major sections:

1. The processes over time section attempts to answer questions of a general nature regarding the behavior of these processes over both days of the week and hours of the day.
2. The specific days and hours section attempts to answer the question of whether the specific day of the week or the period of the day has a selective influence on the sampled variables.
3. The concomitant variation section attempts to answer the question of whether the sampled variables are correlated over time either for pooled subjects or within a subject.
4. The couple systems section attempts to answer the question of whether spouse behaviors covary with one another, i.e., whether their behaviors have become entrained over time.
5. The time orientation section will simply describe the frequency of thoughts classified as belonging either to past, present, future, or no time orientation. Temporal distance in the past or future will be similarly treated.
6. The autocorrelation section attempts to answer the question of whether previous behavior is predictive of subsequent

behavior. For example, do low mood ratings follow low mood ratings made an hour earlier? One day's recordings will be randomly sampled for each of the variables of mood, thought reference (focus of attention), and mental activity (intensity of attention) for each of the four subjects.

7. The post-experiment questionnaire section summarizes the judged ease of classification for the self-monitored variables.

Processes Over Time

Mood (Over Time)

The mean mood per day was determined by summing across hours of the day for all subjects. The results of the single factor subjects by days analysis of variance yielded a nonsignificant difference; $F(13,39) = 1.15$, $p > .05$. This result indicates that mood for all four subjects remains relatively stable from day to day.

Stability of mood for individual subjects across days was assessed by a single factor subjects by days analysis of variance. Subject degrees of freedom for individual analyses were provided by treating each hour as a distinct subject, netting 13 subject degrees of freedom, one for each hour of recording minus one. As these subject degrees of freedom cannot strictly be regarded as being independent, the alpha level for these analyses was set at .01 rather than .05.

Male 1, couple 1 analysis yielded a statistically significant difference for days, $F(13,169) = 4.11$, $p < .001$. Female 1, couple 1 analysis yielded a nonsignificant difference, $F(13,169) = 1.68$ $p > .01$. Male 2, couple 2 analysis netted a statistically significant difference, $F(13,169) = 3.75$, $p < .001$. Finally, female 2, couple 2 analysis yielded

statistically significant difference for days, $F(13,169) = 5.74$, $p < .001$. Three out of the four subjects demonstrated statistically significant changes in mean mood across day. No post-hoc comparisions were done on these results as the effects of specific day of the week will be examined in subsequent analyses.

Group means and standard deviations can be found in Appendix G.

The mean mood per hour was determined by summing across days of the week for all four subjects. The results indicate no significant difference for hours, $F(13,39) = 1.66$, $p > .05$. Mood remained relatively stable from hour to hour within a day for all four subjects.

Stability of mood over hours for individual subjects was assessed in the same manner as was mood over days. A single factor subjects hours analysis of variance was performed. Subject degrees of freedom were obtained by treating each day as a different subject. Again, alpha is set at .01. Male 1, couple 1 analysis yielded a significant difference for hours, $F(13,169) = 4.56$, $p < .001$. Female 1, couple 1 analysis yielded a nonsignificant difference for hours, $F(13,169) = 1.34$, $p > .01$. Male 2, couple 2 analysis yielded a nonsignificant effect for hours, $F(13,169) = 1.63$, $p > .01$. Finally, female 2, couple 2 analysis yielded a significant effect, $F(13,169) = 2.47$, $p < .01$. Hence, for two of the subjects mood was found to significantly change within a period of a day, and for the other two mood remained stable throughout the day. Specific periods of the day will be examined in subsequent analysis.

Standard deviations were utilized as scores to determine if mood is more or less variable on different days and hours across subjects. A single factor subjects by days analysis of variance netted a non-

significant effect, $F(13,39) = .92$, $p > .05$. The second analysis of variance for hours yielded a nonsignificant effect, $F(13,39) = .62$, $p > .05$. Thus, variability of mood did not differ significantly from day to day nor from hour to hour. Mean standard deviations and their standard deviations may be found in Appendix G.

Focus of Attention or Thought Reference (Over Time)

The same sets of analyses that were performed on mood were performed on mean thought reference scores for both individuals and combined subjects, as well as for hours and days. One significant effect for combined subjects on the days factor was found, $F(13,39) = 2.39$ $p < .02$. Results of the remaining analyses failed to achieve statistical significance. Group means and standard deviations may be found in Appendix H. These findings support the contention that the cognitive variable of focus of attention remains remarkably stable over days of the week and hours of the day.

The AOV's of standard deviations for combined subjects also failed to reach statistical significance. The variability of focus of attention was found not to change significantly from day to day or from hour to hour.

Intensity of Attention or Mental Activity (Over Time)

Again, identical sets of analyses were performed on mean intensity of attention for both individual and combined subjects, as well as for hours and days. Combined subjects AOV's yielded no significant effects

for either hours or days.

Male 1, couple 1 analysis yielded a near significant effect for hours, $F(13,169) = 2.10$, $p < .02$. Male 2, couple 2 analysis yielded a significant effect for hours, $F(13,169) = 3.12$ $p < .001$. Neither male analysis for days netted a significant effect. Female 1, couple 1 analysis yielded a significant effect for days, $F(13,169) = 3.45$, $p < .001$. Female 2, couple 2 analysis yielded a significant effect for days, $F(13,169) = 2.90$ $p < .01$. Neither female AOV yielded any significant effects for hours of the day. Group means and standard deviations may be found in Appendix I.

The AOV of standard deviations for days of the week was found to be nonsignificant, $F(13,39) = .12$ $p > .05$. The AOV for hours across subjects for standard deviations yielded a significant effect, $F(13,39) = 2.32$ $p < .02$. Hence, intensity of attention was found to be more variable at certain hours of the day and less variable at other hours of the day (See Figure 1). As seen in Figure 1, the afternoon hour of 2 p.m. is most variable while the morning hour of 9 a.m. is least variable. These results suggest that intensity of attention follows a diurnal pattern with increased variability in the early afternoon (the 'post-lunch' phenomenon).

Specific days and periods of the week will be analyzed in following sections.

MAACL (Over Time/Days)

As MAACL scores were only obtained daily, no hourly evaluation is possible. MAACL scores were first converted to standard scores. The AOV for anxiety scores yielded a significant effect for days,

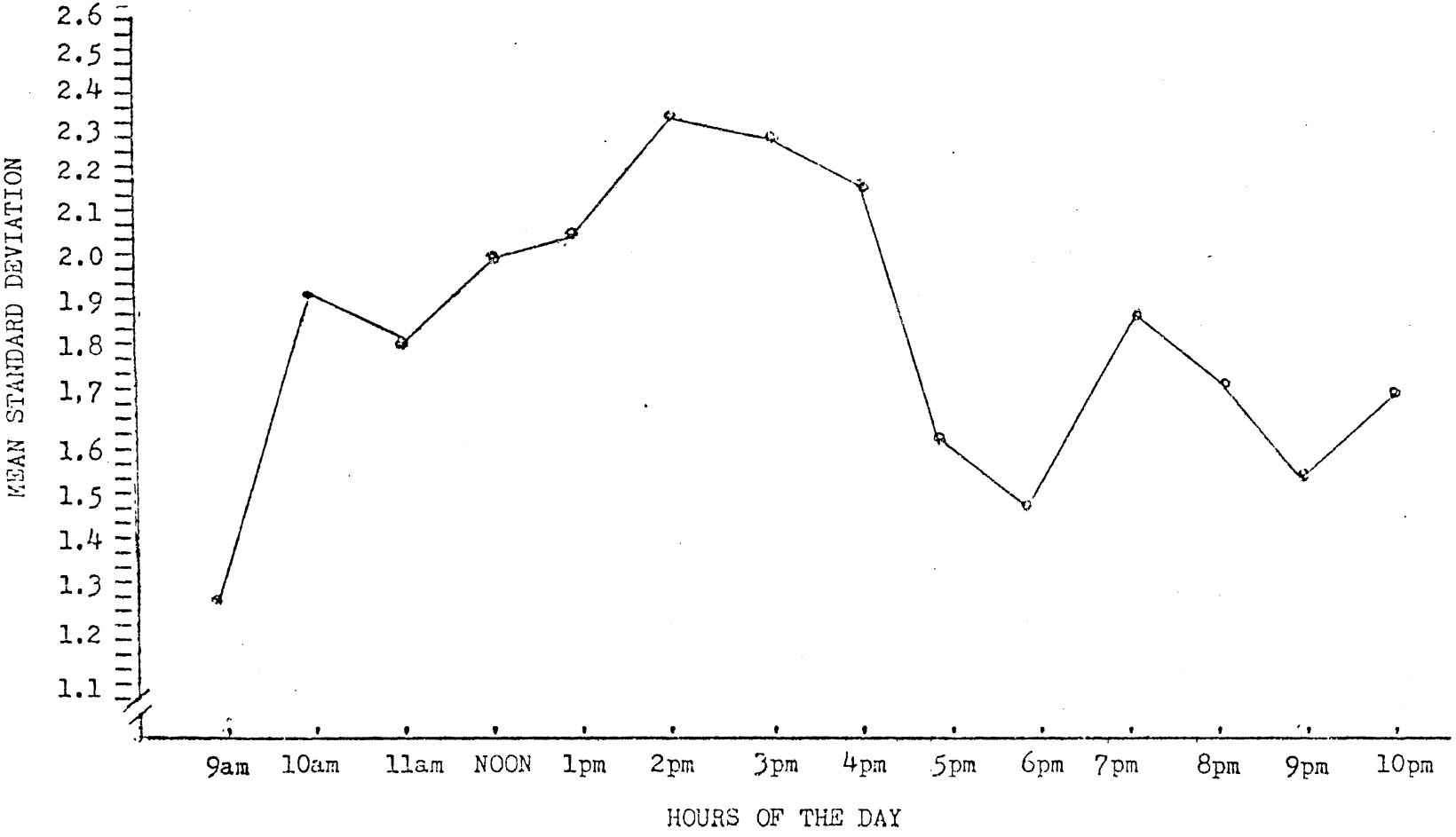

Figure 1. Mean Standard Deviations for Intensity of Attention (All Four Subjects)

$F(13,39) = 2.31$, $p < .02$. The AOV for hostility scores netted a non-significant effect for days, $F(13,39) = 1.48$ $p > .05$. Finally, the AOV for depression scores yielded a significant effect, $F(13,39) = 6.21$, $p < .001$. Hence, anxiety and depression exhibited significant variability over time while hostility remained relatively stable.

The preceding results suggest that the general effect of time on the samples variables acts selectively on these cognitive and affective processes. This result is highly suggestive of the discriminability and independence of the sampled variables in the study.

Specific Days and Periods

Mood (Specific Days and Periods)

Two aspects of mood were analyzed, means and standard deviations, to ascertain the effects of specific days of the week and hours of the day. A series of two factor repeated measures analysis of variance were performed on mood as well as focus of attention and intensity of attention. These analyses, unlike previous analyses, were performed only on data pooled across all four subjects, as individual analyses are not possible due to the data combining procedures (no subject degrees of freedom are available for individual analysis). Days of the week were combined into like days, e.g. Sunday one plus Sunday two, to yield seven (7) levels of the first factor (days of a week). Hours of the day for the combined days were blocked (as in trials) into four periods of the day yielding four (4) levels on the second factor. To equalize the number of observations in each block or period, the 9 a.m. and 10 p.m. recordings were deleted, resulting in twelve hours, which were then divided into four periods containing

three observations per day. Since the days were combined, six observations per cell were resultant. The means and standard deviations of these six observations for all subjects were thus the dependent measures analyzed. The four periods consist of a morning period, MN (10 a.m., 11 a.m. and Noon recordings) an afternoon period AN (1 p.m., 2 p.m., and 3 p.m. recordings), an early evening period EE (4 p.m., 5 p.m., and 6 p.m. recordings) and a late evening period LE (7 p.m., 8 p.m., and 9 p.m. recording).

Table I contains the means and standard deviations for the seven days of the week and the four periods of the day for the means analysis. As this table shows, there is a tendency for mood to increase on weekend days and a tendency for mood to decrease in the afternoon (AN), then peak in the late evening, (LE). The first AOV (See Table II) yielded a nonsignificant effect for days, $F(6,18) = .705$ $p > .05$, a significant effect for periods of the day $F(3,9) = 7.97$, $p < .01$, and a nonsignificant days x periods interation, $F(18,54) = 1.26$, $p > .05$. Figure 2 depicts the effects of periods of the day on mood. Subsequent analysis of pair-wise comparisons using Tukey's procedure (Kirk, 1968, p. 169), indicated that mood significantly dropped from the morning period (MN) to the afternoon period (AN); $q(2.9) = 3.81$, $p < .05$; that mood increased significantly from the early evening period (EE) to the late evening period (LE); $q(2.9) = 4.47$, $p < .05$; and that mood showed the most significant increase from the AN to the LE; $q(3.9) = 6.79$, $p < .01$. Significant in these findings is the presence of the so called post "lunch dip" found frequently in other behaviors.

A similar AOV was performed on a measure of mood variance, specifically the standard deviation at different days of the week and periods

TABLE I

MEAN MOOD RATING AS A FUNCTION OF SPECIFIC DAYS OF THE WEEK AND PERIODS OF THE DAY FOR ALL FOUR SUBJECTS

MOOD[1]	DAYS						
	Mondays	Tuesdays	Wednesdays	Thursdays	Fridays	Saturdays	Sundays
$\overline{X}$	6.74	7.00	6.99	6.69	6.89	7.11	7.03
SD	1.04	1.04	1.15	1.20	.931	.924	1.19
	PERIODS						
	Morning (MN)		Afternoon (AN)		Early Evening (EE)		Late Evening (LE)
$\overline{X}$	6.96		6.73		6.87		7.14
SD	1.09		1.07		1.07		1.11

[1]Mood could range from zero (0), representing a bad mood, to nine (9), representing a good mood.

TABLE II

AOV OF MOOD: DAYS OF THE WEEK
BY PERIODS OF THE DAY

SOURCE	df	MS	F
TOTAL	111		
Subjects	3		
Days	6	.350	.705
Periods	3	.813	7.97**
Days X Periods	18	.215	1.26
Error Days	18	.496	
Error Periods	9	.102	
Error Days X Periods	54	.170	

NOTE: Significance levels for all AOV Tables are represented by the following: *** p <.001; ** p <.01; *p. <.05.

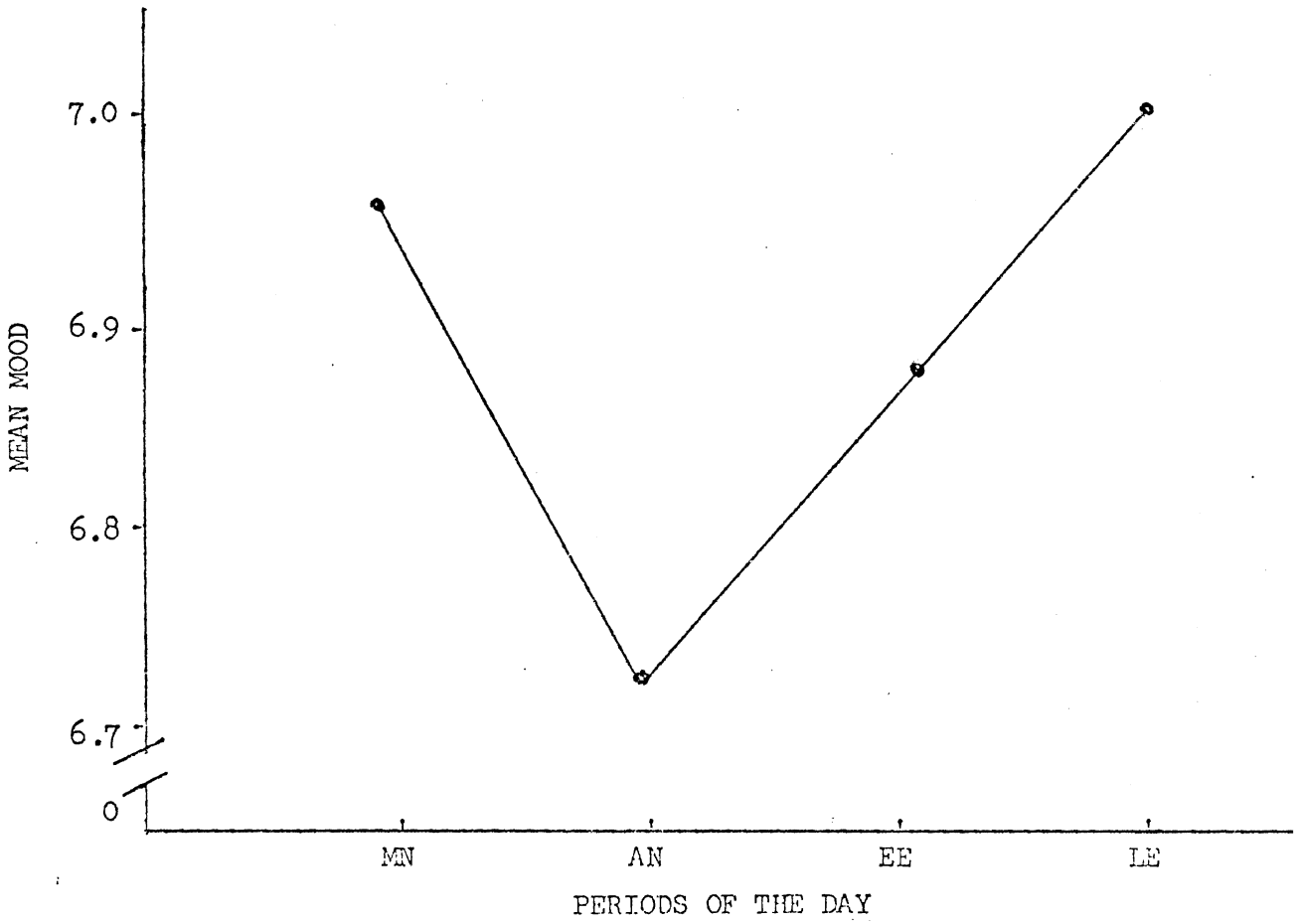

Figure 2. Mean Mood as a Function of Periods of the Day (All Four Subjects)

of the day. The results netted a nonsignificant effect for days, $F(6,18) = .442$, $p > .05$, a nonsignificant effect for periods $F(3.9) = 1.16$ $p > .05$, and a nonsignificant interation, $F(9,54) = .105$, $p > .05$. These results indicate that the variability of mood is unaffected by either day of the week or period of the day.

Focus of Attention or Thought Reference
(Specific Days and Periods)

Focus of attention was analyzed using the same type of AOV used to assess mood. Table III shows the means and standard deviations for days of the week and periods of the day. As is shown in Table III, focus of attention was consistently in the direction of external references or external stimulation with none of the values dipping below a rating of six. There was a tendency for focus of attention to shift down the scale on Monday yet not for all subjects as this day also has the greatest variance. In addition, focus of attention tended to shift toward an internal reference during the afternoon, and rather consistently as this AN period has the smallest standard deviation. An analysis of variance was performed and a significant effect was found for days of the week, $F(6,18) = 3.02$ $p < .05$, a nonsignificant effect for periods, $F(3,9) = .127$, $p > .05$, and a nonsignificant days X periods interation, $F(18,54) = .699$, $p > .05$, (See Table IV). Because the number of pair-wise comparisons for the factor days are impractically large, Tukey's LSD procedure (Kirk, p. 87, 1968) was undertaken and the results indicated that a LSD value of .837, $q = .05$ was exceeded by only one comparison. The difference was .850 between Monday and Wednesday, the lowest and highest values respectively.

TABLE III

MEAN FOCUS OF ATTENTION AS A FUNCTION OF SPECIFIC DAYS OF THE WEEK AND PERIODS OF THE DAY FOR ALL FOUR SUBJECTS

FOCUS OF ATTENTION	DAYS						
	Mondays	Tuesdays	Wednesdays	Thursdays	Fridays	Saturdays	Sundays
$\overline{X}$	6.08	6.49	6.93	6.33	6.47	6.65	6.78
SD	1.74	1.14	1.04	1.08	1.36	.985	1.35

	PERIODS			
	Morning (MN)	Afternoon (AN)	Early Evening (EE)	Late Evening (LE)
$\overline{X}$	6.77	6.21	6.52	6.64
SD	1.14	1.07	1.33	1.46

TABLE IV

AOV FOR FOCUS OF ATTENTION: DAYS OF THE WEEK X PERIODS OF THE DAY

SOURCE	df	MS	F
TOTAL	111		
Subjects	3		
Days	6	1.28	3.02*
Periods	3	1.44	.381
Days X Periods	18	.916	.699
Error Days	8	.423	
Error Periods	99	3.77	
Error Days X Periods	54	1.31	

The variability (standard deviation) was subject to an AOV which resulted in a nonsignificant effect for days, $F(6,18) = 1.62$, $p > .05$, a nonsignificant effect for periods of the day, $F(3,9) = 1.68$, $p > .05$, and a nonsignificant interaction, $F(18,54) = .05$, $p > .05$. These results suggest that specific time of day has no effect on the variability of focus of attention.

Intensity of Attention or Mental Activity
(Specific Days and Periods)

The same analyses that were performed for mood and focus of attention were performed on the variable intensity of attention.

Analysis of variance on mean intensity of attention resulted in a nonsignificant effect for specific days, $F(6,18) = .456$, $p > .05$, a nonsignificant effect for periods of the day, $F(3,9) = 2.02$, $p > .05$, and a nonsignificant interaction, $F(18,54) = 1.33$, $p > .05$. Despite the absence of significance of alpha .05, periods of day was significant at $p < .20$. Table V shows the means and standard deviations of this analysis. It can be seen that with the exception of the MN period all values are below 5 and consistently toward the mind wandering end of the continuum. For periods, it can be seen that there is a tendency for mental effort or intensity of attention to increase in the MN period, decrease consistently through the AN and EE period and then again begin to increase again in the LE period. Figure 3 depicts this tendency.

Finally, an analysis of variance on standard deviation of intensity of attention was performed. A nonsignificant effect for days was found, $F(6,18) = 1.8$, $p > .05$, a nonsignificant effect for periods,

TABLE V

MEAN INTENSITY OF ATTENTION AS A FUNCTION OF SPECIFIC DAYS OF THE WEEK AND PERIODS OF THE DAY

INTENSITY OF ATTENTION	DAYS						
	Mondays	Tuesdays	Wednesdays	Thursdays	Fridays	Saturdays	Sundays
$\bar{X}$	4.64	4.71	4.81	4.81	4.47	4.53	4.37
SD	.995	.706	1.05	1.67	1.08	.989	1.14

	PERIODS			
	Morning (MN)	Afternoon (AN)	Early Evening (EE)	Late Evening (LE)
$\bar{X}$	5.10	4.69	4.45	4.83
SD	1.05	1.22	.970	1.02

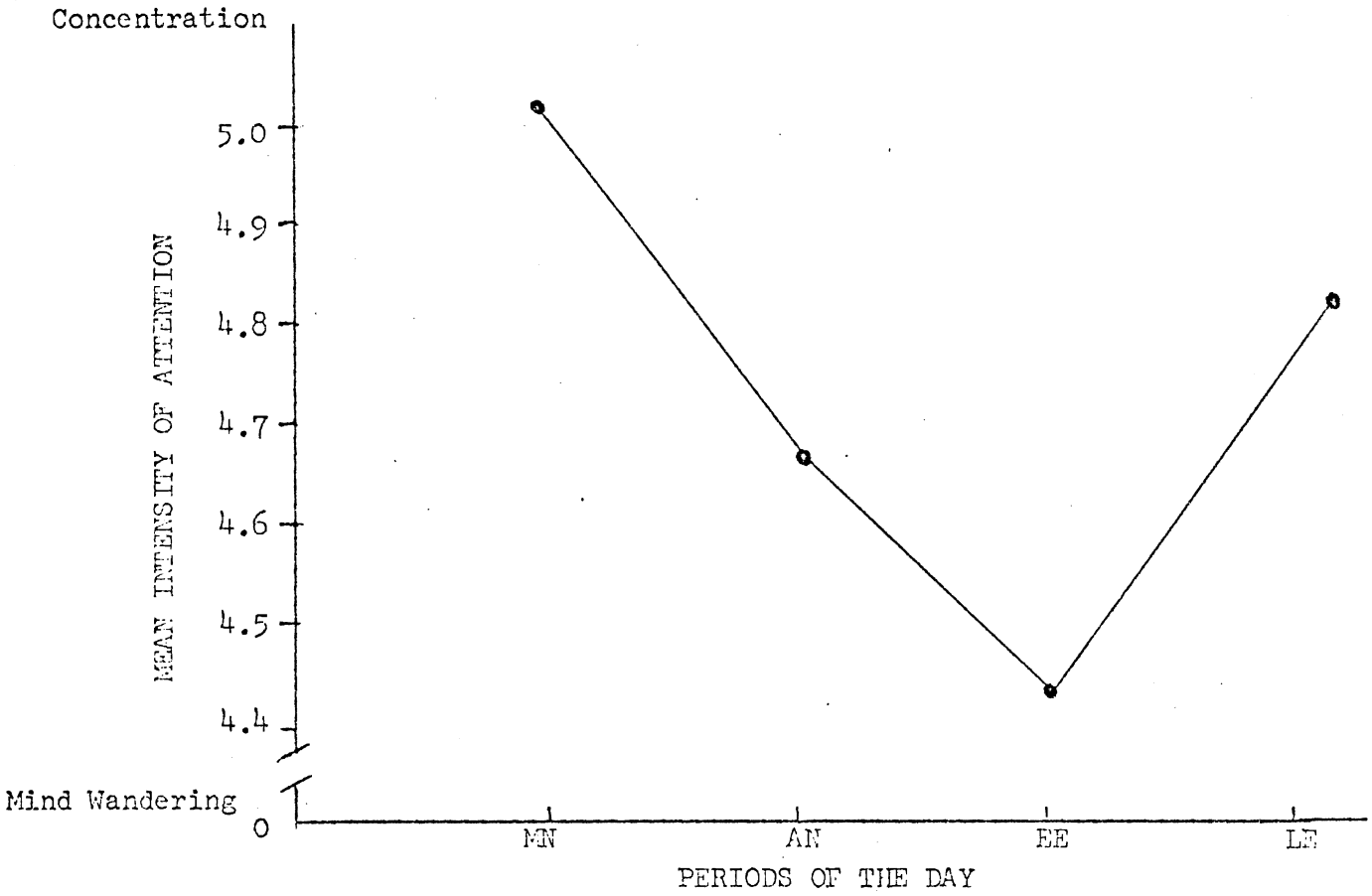

Figure 3. Mean Intensity of Attention as a Function of Periods of the Day (All Four Subjects)

$F(3,9) = 3.31$, $p > .05$ and a significant effect for the interaction days X periods, $F(18,54) = 2.28$, $p < .01$. Although periods was not significant at alpha level .05, it was significant at $p < .10$. The interaction term is not directly testable for simple effects due to the violation of assumptions for individual comparison when more than two error terms are pooled for these tests. Each comparison would entail the derivation of separate t distributions for significance tests. Table VI shows the mean standard deviations. In Figure 4 the intensity of attention variability is shown as a function of periods of the day. It can be seen in Figure 4 that intensity of attention becomes more variable during the AN period and steadily becomes less variable through the EE and LE periods. Again, there is suggestive evidence for the "post lunch" phenomenon as subject's ability to maintain intense attention becomes more difficult and shifts toward the less intense end of the continuum, mind wandering; in the early afternoon hours.

MAACL (Specific Days)

Three single factor AOV's were performed on standard scores for the subscales of anxiety, hostility, and depression. As specific day of week serves as the major comparison, like day scores were combined (i.e., Monday one scores plus Monday two scores) yielding seven days.

The results of the anxiety analysis yielded no significant effect for specific days, $F(3,6) = 1.88$, $p > .05$, for hostility no significant effect, $F(3,6) - 2.59$, $p > .05$, and for depression no significant effect, $F(3,6 - 2.65$, $p > .05$. Clearly the specific day of the week has no effect on these measures of affect.

TABLE VI

MEAN STANDARD DEVIATION INTENSITY OF ATTENTION AS A FUNCTION OF SPECIFIC DAYS OF THE WEEK AND PERIODS OF THE DAY

INTENSITY OF ATTENTION	DAYS						
	Mondays	Tuesdays	Wednesdays	Thursdays	Fridays	Saturdays	Sundays
$\bar{X}$ (SD)	2.26	1.80	1.99	1.76	1.91	1.59	1.77
	PERIODS						
	Morning (MN)		Afternoon (AN)		Early Evening (EE)		Late Evening (LE)
$\bar{X}$ (SD)	1.90		2.18		1.71		1.69

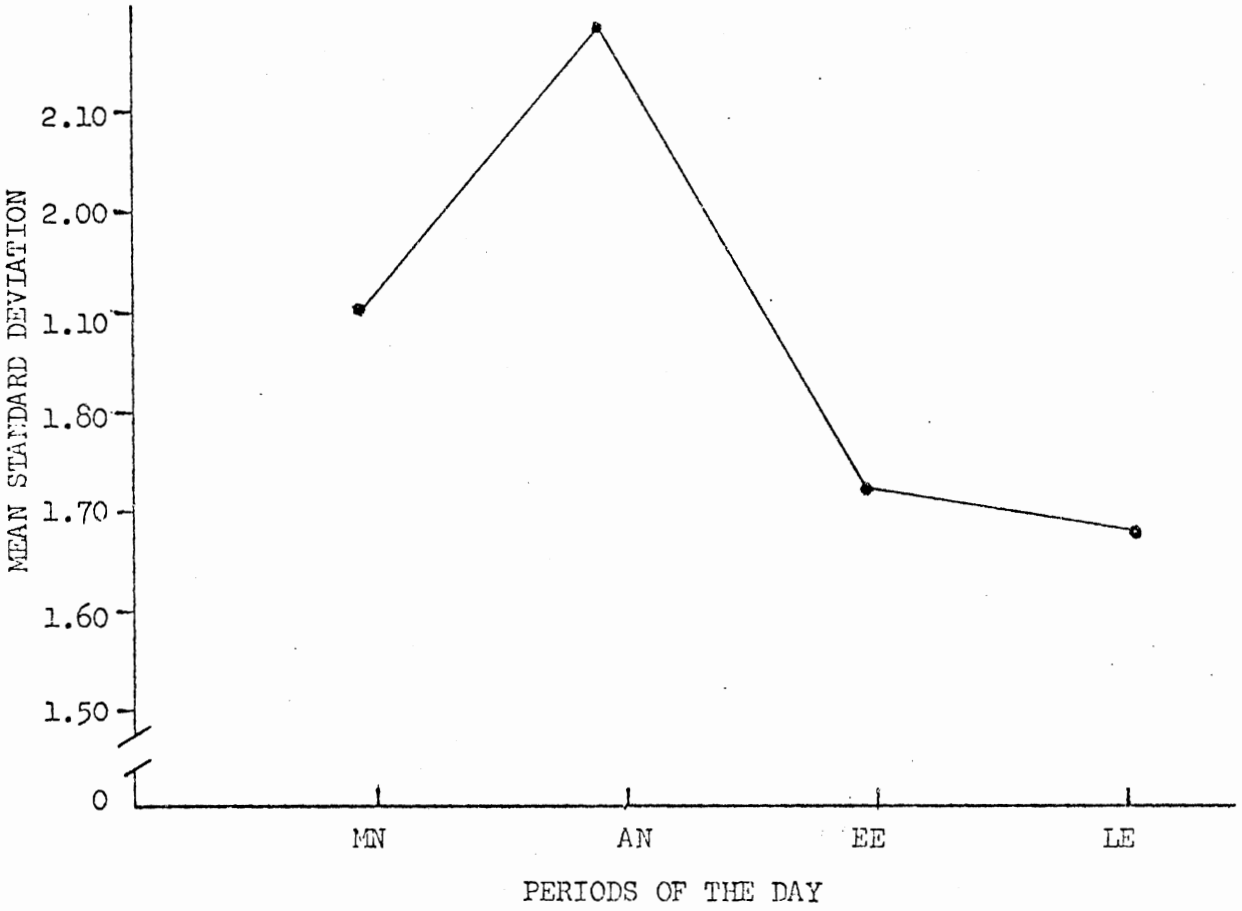

Figure 4. Mean Standard Deviation for Intensity of Attention as a Function of Periods of the Day (All Four Subjects)

Concomitant Variation

As a means of establishing the first link in causality, a series of correlations over time (concomitant correlation) were undertaken among the variables of mood, focus of attention, intensity of attention, anxiety, hostility, and depression. Daily means determined by summing across hours of the day were used to analyze both combined subjects and individual subjects data (day means). Hourly means, e.g., means of all 9 a.m. recordings, determined by summing across days of the monitoring period were used to analyze combined subjects and individual subjects data (hour means). Tables VII, VIII, IX, X, and XI summarize the combined subjects correlations, and the four individual correlations.

Day means correlations summarize the relationship between variables over an extended period of time, that is, the fourteen day monitoring period, while hour means correlations summarize the relationship between variables over the length of an average day, that is, the fourteen hours of the day. Thus, hourly mean analyses are representative of the simultaneous relationship while daily means analysis is representative of the total relationship.

As can be seen in Table VII, combined subject correlations for day means resulted in large significant positive correlations among the subscales of the MAACL. This result indicates that for the combined subjects these scales are not independent of one another in that they vary together over time. Table VII also shows that anxiety, hostility, and depression are all negatively correlated with mood ratings, although none of these reached significance. These two sets of results suggest that the MAACL subscales are all measuring a common factor, perhaps

TABLE VII

COMBINED SUBJECTS; r AND p VALUES FOR DAYS AND HOURS CORRELATIONS AMONG MOOD (M), FOCUS OF ATTENTION (FOA), INTENSITY OF ATTENTION (IOA), ANXIETY (A), HOSTILITY (H), AND DEPRESSION (D)

Variables Correlated		r value	p value
Days	M vs FOA	.69	.01
	M vs IOA	.20	--
	M vs A	-.41	--
	M vs H	-.22	--
	M vs D	-.38	--
	FOA vs IOA	.35	--
	FOA vs A	-.26	--
	FOA vs H	-.31	--
	FOA vs D	-.18	--
	IOA vs A	-.35	--
	IOA vs H	-.30	--
	IOA vs D	-.34	--
	A vs H	.82	.001
	A vs D	.94	.001
	D vs H	.73	.01
Hours	M vs FOA	.32	--
	M vs IOA	-.40	--
	FOA vs IOA	.36	--

TABLE VIII

MALE 1, COUPLE 1; r AND p VALUES FOR DAYS AND HOURS CORRELATIONS AMONG MOOD (M), FOCUS OF ATTENTION (FOA), INTENSITY OF ATTENTION (IOA), ANXIETY (A), HOSTILITY (H), AND DEPRESSION (D)

Variables Correlated		r value	p value
Days	M vs FOA	-.03	--
	M vs IOA	.44	--
	M vs A	-.19	--
	M vs H	-.21	--
	M vs D	-.37	--
	FOA vs IOA	.17	--
	FOA vs A	-.34	--
	FOA vs H	-.24	--
	FOA vs D	-.08	--
	IOA vs A	-.34	--
	IOA vs H	-.23	--
	IOA vs D	-.16	--
	A vs H	.83	.001
	A vs D	.70	.01
	D vs H	.62	.02
Hours	M vs FOA	.19	--
	M vs IOA	.24	--
	FOA vs IOA	.41	--

TABLE IX

FEMALE 1, COUPLE 1; r AND p VALUES FOR DAYS AND HOURS CORRELATIONS AMONG MOOD (M), FOCUS OF ATTENTION (FOA), INTENSITY OF ATTENTION (IOA), ANXIETY (A), HOSTILITY (H), AND DEPRESSION (D)

Variables Correlated		r value	p value
Days	M vs FOA	.83	.001
	M vs IOA	.68	.01
	M vs A	.03	--
	M vs H	-.41	--
	M vs D	-.34	--
	FOA vs IOA	.68	.01
	FOA vs A	.10	--
	FOA vs H	-.30	--
	FOA vs D	-.17	--
	IOA vs A	.32	--
	IOA vs H	-.07	--
	IOA vs D	-.13	--
	A vs H	.78	.001
	A vs D	.68	.01
	D vs H	.73	.01
Hours	M vs FOA	.11	--
	M vs IOA	-.28	--
	FOA vs IOA	.65	.02

TABLE X

MALE 2, COUPLE 2, r AND p VALUES FOR DAYS AND HOURS CORRELATIONS AMONG MOOD (M), FOCUS OF ATTENTION (FOA), INTENSITY OF ATTENTION (IOA), ANXIETY (A), HOSTILITY (H), AND DEPRESSION (D)

Variables Correlated		r value	p value
Days	M vs FOA	.25	--
	M vs IOA	-.37	--
	M vs A	-.61	.05
	M vs H	.12	--
	M vs D	-.23	--
	FOA vs IOA	-.24	--
	FOA vs A	-.14	--
	FOA vs H	-.19	--
	FOA vs D	.28	--
	IOA vs A	.01	--
	IOA vs H	-.01	--
	IOA vs D	-.07	--
	A vs H	.40	--
	A vs D	-.16	--
	D vs H	-.47	.10
Hours	M vs FOA	.22	--
	M vs IOA	-.30	--
	FOA vs IOA	-.73	.01

TABLE XI

FEMALE 2, COUPLE 2; r AND p VALUES FOR DAYS AND HOURS CORRELATIONS AMONG MOOD (M), FOCUS OF ATTENTION (FOA), INTENSITY OF ATTENTION (IOA), ANXIETY (A), HOSTILITY (H), AND DEPRESSION (D)

Variables Correlated		r value	p value
Days	M vs FOA	.51	.10
	M vs IOA	.40	--
	M vs A	-.08	--
	M vs H	.06	--
	M vs D	.05	--
	FOA vs IOA	.40	--
	FOA vs A	-.23	--
	FOA vs H	.02	--
	FOA vs D	-.25	--
	IOA vs A	.10	--
	IOA vs H	-.17	--
	IOA vs D	-.34	--
	A vs H	.32	--
	A vs D	.70	.01
	D vs H	.62	.05
Hours	M vs FOA	.04	--
	M vs IOA	-.12	--
	FOA vs IOA	.61	.05

simply negative affect.

Also shown in Table VII is the positive and significant correlation of mood and focus of attention, r - .69, $p < .01$, acorss days of the monitoring period. This relationship was not evidenced in the correlation between these variables across the shorter period of one day. In addition, this relationship was not observed for the male subjects in this study, and was only found for the female subjects across days of the monitoring period (see Tables IX and XI). Apparently, positive mood ratings are associated with external focus of attention only in a total or summative fashion, and only for the female subjects in this study. In other words, positive mood is related to external focus of attention over an extended time period (fourteen days), but no simultaneous relationship exists in the sense that positive mood is not related to an external focus of attention at a given recording time during the day. Figure 5 depicts the relationship between mood and focus of attention over days.

Table VIII indicates that for male 1 of couple 1, the subscales of the MAACL were significantly correlated. The remaining correlations failed to reach significance. For the female of this couple, mood was significantly correlated with focus of attention across days, (See Table IX). This result is in congruence with the combined subjects correlations reported above. Mood was also significantly and positively correlated with intensity of attention across days. Hence, for female 1 of couple 1, overall positive mood was related to more intense attention over the fourteen day monitoring period. Focus of attention was significantly and positively correlated with intensity of attention over a day and over the entire fourteen day period for this individual.

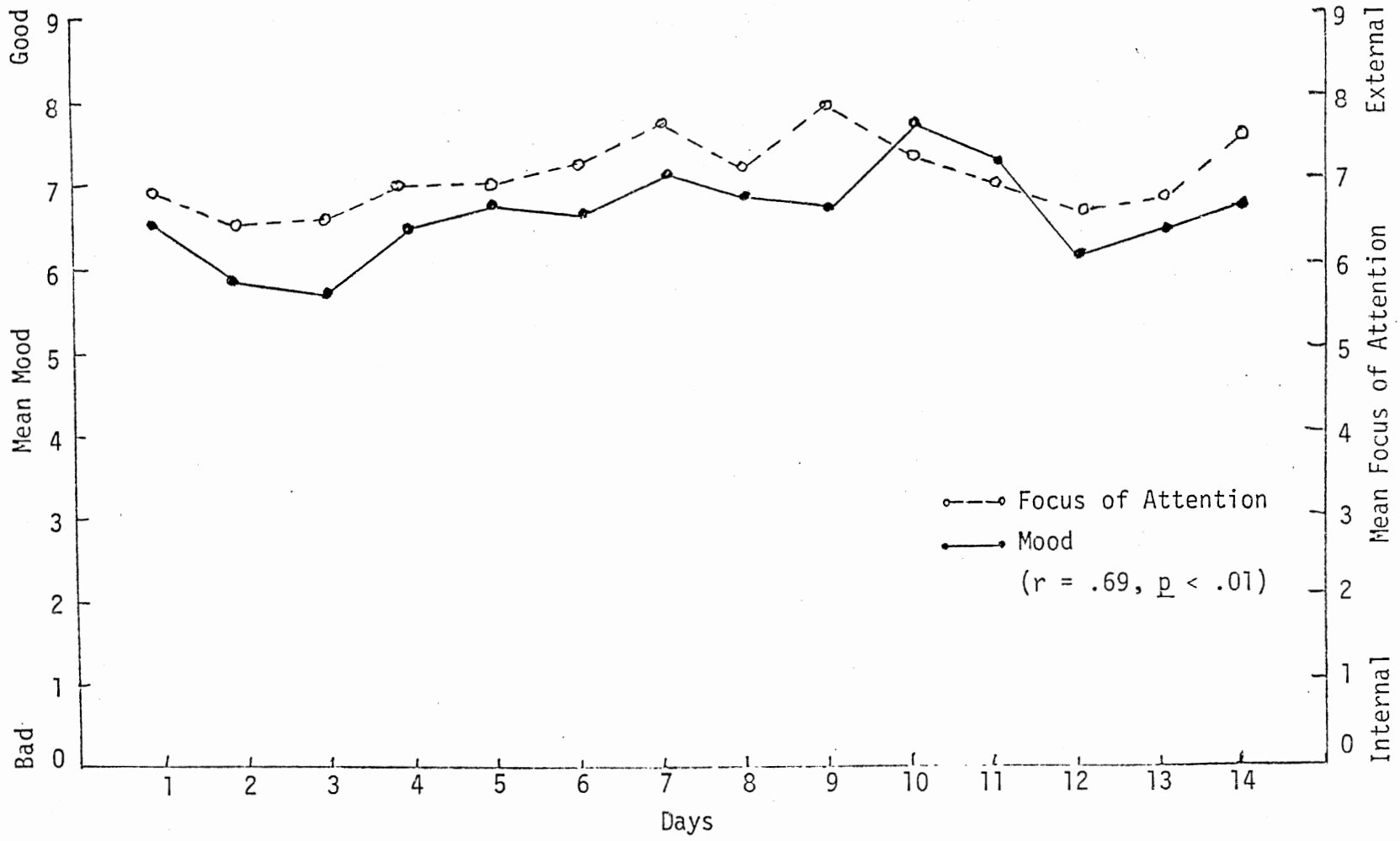

Figure 5. The Concomitant Variation of Mean Daily Mood and Mean Daily Focus of Attention over the Fourteen Day Monitoring Period (All Four Subjects). (0 = Bad Mood and Internal Focus of Attention; 9 = Good Mood and External Focus of Attention)

This indicates that for female 1, external focus of attention was simultaneously and in general related to the experience of mental effort. Finally, the MAACL subscales were significantly correlated with one another (see Table IX).

Tables X and XI summarize the concomitant correlations for couple 2. For the male member of this couple, mood and anxiety were found to be significantly and negatively correlated, $\underline{r} = -.61$, $\underline{p} < .05$, over the fourteen day period. Thus, for male 2, positive mood was in general associated with lower anxiety scores on the MAACL. Focus of attention was significantly and negatively correlated with intensity of attention across hours for male 2. This indicates that simultaneous shifts in the values for these two variables occurred throughout an average day. Hence, as focus of attention shifted to external sources, intensity of attention decreased and vice versa. For female 2 (Table XI), mood and focus of attention were positively correlated. This is congruent with the combined subjects analysis over days. The MAACL subscales are again significantly correlated for this subject, although anxiety and hostility were not so related. Finally, for female 2, focus of attention and intensity of attention were significantly and positively correlated over hours. This indicates, as was true for female 1, that focus and intensity of attention tend to shift together simultaneously, with the experience of more effort being associated with external sources of attention for female 2.

The overall pattern of individual correlations indicates that focus of attention and intensity of attention may be causally related although the direction of causality is unknown. It will be recalled that these variables were related positively for both female subjects

and negatively for male subject 2. All of these correlations were significant and were found across the hours of the day. This suggests that these two variables change in value simultaneously throughout an average day.

Couple Systems

Physical Presence of the Spouse

The question of whether physical presence of spouse effects the other spouse's behavior was approached by a calculation of the proportion of time that each spouse was physically present when each hourly recording was made (SP). This proportion was calculated for each subject, both within a day and within hours across days. These proportions are summarized in Appendix J. There was not perfect agreement within spouse pairs. It may be that one spouse checked spouse present when the other was in another room of the house while the other checked spouse present only when the spouse was in the same room. To determine amount of agreement within spouse pairs, pearson product moment correlations were computed between proportions for each couple for both hours and days. Between couple 1 for days, $r = .98$, $p < .0005$; for hours for couple 1, $r = .97$, $p < .0005$; and between couple 2 for days, $r = .96$, $p < .005$; and finally, for this couple the correlation for hours was $r = .96$, $p < .005$. Hence, despite imperfect agreement, the correlations for SP were extremely high.

Two values of the variable SP were correlated with the self-monitored variables. Hourly SP was calculated by summing across the days of the period for each hour that recordings were made. This

value was then correlated with mean hourly mood, focus of attention, and intensity of attention for each member of both couples. Daily SP was calculated by summing across the hours of each day of the monitoring period of fourteen days. This value was correlated with daily mood, focus of attention, intensity of attention, anxiety, hostility, and depression values. Hourly SP thus represents the proportion of time the spouse was physically present for each hourly recording for the total days, while daily SP represents the proportion of time the spouse was physically present for each day of the monitoring period.

These correlations were undertaken to determine if SP was concomitantly related to the self-monitored variables on an hour to hour basis or a day to day basis. Table XII summarizes the r values and the p values for the correlated variables of couple 1.

As can be seen, SP days was negatively correlated with anxiety, hostility, and depression for male 1. In general, this suggests that increased time spent in the presence of his spouse was associated with smaller values on the scales of anxiety, hostility, and depression. Finally, it can be seen that for female 1, SP hours was negatively correlated with intensity of attention. This indicates that on an average day, as time spent with spouse increases, intensity of attention decreases.

Table XIII shows that for male 2, SP days is correlated negatively with intensity of attention. This indicates that as time spent with the spouse increases over days, intensity of attention decreases. SP hours for male 2 was also negatively correlated with intensity of attention, suggesting that within a day and from hour to hour, as time spent with spouse increases, intensity of attention decreases. Hence,

TABLE XII

COUPLE 1; r AND p VALUES FOR THE CORRELATIONS BETWEEN SP (PROPORTION OF TIME SPOUSE WAS PHYSICALLY PRESENT) AND MOOD (M), FOCUS OF ATTENTION (FOA), INTENSITY OF ATTENTION (IOA), ANXIETY (A), HOSTILITY (H), AND DEPRESSION (D). (DAYS AND HOURS)

Subject	Variables Correlated	r value	p value
Male 1 (Days)	M vs SP	.19	--
	FOA vs SP	.13	--
	IOA vs SP	.07	--
	A vs SP	-.45	.10
	H vs SP	-.55	.05
	D vs SP	-.53	.05
Female 1 (Days)	M vs SP	.42	--
	FOA vs SP	.20	--
	IOA vs SP	.26	--
	A vs SP	-.09	--
	H vs SP	-.35	--
	D vs SP	-.15	--
Male 1 (Hours)	M vs SP	.10	--
	FOA vs SP	-.32	--
	IOA vs SP	-.07	--
Female 1 (Hours)	M vs SP	.36	--
	FOA vs SP	-.16	--
	IOA vs SP	-.50	.10

TABLE XIII

COUPLE 2; r AND p VALUES FOR THE CORRELATIONS BETWEEN SP (PROPORTION OF TIME SPOUSE WAS PHYSICALLY PRESENT) AND MOOD (M), FOCUS OF ATTENTION (FOA), INTENSITY OF ATTENTION (IOA), ANXIETY (A), HOSTILITY (H), AND DEPRESSION (D). (DAYS AND HOURS)

Subject	Variables Correlated	r value	p value
Male 2 (Days)	M vs SP	.15	--
	FOA vs SP	.34	--
	IOA vs SP	-.54	.05
	A vs SP	.09	--
	H vs SP	.21	--
	D vs SP	-.07	--
Female 2 (Days)	M vs SP	.39	--
	FOA vs SP	.08	--
	IOA vs SP	-.01	--
	A vs SP	-.44	--
	H vs SP	-.01	--
	D vs SP	-.20	--
Male 2 (Hours)	M vs SP	.15	--
	FOA vs SP	.40	--
	IOA vs SP	-.64	.01
Female 2 (Hours)	M vs SP	.63	.01
	FOA vs SP	-.27	--
	IOA vs SP	-.04	--

over an extended period of time (fourteen days), the spouse's presence is associated with a decrease in intensity of attention, also over a shorter period of time (1 day) the spouse's presence is associated with a decrease in intensity of attention. Finally, for female 2, SP hours was correlated positively with mood. This indicates that as time spent with the spouse increases on an average day, mood also increases.

Finally, the question of reciprocal influence in couple systems was addressed by correlating the same self-monitored variables between husband and wife in both couples. This procedure is analagous to the study of behaviors which have become entrained over time. Table XIV summarizes the results of these analyses. As is shown in this table, couple 1 was the only couple to demonstrate reciprocal influence. There was positive correlation between the husband's hostility score and the wife's hostility score. This suggests that as hostility scores increase for one spouse, they also increase for the other. Depression was similarly correlated for this couple although it was not significant at the .05 level.

Time Orientation

Cumulative frequencies of the time orientation response were compiled by tabulating the total number of thoughts rated as present, no time orientation and greater than 12 hours, 12 hours, 11 hours, 10 hours, 9 hours, 8 hours, 7 hours, 6 hours, 5 hours, 4 hours, 3 hours, 2 hours, or 1 hour into the past or future. Time orientation referred to the temporal orientation of the thought content which the subject wrote down when the timer sounded. The frequency of no time orientation

TABLE XIV

COUPLES; r AND p VALUES FOR THE CORRELATION OF THE VARIABLES OF MOOD (M), FOCUS OF ATTENTION (FOA), INTENSITY OF ATTENTION (IOA), ANXIETY (A), HOSTILITY (H), AND DEPRESSION (D) BETWEEN HUSBANDS AND WIVES OF BOTH COUPLES FOR DAYS AND HOURS

	Variable	r value	p value
Couple 1 (Days)	M	.16	--
	FOA	.19	--
	IOA	-.01	--
	A	.24	--
	H	.55	.05
	D	.50	.10
Couple 1 (Hours)	M	.16	--
	FOA	.24	--
	IOA	-.02	--
Couple 2 (Days)	M	-.07	--
	FOA	-.09	--
	IOA	-.23	--
	A	.06	--
	H	-.01	--
	D	.34	--
Couple 2 (Hours)	M	.22	--
	FOA	.06	--
	IOA	-.01	--

thoughts are presented in Table XV, for both individual subjects and pooled subjects. As can be seen, all subjects except male 2, classified very few thoughts as having no distinguishable time orientation.

Figures 6, 7, 8, 9 and 10 represent the cumulative frequencies of pooled subjects, male 1, female 1, male 2, and female 2 respectively. In Figure 6, it can be seen that most thought content is classified as being in the present, and slightly more thoughts are classified as containing past content for time periods greater than 5 hours from the present, with comparatively fewer thoughts concerning future content greater than five hours from the present. For temporal distances, less than four hours from the present, more thoughts are classified as containing future content; this difference is more apparent at a temporal distance of one hour. As can be seen in all but one of the individual cumulative distributions (Figure 9, male 2), more thoughts are classified as future content at a temporal distance of one hour than are past thoughts at this same distance.

These results may be indicative of some optimal forecasting time for daily events that confront an individual in their natural environment.

Autocorrelations

Autocorrelations were undertaken to determine if any of the variables are sequentially dependent over a period of the day or whether past behavior of the variables has any influence on the future behavior of that same variable. The variables of interest are mood, focus of attention, and intensity of attention.

Raw scores were used in the autocorrelations as there was no

TABLE XV

FREQUENCY OF THOUGHTS CLASSIFIED AS HAVING NO TIME ORIENTATION: INDIVIDUAL AND POOLED SUBJECTS

NO TIME ORIENTATION	POOLED SUBJECTS	MALE 1	FEMALE 1	MALE 2	FEMALE 1
Frequency	101	8	10	69	14

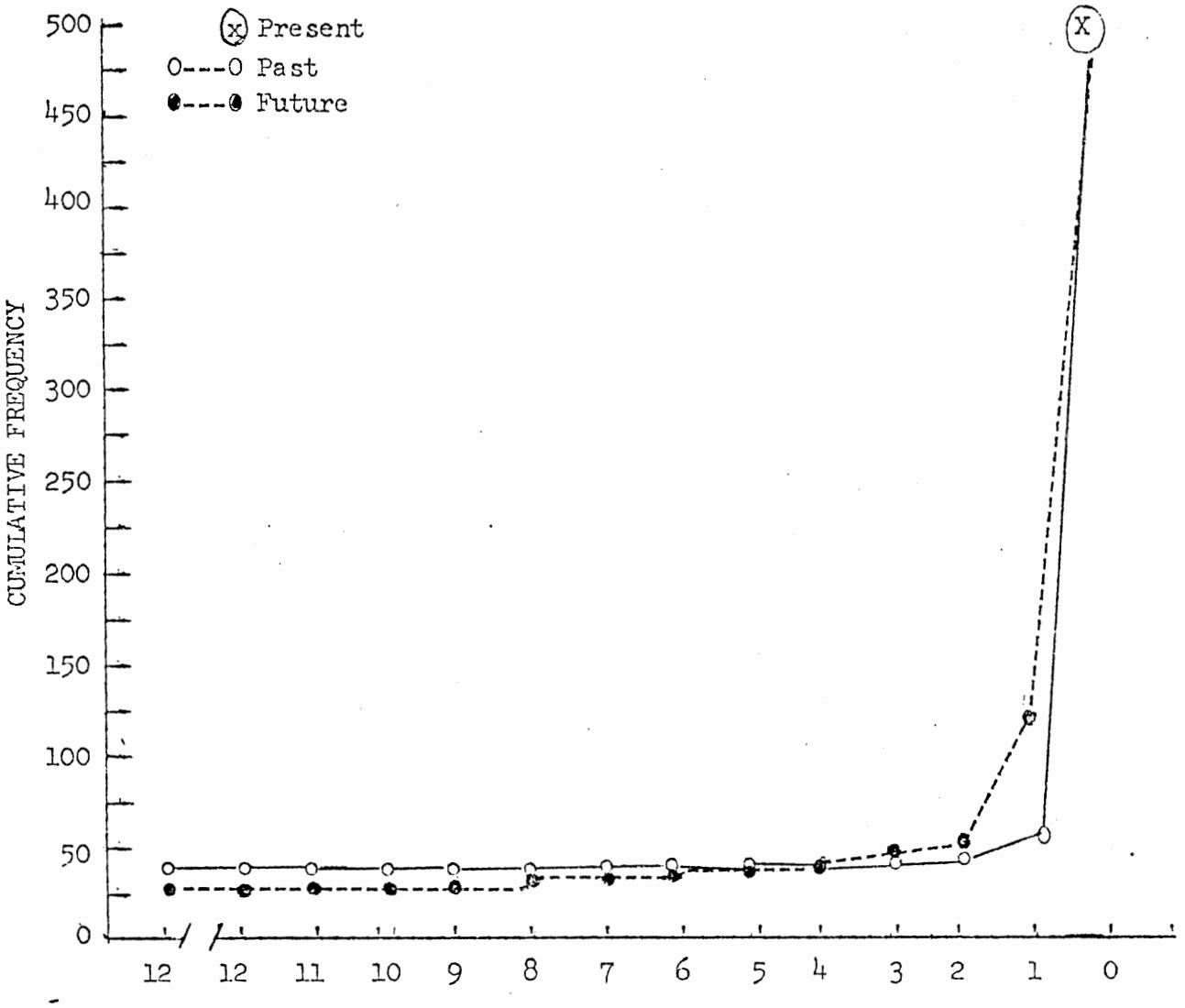

Figure 6. Four Subjects: Hours From Present (0), Past and Future Temporal Judgments of Thought Content

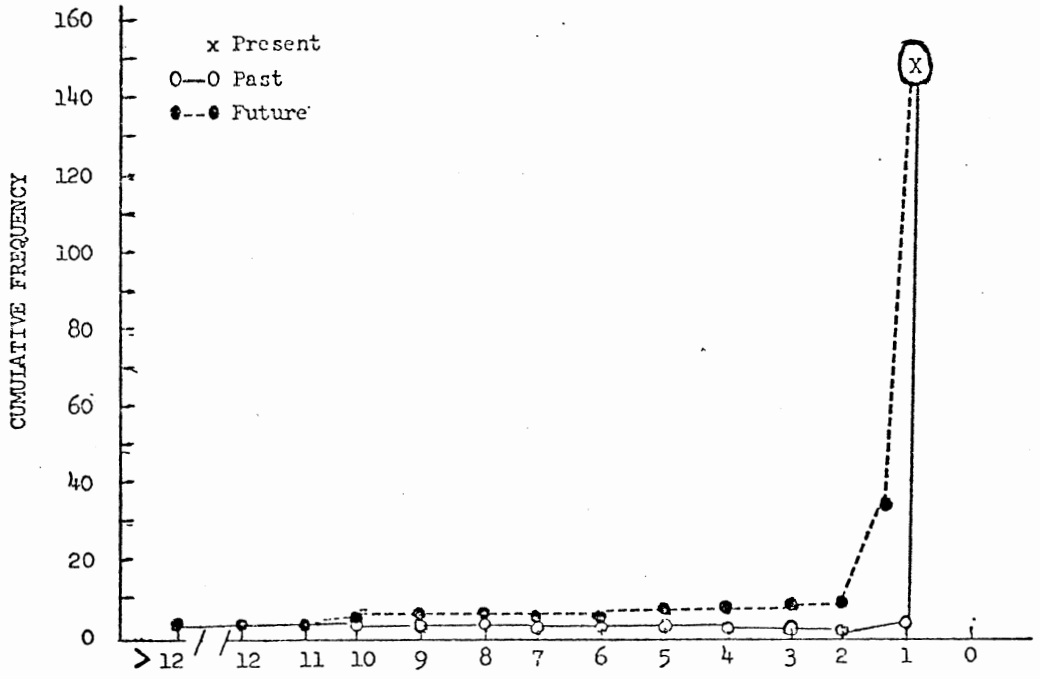

Figure 7. Male 1: Hours from Present (0), Past and Future Temporal Judgments of Thought Content

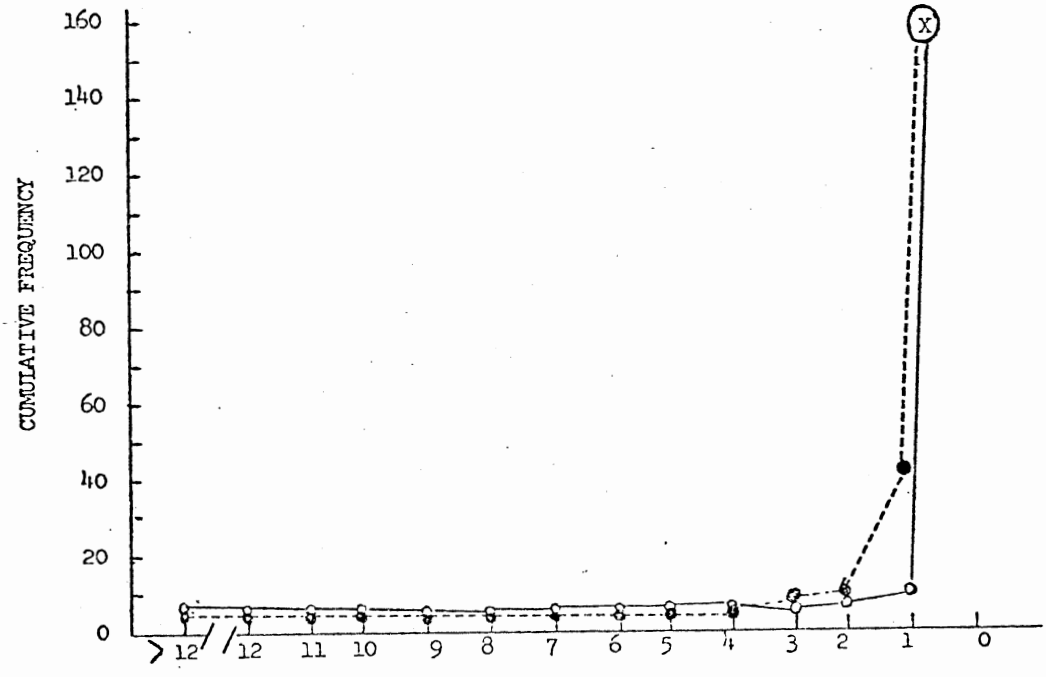

Figure 8. Female 1: Hours from Present (0), Past and Future Temporal Judgments of Thought Content

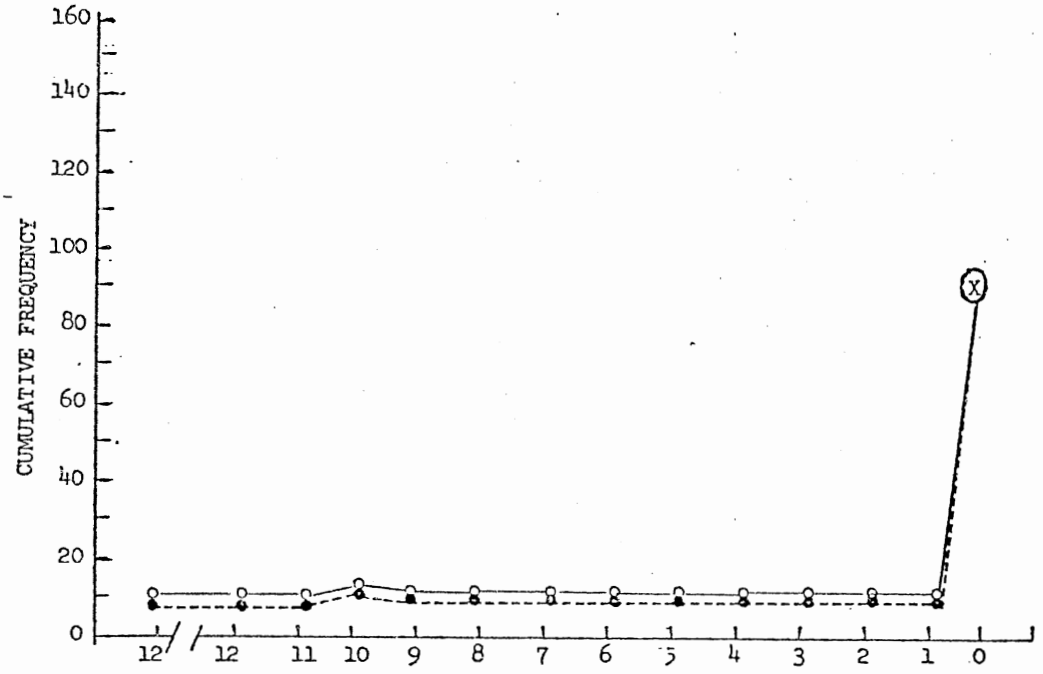

Figure 9. Male 2: Hours from Present (0), Past and Future Temporal Judgments of Thought Content

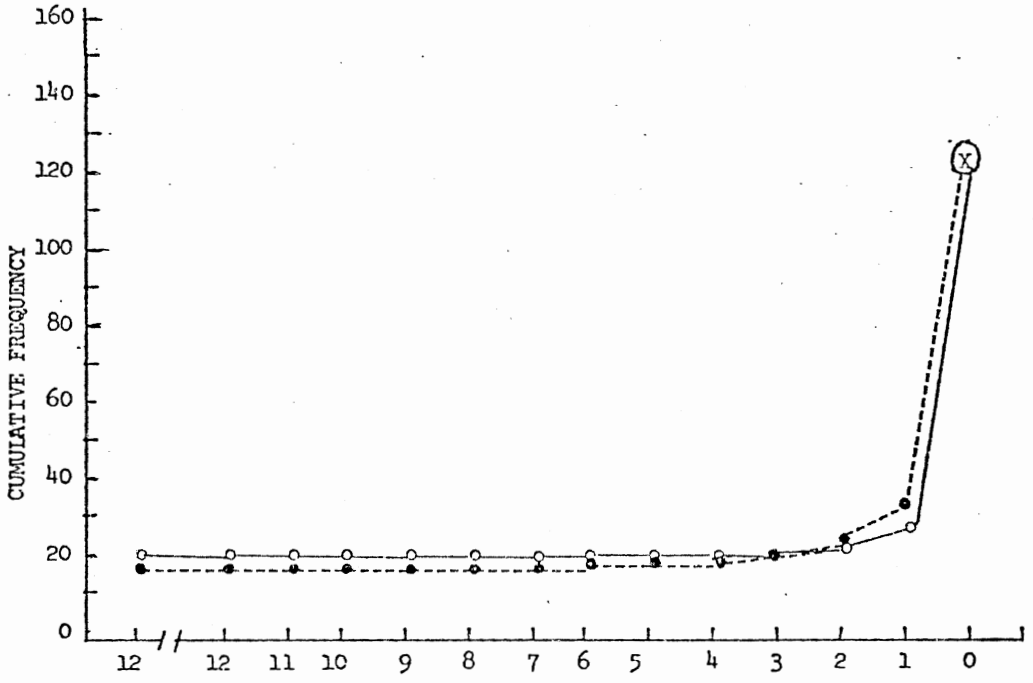

Figure 10. Female 2: Hours from Present (0), Past and Future Temporal Judgments of Thought Content

reason to believe that means of each day would be sequentially dependent. The procedure was to select at random from the fourteen day monitoring period, one days raw scores for each of the four subjects. This was done for each of the above mentioned variables. This procedure netted 12 autocorrelations; 3 each for each of the 4 subjects. The autocorrelations were computed only for a distance of lag 1 (each hourly rating was correlated with the next recording an hour away). All autocorrelations were computed from a formula presented by Gottman and Lieblum (1974) and tested by a modified Bartlett test, also presented by Gottman et al.

For male 1, couple 1, mood was not significantly autocorrelated, ($r = .46$, $p > .05$), indicating that for this subject mood across the sampled day is not sequentially dependent. Focus of attention for male 1 was also not significantly autocorrelated, ($r = .35$, $p > .05$), and for intensity of attention there was not a significant negative autocorrelation, ($r = -.24$, $p > .05$).

For female 1, couple 1, mood was not significantly autocorrelated, ($r = .32$, $p > .05$). For this subject focus of attention was not significantly autocorrelated, ($r = -.36$, $p > .05$), and intensity of attention was not significantly autocorrelated, ($r = .23$, $p > .05$).

For male 2, couple 2, mood was not significantly autocorrelated, ($r = .45$, $p > .05$). Also focus of attention was not significantly autocorrelated, ($r = .27$, $p > .05$). Finally, for this subject intensity of attention was significantly autocorrelated, ($r = .62$, $p < .05$), indicating intensity of attention is sequentially dependent over a two hour span, such that periods of low intensity follow one another and high intensity periods follow one another, representing a two hour off

and on periof of intensity of attention. This is perhaps evidence for a 1 hour phasic shift in the capacity to attend.

For female 2, couple 2, mood was not significantly autocorrelated, (r= -.02, p >.05); focus of attention was not significantly autocorrelated, (r= -.15, p >.05); and intensity of attention was not significantly autocorrelated, (r= -.41, p >.05).

Post-Experiment Questionnaire

The results of the post-experiment questionnaire (see Appendix D) indicated that mood was the least difficult variable to classify and that the most difficult variable to classify was no time orientation.

Timer, booklet, and the MAACL were rated for convenience on a scale from 0 to 9 with 0 representing very convenient and 9 representing not convenient. The mean convenience rating for the timer was 2.75 with a standard deviation of 1.3, the booklet had a mean rating of 4.5 and a standard deviation of 3.69, and finally, the MAACL forms had a mean rating of 5.5 with a standard deviation of 1.29. Difficulty of classification of the sampled variables was assessed by having subjects rank the variables from least to most difficult to classify. Means and standard deviations of the rankings are presented in Table XVI.

TABLE XVI

MEAN RANK DIFFICULTY OF VARIABLE CLASSIFICATION

	Mood	Internal Stimulation	External Stimulation
$\bar{X}$	2.25	7.25	6.00
SD	2.50	2.87	2.70

	Mind Wandering	Concentration	Present Orientation
$\bar{X}$	4.00	3.50	5.25
SD	1.41	1.73	2.50

	Past Orientation	Future Time Orientation	No Time Orientation
$\bar{X}$	3.75	4.75	8.25
SD	.500	2.62	.957

NOTE: Rank values ranged from 1 to 9 inclusive, with 1 representing no problem in classification and 9 representing extreme difficulty in classification.

CHAPTER IV

DISCUSSION

Before turning to the discussion of the results of the present study it would be well to consider again the nature of the study and how it has departed from more traditional studies. First, no specific treatments were applied to the subjects in this study, hence the analysis of the data does not lend itself to strong inferences of causality, rather an attempt was made to account for variability over time in naturally occurring cognitive and affective processes by partialing out the effects of time, couple systems, and concomitant variation. Secondly, since only four subjects were used in the present study, analysis by both group and individual was possible and was undertaken. Ideally the results of both analyses would be equilvant or complimentary, however, that was not the case in the present study. Rather, significant relationships were found for individuals but not for the group and vise versa. Gottman (1971) has pointed out the frequently observed phenomenon of discrepancies between individual and group learning curves and suggests that averaging of data may be misleading in the study of events occurring over time. Therefore, in this chapter more time is devoted to the results of individual and group analyses which are complimentary, and less time is devoted to results which exhibit a marked discrepancy between individual and group data.

Finally, the present study may also be considered an attempt to

generate empirical hypotheses which are not perhaps the eloquent labor of love that some deductive hypotheses are, but nevertheless may provide the missing links in the first attempts at building a case for causality. Dukes (1965) points out, N of one and small N studies are just as good as an N of 1000 in rejecting an asserted or assumed universal relationship.

Stability of Processes Over-Time

The relative as well as the comparative stability of cognitive and affective processes over time is of general theoretical and practical consequence. For instance, if a process like mood is relatively stable, then this may describe the individual's adaptation in his or her affective response (system in steady state). It also provides the necessary stability to evaluate stressors and other influences on the affective process.

Comparatively, a process which demonstrates stability over time may be a function of enduring disposition plus an invariant environment as opposed to a fluctuating process which is more a function of changing stimulus demands.

Mean mood across subjects and hours (mean daily mood) did not vary significantly during the monitoring period, indicating that for all four subjects combined, mood ratings remained stable across days. When individual data is analyzed, all but one of the subjects demonstrated significant mood variation for the monitoring period. When examining the disparate individual's curve, the mood ratings only ranged between 7 and 9 exclusively, producing a remarkably stable and flat function across days. When this curve is added into the group curve, all significant effects disappear. It is possible that for this individual a

response bias was operating since the mood rating was consistently high. In this connection, it is interesting to note that this same individual demonstrated more variability in MAACL scores than did the remaining three subjects. This result is suggestive of a response bias operating for the hourly mood ratings; it is cautiously ventured that mood showed marked and significant variability over the fourteen day monitoring period.

Mood was also assessed for stability over a shorter period (one day) by summing across days for both individuals and combined data (mean hourly mood). More specifically, these sets of analyses answered the question of whether or not mood varied consistently from one particular hour of the day to the next. Stability versus instability of the process over a one day period is not directly assessed, rather stability is assessed indirectly by comparing averaged mood ratings at fixed hours each day, for instance, the mean 9 a.m. rating versus the mean 6 p.m. rating. Using this procedure, no significant differences were found for the combined subjects mood ratings within an average day. Individual analysis reveals two individuals demonstrating significant variation within a day, and two who demonstrated no significant variation in mood for an average day. However, it is obvious when examining individual days for all subjects that mood is variable one day and relatively stable the next.

Analyses of the standard deviations for group data for days (SD days) and hours (SD hours) yielded non-significant results. This finding indicates that day to day and hour to hour variability did not change significantly over time for combined subjects. For instance, mood is no more or less variable at ten a.m. than it is at any other

time of the day; and mood is no more or less variable on a Sunday than it is on any other day.

It is concluded that mood may vary significantly over longer periods of time (fourteen days), but in general can demonstrate remarkable stability over extended and shorter periods of time (one day). From the analyses of standard deviations for specific hours and days, it may be concluded that no one hour or day was associated with greater or lesser amounts of variability in mood.

Focus of attention or thought reference may be viewed as the subjects primary focus of attention. It was assessed by having the subjects rate the degree to which their attention was focused on either an external stimulus (watching a television program) or an internal stimulus (thinking about something) at the instant at which their timers sounded. As might be expected, subject's ratings reflected mixed focus, with relatively few instances of complete absorbed attention to only one source of stimulation. Mean ratings for all subjects across days was 6.53 with a standard deviation of .520, and across hours the mean was 6.52 with a standard deviation of .346. Although ratings were consistently in the direction of external focus of attention for all subjects, mixed focus was by far the predominant rating.

Mean focus of attention for all subjects across days was found to vary significantly from day to day, indicating that focus of attention does shift from one predominant source of stimulation to another over days. The effects of specific days will be discussed in following paragraphs. The remaining individual analyses resulted in no significant differences and hence, the effect found for combined subjects is likely to be a function of averaging disparate individual curves. It is

suggested that focus of attention therefore is likely to remain stable over time and to be of mixed focus, which seems to be a suitable adaptation to a familiar environment.

Standard deviation analyses yielded no significant differences over hours or days, suggesting that specific days and hours are not associated with significantly differing amounts of variability in focus of attention.

Intensity of attention refers to the subject's experience of effort associated with the object of predominate attention. In other words, this variable refers to a continuum consisting of the experience of extreme mental effort or concentration at one end and the experience of no mental effort, mind wandering or 'blank mind' at the other end. The mean rating for all subjects for days was 4.57 with a standard deviation of .323, and for hours the mean was 4.60 with a standard deviation of .373.

These values indicate that intensity of attention is about half way between the experience of extreme concentration (effortful attention) and the experience of no effort (effortless attention) and is suggestive of an optimal level of energy conservation, as both ends of the continuum were checked from time to time by all subjects.

Group analyses indicated that intensity of attention did not vary significantly over days or hours. However, for both male subjects intensity of attention varied significantly from hour to hour but not from day to day. For the female subjects, intensity of attention varied significantly only from day to day and not from hour to hour. This indicates a possible sex difference in the stability of intensity interacting with the length of time under consideration. For the

males in this study, intensity varied significantly within a day, but not over the monitoring period. The females, on the other hand, demonstrated significant variability over the monitoring period but relatively stable levels of intensity within days.

Analysis of variability at different hours of the day (SD hours) yielded a significant effect. This analysis was for combined subjects. This result indicates that specific hours of the day are associated with more or less variability in intensity of attention. Briefly, the 9 a.m. recording showed the least variability and the 2 p.m. recording showed the most variability. The plot of this function is suggestive of the diurnal rhythm found frequently in studies of self-reported activation (Thayer, 1967). The morning hours, nine through twelve noon, show less variability in intensity and the early afternoon hours, one through four p.m., show much more variability. Perhaps the "post-lunch" increase in variability is indicative of an effort to maintain concentration in the face of a faltering capacity to attend.

The MAACL scores for anxiety, hostility, and depression were also analyzed for stability over time, but on days only as the MAACL was completed once a day, and for combined subjects only. Both anxiety and depression were found to vary significantly over the monitoring period, while hostility scores remained relatively stable over time. These measures of affect, with the exception of hostility, tend to be congruent with the pattern of marked variability found for mood ratings over time.

In general, it may be concluded that the cognitive processes; focus of attention and intensity of attention, demonstrated more stability over time than did the affective processes; mood ratings,

anxiety, and depression.

Mood, Focus of Attention, Intensity of Attention and the MAACL: Specific Days and Periods

The major variables mood, focus of attention, intensity of attention, and MAACL scores were analyzed for effects of specific day of the week and for four specific periods of the day. The seven days of a week served as one factor, and the periods of the day; morning, (10 a.m., 11 a.m., and noon); afternoon (1 p.m., 2 p.m., and 3 p.m.); early evening (4 p.m., 5 p.m., and 6 p.m.); and late evening (7 p.m., 8 p.m., and 9 p.m.), served as the other factor. Both means and standard deviations were again analyzed. This analysis is described in the Results chapter.

The purpose of these analyses was to determine what effect a specific time period had on the self-monitored variable, since stability over time per se is not of prime importance in this section. Here the questions of entrainment to an established schedule (the 7 day work week and the 'average' day) and diurnal variation are of more central importance. Entrainment would be demonstrated if any of the variables were differently affected by the day of the week or the specific period of the day. Entrainment here is not used in the same sense as biological entrainment. Diurnal variation would be evident if hourly monitored variables demonstrated the 'post-lunch' phenomenon. Taub and Bergen (1974) have reported diurnal variation in self-report check-lists of both mood and concentration. In addition, Thayer (1967) presents evidence for diurnal variation in general activation self-report which is highly correlated with skin resistance and heart rate. The factor

of general activation is postulated to be a reflection of total organismic energy release (Duffy, 1962).

Mood ratings analysis for days and combined subjects (means) resulted in a significant effect for periods of the day. Subsequent post-hoc analysis revealed that mood drops significantly from the morning period to the afternoon period, evidencing the 'post-lunch' drop. In addition, mood increased significantly from the early evening to the late evening, and finally, the largest increase in mood was from the afternoon to the late evening. When examining the curve, mood can be seen to be relatively high throughout the morning, then taking a drop in the afternoon and rising through the early evening, and finally reaching its highest level in the late evening. This pattern suggests not only the presence of a diurnal rhythm, but also of entrainment, as mood might be expected to be the highest in the relaxed hours of the evening once the business of the day is complete.

No significant effects were found for the SD analysis of mood for either days of the week or periods of the day. Apparently, mood follows a daily course without significant variation at the different periods.

Focus of attention analyses were performed on means and standard deviations with the only significant effect occurring for the day means analysis. Post-hoc testing revealed a significant difference between Monday (the lowest rating or toward the internal focus end) and Wednesday (toward an external focus of attention).

This result is difficult to explain on the basis of entrainment because it is not apparent why focus of attention would be more internally directed on Mondays and more externally focused on Wednesdays. Perhaps Monday is a day of reflection. There is at least some intuitive

support for the notion that Monday is not a popular day, as it is well known that most work absences occur on this day. Perhaps Wednesday being the middle of the work week is a day when subjects are more enthused about their work, after all the weekend is only two days away. Indeed, support for this notion is gained when intensity of attention is examined for Wednesday. Both Wednesday and Thursday are tied for the highest value of the week, 4.81, and of the days of the work week Monday has the lowest intensity rating next to Friday, with a 4.64.

Mean intensity of attention was found to drop in the afternoon, but this effect was only significant at the .20 level. Nevertheless, this is congruent with what would be expected if intensity of attention is viewed as requiring effort or energy.

When standard deviations for intensity were analyzed, a significant effect was seen for the days x periods interaction. This term was not testable due to the inappropriateness of pooling more than two error terms. An effect for periods of the day was found, but only reached the .10 level of significance. Again, however, this effect manifested itself in an increase in variability of intensity during the afternoon period. Coupled with the drop in mean value, the increased variability for this period is suggestive of a decreased ability or capacity of intense attentiveness, which would be predicted by the diurnal variation in general activation.

The MAACL scores were only analyzed for days and no significant effect was found on any of the three scales: anxiety, hostility, or depression. This finding is in line with the absence of effects on mood ratings by specific days of the week. Apparently, affective processes do not entrain with specific days, although mood ratings tend

to be highest on the weekends; 7.11 for Saturdays and 7.03 for Sundays.

Concomitant Variation

This section deals with the manifestation of relationships between the monitored variables; mood, focus of attention, intensity of attention, anxiety, hostility, and depression over time; both days and hours of the day. MAACL scales are not correlated over hours as they were only obtained daily. Again, both combined subject correlations and individual correlations were done.

For the combined subjects, a significant correlation was found between mean daily mood and mean daily focus of attention, indicating that as mood increases one's focus of attention shifts toward an external source of stimulation or vice versa. Evidently, mood is more positive when attention is directed toward an external reference. This result would seem to support the findings of Singer and Rowe (1962) who reported a positive correlation between daydreaming (internal focus of attention) and the scores on the Cattell Anxiety Scale. The present finding is, with some caution, the logical reverse of their finding. It should be noted that the female subjects showed this relationship in individual analysis, but the males did not.

Also, for the combined subjects the MAACL scales of anxiety, hostility, and pression were highly inter-correlated, a distressing finding for the needed independence of the scales.

For male 1 of couple one, MAACL scales were inter-correlated positively.

For female 1, couple one, mean daily mood was significantly correlated with mean daily focus of attention, hence higher moods are

associated with more external focus of attention. Interestingly, mean daily mood is significantly correlated with mean daily intensity of attention, indicating that higher moods are associated with more intense attention for this subject. Mean focus of attention was also correlated with mean daily intensity. Also, as with her husband, MAACL scores are highly inter-correlated.

For male 2, couple two, two significant correlations over time were found. The first significant correlation was that mean daily mood was negatively correlated with anxiety scores, indicating that anxiety increases as daily mood decreases. The second correlation was negative also, and was between mean hourly intensity of attention and mean hourly focus of attention. For this subject as focus shifts toward internal sources, intensity increases.

For female 2 of couple two, mean hourly focus and mean hourly intensity were positively correlated. As focus shifts to external sources of attention, intensity increases. Finally, for this subject the MAACL scales were positively inter-correlated.

It is apparent that for individuals many different patterns of concomitant association are present and that these are not apparent in the combined subjects correlations. It is of interest that a number of correlations between the variables focus of attention and intensity of attention manifest themselves throughout the individual correlations. It may be surmised that these two variables are more than just casually related. In addition to the frequency of the relationship between these two variables, theoretical rationales exist for their possible relationship. Kahneman (1973) presents evidence that what is attended to is in large part responsible for the allocation of a limited capacity of

attentional effort. It therefore might be expected that the focus of attention, whether it is internal or external, may have a significant influence on the experience of the intensity of effort. This result demonstrates the empirical generation of hypotheses by means of studying concomitant variation for a small N.

Couple Systems

It has been suggested that spouses can and do exert control over the other spouse's behavior, both by implicit and explicit means. This section deals with the effect one spouses physical presence (proportion of the time during the day and specific hours of the day that the other spouse was present when the hourly recordings were being made, SP) has on mood, focus of attention, intensity of attention, anxiety, hostility, and depression. In addition, each spouse's responding on the variables was correlated with the identical variables of their spouse. For instance, the husband's mood is correlated with the wife's mood, and so on. Again for SP correlations, means of the monitored variables were analyzed.

For couple one, the husband's daily hostility scores were significantly and negatively correlated with SP, indicating that hostility decreased as the amount of time with his wife present increased. The husband's daily depression scores were also significantly and negatively correlated with increased presence of his wife.

The question of entrainment of behaviors in this couple was answered by correlating like variables. These analyses yielded a significant correlation between each of the spouses daily hostility scores, indicating that when one spouse's hostility scores increase,

so do the hostility scores of the other spouse.

For couple two, the husband's daily means for intensity of attention were significantly and negatively correlated with SP. Therefore, as the amount of time his wife was present increased, his intensity of attention decreased. The same relationship existed for hour mean correlation. For the wife in this couple, mean hourly mood was correlated with SP; as amount of time the husband was present increased, mood increased.

Entrainment was not evidenced in this couple.

Apparently the effect the spouses have on one another is not as pervasive as intuition would suggest, particularly as it pertains to individual's private experience (covert behaviors).

Time Orientation

Time orientation refers to the judged orientation of the subject's thought content which was predominate at the sounding of the timer. The thought content could be judged as either past, present, or future oriented, or it could be judged as having no time orientation whatsoever.

For all subjects, the judgment of present thought was made most frequently. Evidently most thought content is about or concerned with immediate stimulation and fewer thoughts are concerned with retrieved stimulation like past information or future plans. It is also apparent that for the subjects, when other than present thoughts were occurring, these were most frequently thoughts of the immediate past or of the immediate future. Most frequently these thoughts were concerned with events no greater than one hour in the past or one hour in the

future. These results may suggest that + or - one hour from now represents a limit on an individuals capacity to use past information effectively to direct present behavior, and a limit on the capacity to use past and present information to predict or forecast future events in the natural environment.

Autocorrelations

For each of the subjects a day was selected at random for each of the variables: mood, focus of attention, and intensity of attention. The purpose of this procedure was to select an intact day and analyze the hourly recordings for sequential dependency and predictive power of one recording lagged an hour behind each preceding recording. This was accomplished by correlating each variable with itself lagged by one observation. This is the method of autocorrelation described previously and also more extensively by Gottman and Lieblum (1974).

One variable for one subject demonstrated a significant autocorrelation. Intensity of attention was autocorrelated at lag of 1, indicating that for this individual low levels of intensity tended to follow one another and higher levels of intensity tended to follow each other. There is evidence therefore, of a one hour phasic or rhythmic quality to this series, and intensity is somewhat sequentially dependent.

Post-Experiment Questionnaire

Finally, the subjects in this study judged mood and intensity of attention to be mong the easiest of the variables to classify during

the self-monitoring period. This result suggests that more confidence might be placed in this data. Furthermore, these variables may prove to be fruitful ones for further research efforts.

CHAPTER V

SUMMARY

The purpose of this study was to use self-observers in the natural environment to investigate selected cognitive processes (primary focus of attention and perceived intensity of attention) and selected affective processes (mood ratings, ranging from positive to negative, and the depression, anxiety, and hostility scales of the MAACL). The questions of interest were: how do these processes behave over time, that is are they stable or not; do these processes vary according to routine daily and hourly schedules; do these processes exhibit diurnal rhythmicity over an average day; are these processes related over-time, (concomitant variation); do couple systems provide reciprocal control of these processes; are these processes over an average day serially dependent, that is autocorrelated. In addition, the question of how frequently thoughts are judged to be concerned with the immediate situation (present thoughts), past situations, future material, or not concerned with anything that could be judged to have a time orientation was sampled. The present study was also concerned with the demonstration that concomitant variation can be utilized in building models for causality and that an ethological study can be useful in deriving empirical hypotheses.

The broader purpose of this study was to demonstrate that an ethological approach to the study of private experience was not only

feasible, but also of considerable value. Toward this aim, the present study demonstrated the usefulness of self-monitored data over an extended period of time for investigating processes not easily assessed in traditional laboratory settings.

The major results of the study indicated: (1) that the selected cognitive processes are in general more stable over time than were the affective processes; (2) that mixed focus of attention and moderate levels of intensity are the predominate modes of attending in the natural environment; (3) that both mood and intensity of attention are of a diurnal rhythmic nature, with both demonstrating the 'post-lunch' phenomenon; (4) that some of the processes are influenced by the presence of an individual's spouse, and that in general affective processes demonstrate the most reciprocal influence; (5) that for combined subjects, positive mood ratings varied concomitantly with a predominate external focus of attention, and that individual subjects demonstrate differential patterns of significant concomitant variation; (6) that thoughts are judged most frequently to be concerned with immediate stimulation (present orientation); (7) that in general the variables mood, focus of attention, and intensity of attention are not sequentially dependent over an average day, and hence are not influenced by recordings made an hour earlier; (8) that for one subject a significant amount of variance in intensity of attention is accounted for by the variable focus of attention and is highly suggestive of the existence of a causal link. This finding was the result of these variables being significantly correlated for 3 out of the 4 subjects.

In conclusion, the present study was a departure from traditional experimental studies and was undertaken primarily as a demonstration

of the usefulness of small N studies and self-monitoring of private experiences not easily assessed by experimental methods. Thus, this study was intended to provide information on naturally occurring processes and to point to possible causal links which could be subsequently examined in more controlled settings. Indeed, it is hoped that an ethological approach such as the one used in this study would complement the refinement of controlled experimentation, and that their relative merits would not serve as a rationale to exclude one or the other method in the search for causality.

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APPENDIX A

DEFINITIONS

DEFINITIONS

MOOD is defined as how you feel at the time the buzzer sounds. Mood may range from 0 to 9, with 0 meaning about as bad as you would feel during a normal day and 9 meaning about as good as you would feel during a normal day.

THOUGHT REFERENCE is defined as what you are attending to at the time the buzzer sounds. In other words, what your thought processes are related to at the time the buzzer sounds. Basically your thought processes may be related to internal events or to external events. Thought reference may range from 0 to 9, with 0 meaning that your thought processes or attention are/is totally involved with internal events and 9 meaning that your thought processes or attention are/is totally involved with external events. EXTERNAL EVENTS may be regarded as anything you see, feel, hear, taste, or touch that is in your present environment and that you are attending to at the time that the buzzer sounds. For example, watching television, listening to someone talk, talking to someone, sensations of heat in a non-air-conditioned room, eating, throwing a ball, etc. Note: Your thought process or attention must be totally involved with the external event if thought reference is to be given a rating of 9. In other words, if you are watching television but are not completely attending to it, your thought reference rating should be less than 9. Externally cued events are something that are present in the immediate environment that triggers, represents or is associated with the thought(s) that you are having. INTERNAL EVENTS may be regarded as anything that you are thinking about or attending to that is not in your present external environment at the time the buzzer sounds. For example, you are trying to think of an old friend's middle name, you are singing a song in your head (not aloud), you are thinking about next summer's vacation, you are thinking about something you just read (not something you are reading), meditating, etc. Note: Your thought process or attention must be totally involved with the internal event if thought reference is to be given a rating of 0. In other words, if you are meditating but are being distracted by the stereo, your thought reference rating should be greater than 0. (Your task then is to decide whether your attention is primarily to an internal event or to an external event and then to judge the extent to which your thought processes or attention are/is related to the primary event). Internally cued thoughts are any thoughts that are aroused spontaneously and/or is not dependent or associated with the immediate external environment.

MENTAL ACTIVITY/WORK is defined as how your thought processes are occupied at the time that the buzzer sounds. Basically your thought processes may be characterized as ranging from a state of complete concentration to a state of complete mind wandering. COMPLETE CONCENTRATION may be regarded as "strained" or intense mental activity. It may be regarded as the experience of "mental work". For example, you may be reading a book for an upcoming exam, you

may be memorizing a shopping list, you may be trying to recall the shopping list once you are at the market, you may be doing a math problem in your head (adding in your head items you select at the market), listening intently to a weather broadcast, etc. COMPLETE "MIND" WANDERING may be regarded as relaxed or "unstrained" mental activity. It can be characterized as the "automatic" and spontaneous jumping from one thought to another, without the effort required in "mental work". It may be experienced as not thinking of anything in particular or as thinking about a number of unrelated and "irrelevant" things. It may occur when you are trying to concentrate, when you are bored, when you are tired, when you are relaxed, etc. For example, you are walking in the park and you are thinking about the flowers in the park, then suddenly you are thinking about how good you feel, and then just as suddenly you begin to think about the fun you had in the park last summer; or you are sitting at your desk working when you notice the poster on the wall, then you notice the clock on the wall, and then you begin to think about dinner; or you are listening to a boring speech when you just "tune" it out, but you are not thinking about anything in particular you simply are not listening. Mental activity may be regarded as ranging from 0 to 9, with 0 meaning that your thought processes are best characterized by the state of complete "mind" wandering, and 9 meaning that your thought processes are best characterized by the state of complete concentration.

TIME ORIENTATION is defined as the time (past, present, or future) that best characterizes the thought or thoughts you recorded after the buzzer sounded. Basically your thought processes may have a time orientation or an atemporal orientation (no time reference). If your thought or thoughts has/have a time orientation they may be concerned with something that has happened or that could have happened (PAST); they may be concerned with something that is happening now (PRESENT); or they may be concerned with something that is going to happen or that could happen (FUTURE). Present Orientation will refer to any thoughts about something that happened no longer than 5 minutes ago, i.e. you just walked out of class and are thinking about the lecture. Present orientation will also refer to any thoughts about something that is going to happen no longer than 5 minutes from when the buzzer sounds, i.e. you are walking to the cafeteria and are thinking about what you will eat. Past Orientation refers to anything that you are thinking about that happened or could have happened longer than 5 minutes ago; i.e. it is Monday and you are thinking about the previous weekend's activities. Future Orientation refers to anything that is going to or could happen more than 5 minutes from the time that the buzzer sounded, i.e. you are thinking about the things that you need to do tomorrow. Atemporal Orientation refers to anything that you are thinking about that has no time orientation, i.e. you are doing long division in your head. Note: If the time orientation is either past or future you will need to estimate how far into the past or future your thought goes. For example, if it is 10 p.m. and you are thinking about what you will wear in the morning, your estimate might be 9 hours from now, assuming that you get dressed at approximately 7 the next morning.

APPENDIX B

INSTRUCTIONS

INSTRUCTIONS

Your task for this study will be to report on your mood and four aspects of your mental activity at hourly intervals for a period of fifteen days. You will have the first day to determine if you wish to continue for the remaining fourteen days of the study.

You will be given one response booklet in which you will make your hourly recordings for the first eight days and then an identical response booklet for the remaining seven days. In addition to the response booklets you will be given a small spring wound interval timer which must be used to indicate when you are to record. The timer should be set for the nearest hour as soon as you arise in the morning (i.e. if you awaken at 8:20 a.m., you should set your timer for 9:00 a.m.). When the timer sounds by emitting a "buzz" after the first hour, you must then make your recording in the response booklet, and then only after you have completed responding set the timer for another hour. Note: If your first recording was at 9:00 a.m., your second recording should be at 10:00 a.m., exactly one hour. This procedure should be continued throughout the waking hours. An average day may consist of fifteen to sixteen hourly recording intervals.

As this task is not an easy one and will be on some inconvenience to you, you are asked to make your responses brief and with as little deliberation as possible; your first impression is your best impression for this task. Once you have become somewhat accustomed to the task it should take you no longer than 20 to 30 seconds to complete your responses.

In as much as we are interested in collecting information in natural settings, you are encouraged to not let the recording procedure interrupt your usual activities.

Specifically, each time the timing buzzer sounds you are to record in your response booklet on the correct page the time of day, a brief description of your thought or thoughts, and what it is you are doing, your mood at the time the buzzer sounds, the degree to which your thoughts were related to internal or external events, the degree to which your thought processes could be described as either complete wandering or complete concentration, and finally, whether what you were thinking was primarily about past, present, or future events. Note: Some thoughts have no time reference; see the definitions and examples provided in the front of your response booklet.

In addition to your hourly recordings during the day you will be required to fill out the Multiple Affect Adjective Checklist at the end of each day and after your last hourly recording of the day. This checklist should take no more than ten minutes to complete.

Because we are interested in accurate data, you will need to have your timer and response booklet with you as much as possible. Should you only have your timer and your response booklet is not available, please make your recordings on what is convenient and later fill in your booklet if this is possible.

It will not always be possible to make your recordings exactly when the buzzer sounds. For example, you may be taking a shower and to interrupt your shower would be too inconvenient. In cases like this, you are asked to make your recordings as soon as it is convenient

to do so. If you totally forget to record, you should leave that entry blank and go on to the next one. Please note that totally forgetting to make your responses should not happen very often.

You should make your responses as soon after the buzzer has sounded as possible, preferably within 60 seconds of the buzzer sound. As you are encouraged to record during normal daily activities the occasion may arise when you will need to tell people you are with what it is you are doing. In cases like this you may want to say something like, "I am serving in this crazy psychology experiment and I must make my recordings now; it will only take a moment."

An important condition to be met in the data collection is that you must not let your spouse or anyone else see your response booklet. Neither should you discuss with one another your responses.

Finally, a time during the day for each day of the study will need to be set up such that the investigator can make phone contact with you so that any difficulties you may be having can be discussed.

In order for you to receive the twenty-five dollars, you and your partner must complete all aspects of the study.

APPENDIX C

ABBREVIATED INSTRUCTIONS AND DEFINITIONS

ABBREVIATED INSTRUCTIONS AND DEFINITIONS

1. Timer: Be sure to set the timer for the nearest hour each morning when you arise, i.e. if you get out of bed at 8:20 a.m., set the timer at 40 minutes so that your first recording will be at 9:00 a.m. After the 9:00 a.m. recording, your timer should be set for 1 hour, making 10:00 a.m. your next recording time. All subsequent recordings should be made at 1 hour intervals.

2. Response Cards: Be sure to record the time of each recording in the space provided on each card. Make sure that you are responding on the correct card in the booklet (each page is numbered).

3. Response Booklets: Be sure that you have the correct booklet for each day (each booklet is numbered on the cover). You will need to have the booklet and timer with you at all times!

4. Responding: Be sure to make your responses quickly (your first impression is your best).

5. Spouse: Do not show your responses to your spouse! (You and your spouse may discuss your responses at the end of the 15 day self-observation period.)

6. Missed Responses: If you miss a recording time, make an X through the response card for that time and go on to the next card for your next recording. If you miss a 10:00 recording, your next recording should be at 11:00. Missed responses should not happen very often!

7. Thought Classification: Be sure to record both your behavior (what you are doing) and your thought <u>before</u> you attempt to classify your thoughts.

8. Do not lose your response booklets!

Mood: is defined as how you feel at the time the buzzer sounds. Mood may range from 0 to 9, with 0 meaning as bad as you would feel during a normal day and 9 meaning as good as you would feel during a normal day.

Thought Reference: is defined as what your thoughts are related to at the time the buzzer sounds, that is, what you are attending to the most. You may be attending to some external event or to some internal event. <u>External events</u> are anything you are looking at, feeling, listening to, tasting, or touching that is in your environment. <u>Internal events</u> may be anything that you are thinking about or attending to that is not in your external environment, i.e. thinking about yoru plans this summer or thinking about an idea that just occurred to you. Thought reference also ranges from 0 to 9 with 0 meaning that your thought processes or attention is completely related to an internal event and 9 meaning

that your thoughts or attention are/is completely related to an external event.

Mental Activity: is defined as how your thought processes are occupied at the time the buzzer sounds. Your thought processes may be viewed as ranging from strained mental activity like concentration to relaxed mental activity like mind wandering. Concentration or strained mental work may be something like solving a difficult math problem. Mind Wandering is something like thinking one thing, then thinking another in a relaxed or unstrained way; it might be felt as having a "blank" mind. (It is the absence of strained mental activity) 0 means complete mind wandering and 9 means complete concentration.

Time Orientation: is defined as the time (past, present, or future) that describes the thought you record when the buzzer sounds. Present is defined as ± minutes (Now); Past is defined as more than 5 minutes ago; Future is defined as more than 5 minutes from now. Thoughts can also have no time orientation.

APPENDIX D

POST-EXPERIMENT QUESTIONNAIRE

POST-EXPERIMENT QUESTIONNAIRE

1. How long did it take to get used to the buzzer and self-monitoring procedure?

   Hours _____ Days _____ Never _____

2. Did the self-monitoring procedure change your normal activities in any way? For example, did you not go to places you would normally have gone because of the obtrusiveness of the buzzer? No____ Yes____ If yes, specify _____
   _____

3. Did the self-monitoring procedure embarrass you?

   Constantly _____
   Only the first _____ hours
   Only the first _____ days
   Not much at all _____

4. If you were to be asked, would you consider participating in another experiment like this in the future? No_____ Yes_____
   If no, specify _____

   _____

5. If you were to participate in another experiment like this in the future, how much would you require in payment for your time?

   _____

6. How convenient was the timer?

   Very 0 1 2 3 4 5 6 7 8 9 Not Convenient

7. How convenient was the response booklet?

   Very 0 1 2 3 4 5 6 7 8 9 Not Convenient

8. How convenient was the Adjective Checklist?

   Very 0 1 2 3 4 5 6 7 8 9 Not Convenient

9. Approximately how long, on the average, did it take you to record your responses?

   Seconds _____ Minutes _____

10. Did you ever peek at your spouse's response booklets after the first day? No _____ Yes _____ If yes, approximately how many times did you peek? _____

11. Did you ever talk to your spouse about your or her/his responses? No_____ Yes_____ If Yes, approximately how many times? _____ (Exclude the first day)

12. Approximately how many times did you wait more than 5 minutes after the buzzer sounded to record your responses?

13. Which of the following was the most difficult to determine? (Rank from 1 to 9 with 1 meaning least difficult and 9 meaning most difficult)

Mood	_____
Internal reference	_____
External reference	_____
Mind wandering	_____
Concentration	_____
Past	_____
Present	_____
Future	_____
No time orientation	_____

14. Were you surprised at any of your responses? No_____ Yes_____ If yes, please specify _____

_____

_____

15. Overall, how do you feel about the experiment? _____

_____

_____

_____

APPENDIX E

TEST EXAMPLES

TEST EXAMPLES

The following are examples of behaviors and thoughts. Your task is to read the examples and then determine the proper classification for each thought (Thought reference, Mental activity, Time orientation). You should first determine if a thought is primarily internally or externally referenced, then if the thought is best characterized as mind wandering or concentration. Once you have determined this, you will have to determine the "degree" to which the thought is either internally referenced or externally referenced and the "degree" to which the thought is either concentrated activity or mind wandering. For time orientation, first determine if the thought deals with past, present, or future events. If a thought has no time orientation, then check no time orientation. If a thought is past or future you will need to estimate by circling the time which most accurately reflects how far into the past or future the thought is. (Do not concern yourself with mood rating for this test.)

ANSWERED EXAMPLE:

Behavior: I was washing my hands in the bathroom.

Thought(s): I was thinking about taking some letters to the post office before work in an hour.

TEST ITEM 1

Behavior: I was talking to my spouse.

Thought(s): I was thinking about what I was saying.

TEST ITEM 2

Behavior: I was leaning back in my chair taking a break from studying.

Thought(s): I was trying to give my mind a rest. I wasn't really thinking of anything.

TEST ITEM 3

Behavior: I was walking to the laundry.

Thought(s): I was thinking that I shouldn't have bought that record yesterday.

TEST ITEM 4

Behavior: I was taking a hot bath.

Thought(s): I was thinking about how good the bath feels and nothing else in particular.

TEST ITEM 5

Behavior: I was lying on the couch with my eyes shut.

Thought(s): I was thinking about a lot of things, but nothing in particular.

TEST ITEM 6

Behavior: I was driving to work.

Thought(s): I was thinking about the plans we have for summer vacation next month.

TEST ITEM 7

Behavior: I was walking downtown.

Thought(s): I was thinking about the cracks in the sidewalk, then about the old saying, "step on a crack and break your mother's back".

TEST ITEM 8

Behavior: I was sitting at the table trying to figure out our finances.

Thought(s): I was multiplying 2 numbers in my head.

TEST ITEM 9

Behavior: I was sitting at the kitchen table staring at the salt shaker.

Thought(s): I was just staring, not really thinking about anything.

TEST ITEM 10

Behavior: I was trying to fix the sewing machine.

Thought(s): I was thinking about the sewing machine.

APPENDIX F

MULTIPLE AFFECT ADJECTIVE CHECKLIST

MULTIPLE AFFECT ADJECTIVE CHECKLIST

Date/Day _____

Time _____

Name _____

DIRECTIONS: On the following sheets you will find words which describe different kinds of moods and feelings. Mark an X in the spaces beside the words which describe how you feel right now. Some of the words may sound alike, but I want you to check all the words that describe your feelings. Work rapidly.

1. ___active
2. ___adventurous
3. ___affectionate
4. ___afraid
5. ___agitated
6. ___agreeable
7. ___aggressive
8. ___alive
9. ___alone
10. ___amused
11. ___amused
12. ___angry
13. ___annoyed
14. ___awful
15. ___bashful
16. ___bitter
17. ___blue
18. ___bored
19. ___calm
20. ___cautious
21. ___cheerful
22. ___clean
23. ___complaining
24. ___contented
25. ___contrary
26. ___cool
27. ___cooperature
28. ___critical
29. ___cross
30. ___daring
31. ___cruel
32. ___desparate
33. ___destroyed
34. ___devoted
35. ___disagreeable
36. ___discontented
37. ___discouraged
38. ___disgusted
39. ___displeased
40. ___energetic
41. ___enraged
42. ___enthusiastic
43. ___fearful
44. ___fine
45. ___fit
46. ___forlorn
47. ___frank
48. ___free
49. ___friendly
50. ___frightened
51. ___furious
52. ___gay
53. ___gentle
54. ___glad
55. ___gloomy
56. ___good
57. ___good-natured
58. ___grim
59. ___happy
60. ___healthy
61. ___hopeless
62. ___hostile
63. ___impatient
64. ___incensed
65. ___indignant
66. ___inspired
67. ___interested
68. ___irritated
69. ___jealous
70. ___joyful
71. ___kindly
72. ___lonely
73. ___lost
74. ___loving
75. ___low
76. ___lucky
77. ___mad
78. ___mean
79. ___meek
80. ___merry
81. ___mild

82. ___miserable
83. ___nervous
84. ___obliging
85. ___offended
86. ___outraged
87. ___panicky
88. ___patient
89. ___peaceful
90. ___pleased
91. ___pleasant
92. ___polite
93. ___powerful
94. ___quiet
95. ___reckless
96. ___rejected
97. ___rough
98. ___sad
99. ___safe
100. ___satisfied
101. ___secure
102. ___shaky
103. ___shy
104. ___soothed
105. ___steady
106. ___stubborn
107. ___stormy
108. ___strong
109. ___suffering
110. ___sullen
111. ___sunk
112. ___sympathetic
113. ___tame
114. ___tender
115. ___tense
116. ___terrible
117. ___terrified
118. ___timid
119. ___thoughtful
120. ___tormented
121. ___understanding
122. ___unhappy
123. ___unsociable
124. ___upset
125. ___vexed
126. ___warm
127. ___whole
128. ___wild
129. ___willful
130. ___wilted
131. ___worrying
132. ___young

APPENDIX G

MEAN MOOD AND MEAN STANDARD DEVIATIONS GROUP DATA

MEAN MOOD AND MEAN STANDARD DEVIATIONS (14 DAYS) - GROUP DATA

	DAYS													
	S1	M1	T1	W1	Th	F1	St1	S2	M2	T2	W2	Th2	F2	St2
$\bar{X}$	6.82	6.56	6.56	6.87	6.64	7.08	7.15	7.21	6.82	7.29	7.01	6.73	6.56	7.14
SD	1.40	1.11	1.47	1.42	1.32	1.24	1.27	1.33	1.23	1.00	1.11	1.27	1.02	.963
$\bar{X}$(SD)	.878	1.01	.981	.695	1.02	.670	.749	.888	.731	.886	1.29	.669	1.10	.855
SD	.397	.241	.243	.150	.609	.098	.244	.469	.351	.379	.869	.263	.537	.400

MEAN MOOD AND MEAN STANDARD DEVIATIONS (14 HOURS) - GROUP DATA

	HOURS													
	9 am	10	11	12	1 pm	2	3	4	5	6	7	8	9	10
$\bar{X}$	6.46	6.95	6.80	7.09	6.88	6.46	6.79	6.74	6.99	6.90	7.35	7.12	6.99	6.75
SD	1.19	1.26	1.16	1.08	1.17	1.08	1.16	.929	1.26	1.23	.868	1.10	1.43	1.56
$\bar{X}$(SD)	.689	.779	.824	1.04	.884	.971	1.02	.980	.818	.863	1.01	1.16	.934	.951
SD	.134	.137	.192	.228	.369	.429	.359	.324	.282	.177	.532	.700	.492	.215

APPENDIX H

MEAN FOCUS OF ATTENTION AND MEAN STANDARD DEVIATIONS GROUP DATA

MEAN FOCUS OF ATTENTION AND MEAN STANDARD DEVIATIONS (14 DAYS) GROUP DATA

	DAYS													
	S1	M1	T1	W1	Th1	F1	St1	S2	M2	T2	W2	Th2	F2	St2
$\overline{X}$	6.88	5.92	5.78	6.52	6.84	6.66	6.92	6.70	6.42	7.60	7.10	5.94	6.03	6.22
SD	.975	1.15	1.26	.843	1.17	.571	.691	1.00	.448	.743	.771	.359	1.23	1.14
$\overline{X}$(SD)	2.40	2.91	2.61	2.49	2.43	2.58	2.14	2.39	2.62	2.13	2.30	2.69	2.60	2.37
SD	.692	.849	.794	.203	.532	.639	.564	.331	.306	1.01	.311	.282	.161	.122

MEAN INTENSITY OF ATTENTION AND MEAN STANDARD DEVIATIONS (14 HOURS) GROUP DATA

	HOURS													
	9 am	10	11	12	1 pm	2	3	4	5	6	7	8	9	10
$\overline{X}$	6.36	7.16	6.24	6.87	6.25	6.52	5.88	6.67	6.36	6.66	6.73	6.90	6.37	6.10
SD	.963	.449	1.50	.986	.917	.947	1.43	1.72	.727	.135	1.06	1.47	.846	1.10
$\overline{X}$(SD)	2.21	2.01	2.34	2.52	2.60	2.59	2.89	2.41	2.58	2.23	2.38	2.14	2.75	2.57
SD	.382	.656	.295	.636	.587	.711	.156	.803	.248	.524	.798	1.18	.299	.539

APPENDIX I

MEAN INTENSITY OF ATTENTION AND MEAN STANDARD DEVIATIONS GROUP DATA

MEAN INTENSITY OF ATTENTION AND MEAN STANDARD DEVIATIONS (14 DAYS) GROUP DATA

	DAYS													
	S1	M1	T1	W1	Th1	F1	St1	S2	M2	T2	W2	Th2	F2	St2
$\bar{X}$	4.44	4.79	4.17	4.68	4.27	4.54	4.74	4.18	4.56	5.18	4.86	5.03	4.42	4.18
SD	.498	1.34	.757	1.28	.401	.851	1.56	.390	.458	.635	.302	.890	1.03	.763
$\bar{X}$(SD)	2.04	2.07	1.76	1.96	2.22	2.00	1.59	1.68	2.18	1.68	2.09	2.19	1.78	1.51
SD	.284	.715	.348	.932	.847	.675	.185	.586	.246	.240	.204	.448	.425	.377

MEAN INTENSITY OF ATTENTION AND MEAN STANDARD DEVIATIONS (14 HOURS) GROUP DATA

	HOURS													
	9 am	10	11	12	1 pm	2	3	4	5	6	7	8	9	10
$\bar{X}$	4.84	5.30	4.99	4.44	4.92	4.71	4.62	4.62	4.43	4.40	4.12	4.15	4.36	4.12
SD	.927	.644	1.14	.563	1.04	1.34	.717	.618	.679	.730	.699	.909	.785	.877
$\bar{X}$(SD)	1.30	2.00	1.87	2.09	2.11	2.38	2.36	2.25	1.73	1.56	2.03	1.86	1.60	1.81
SD	.393	.435	.530	.463	.514	.451	.496	.455	.445	.266	.369	.424	.308	.424

APPENDIX J

PROPORTION OF TIME EACH SPOUSE WAS PHYSICALLY PRESENT WHEN THE OTHER SPOUSE WAS RECORDING: WITHIN A DAY AND WITHIN HOURS

PROPORTION OF TIME EACH SPOUSE WAS PHYSICALLY PRESENT WHEN THE OTHER SPOUSE WAS RECORDING: WITHIN A DAY AND WITHIN HOURS

	S1	M1	T1	W1	Th1	F1	St1	S2	M2	T2	W2	Th2	F2	St2
						COUPLE 1 DAYS								
MALE	1.00	.46	.40	.38	.35	.66	1.00	1.00	.64	.57	.33	.60	.42	.80
FEMALE	1.00	.28	.40	.38	.30	.57	1.00	1.00	.57	.61	.33	.61	.38	.80
						COUPLE 2 DAYS								
MALE	.81	.07	.50	.42	.20	.43	1.00	.64	.25	.28	.36	.33	.18	.46
FEMALE	.66	.14	.45	.28	.20	.43	1.00	.50	.18	.20	.28	.35	.28	.46

	9 am	10	11	12	1 pm	2	3	4	5	6	7	8	9	10
						COUPLE 1 HOURS								
MALE	.58	.38	.50	.50	.35	.28	.28	.21	.92	.91	.85	.85	.92	1.00
FEMALE	.58	.38	.54	.53	.30	.30	.30	.21	.85	.91	.76	.71	.85	1.00
						COUPLE 2 HOURS								
MALE	.01	.18	.30	.23	.07	.16	.21	.09	.38	.66	.61	.61	.61	.92
FEMALE	.01	.18	.15	.14	.21	.14	.21	.14	.42	.53	.57	.57	.76	1.00

VITA[2]

JOE LESTER CONNER

Candidate for the Degree of

Doctor of Philosophy

Thesis: AN ETHOLOGY OF COGNITIVE AND AFFECTIVE PROCESSES

Major Field: Psychology

Biographical:

Personal Data: Born in Shidler, Oklahoma, May 3, 1949, the son of Don I. and Thelma L. Conner.

Education: Graduated from Shidler High School, Shidler, Oklahoma, in May, 1967; received the Bachelor of Arts degree from Northwestern Oklahoma State University, Alva, Oklahoma, in 1971 with majors in psychology and sociology. Received Master of Science degree from Oklahoma State University, Stillwater, Oklahoma, in May, 1975. Completed requirements for the Doctor of Philosophy degree at Oklahoma State University in July, 1977.

Professional Experience: Psychiatric Technician, Stillwater Municipal Hospital, 1973-1974; Graduate Research and Teaching Assistant, Department of Psychology, Oklahoma State University, 1974-1975; Intern in Clinical Psychology, Payne County Guidance Center, Oklahoma State Department of Health, Stillwater, Oklahoma, 1975-1976; Clinical and Research Psychologist, United States Public Health Service, Pawnee Indian Hospital, Pawnee, Oklahoma, from October, 1976 to the present.