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THE BEAT OF THE DIFFERENT DRUMMER
A SOCIAL PSYCHOLOGICAL ANALYSIS OF TIME AND DAILY RHYTHMS

By

Barbara L. Watts

A DISSERTATION

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ABSTRACT

THE BEAT OF THE DIFFERENT DRUMMER: A SOCIAL PSYCHOLOGICAL ANALYSIS OF TIME AND DAILY RHYTHM

By

Barbara L. Watts

The purpose of this research was to explore individual differences, particularly on the morningness-eveningness dimension, in the time concerns that our cultural norms dictate. It was hypothesized that morning-active people would have different attitudes toward pace, punctuality, and achievement than evening-active people, and that differences on the morningness-eveningness dimension would be related to greater incompatibility in dyadic interactions.

Morning types differ from evening types of people on more than the time of day chosen to get up in the morning and go to bed at night -- their cycles of body temperature, subjective arousal, and performance on some tasks also tend to differ. The research conducted for this dissertation supported the hypothesis that these types of people also differ on personality characteristics, as well as indicated that morningness and eveningness are best conceptualized as separate dimensions. Morning activity/inactivity proved to be the more relevant dimension in this research.

Morning active people were found to score higher on measures of achievement tendency, task leadership values, time urgency, and introversion, and they tended to work faster and participate in research earlier in the term than morning-inactive types. Evaluations of

hypothetical others, however, were found, for the most part, to be based more on the speed at which one performed activities rather than the time of arising. Agentic characteristics (i.e., ambitiousness, leadership, assertiveness, and so forth) were perceived as related to fast-paced activity in both task-focused and task-irrelevant situations and by both morning-active and morning-inactive respondents.

Absolute differences in roommates' Morningness scores were found in two studies to be negatively related to how well the roommates got along, their general evaluation of each other, and other such compatibility measures. In another study, synchronization of morningness tendencies was found to be related to desire to continue a task-oriented relationship of short duration between strangers, thus providing support for the concept that similarity of daily rhythms has implications for understanding interpersonal behavior beyond that related to sleep patterns.

Educational and work environments in this culture tend to be morning active; only some individuals tend to be. This dissertation research established that this is a relevant personological and social psychological phenomenon that warrants further study.

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TABLE OF CONTENTS

Chapter

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

Sociological, Psychological, and Physiological Time

Temporal norms in the United States emphasize rigidly scheduled activities, a quick pace, and punctuality. Time is conceived of as a linear process, as an entity, and as a unit of exchange. Time is a valued resource, to be used and not wasted; time is money (Moore, 1963; Pratt, 1981; Schwartz, 1975; White, 1970; Whitrow, 1977). Yet, despite the fact that time is an important aspect of American life, social psychological effects of time norms have been relatively unexplored. Although the pace and time frame of social interactions have been acknowledged as a potentially significant area of social psychological research (Bohannon, 1980; Levine, West, & Reis, 1980; Moore, 1963), little empirical research has been done to date in this area. The purpose of this dissertation is to focus on individual differences in an exploration of the causes, effects, and correlates of the sense of time concern that our temporal norms dictate.

Not all cultures emphasize the linear aspects of time. Indeed, some languages have no equivalent of the word "time" and have no conception of "being on time" or "waiting" (Schwartz, 1975). In contrast to the American way of life, many cultures focus on the cyclical aspects of time. For example, we tend to think of each day as a unique event; the Hopi Indians, who think of time as cyclical, believe that the rising sun marks the return of yesterday in a slightly different form (Maxwell, 1972).

It was the emphasis on a monetary economy, which was introduced during the western world's Industrial Revolution, combined with a linear concept of time, which led to the belief that time is a resource dissociated from human and social events (Whitrow, 1970). While power was based on land ownership and astrologers were influential scholars, the cyslical aspects of the seasons were primary. By the 1800s, however, in industrialized western countries, the mass production of inexpensive watches and the notion that time is money gave rise to living by time, not biological and environmental rhythms. People began to eat by time, not hunger; they began to sleep and wake by time, not tiredness; they began to work by time, not work to be done. Lives began to be ruled by the clock.

> ...loafing is wasted time, and time shouldn't be wasted. It is valuable and scarce. One has only twenty-four hours of it a day. The scarcity of time may appear puzzling. One has always had twenty-four hours of it. They should not seem less now than before. Before, however, one did not have twenty-four hours. There was a sunrise and a sunset, a noon or a hottest part, and there was night. Above all, one had a day, a day of a certain character according to the calendar. Then that great space was partitioned into 1,440 tiny cubicles....A day of twenty-four hours or 1,440 minutes divided into five- or ten- or twenty-minute groups survives in popular custom only if the divisions prove useful....All appointments must be kept by continual reference to the inexorable clock. If you miss a buss or train, or only fail to make a stoplight when on schedule, the result is fear and nervourness at being late, or the tension of not getting done all that you were supposed to. The cramming of hours and minutes takes place because of the belief that time's units are interchangeable and commercially valuable, but it is the clock itself that permits the constant checking and adjusting of one's actions....Other commercial societies have had the feeling of urgency and many things to do, similar to ours, but ours can be more tightly scheduled and made almost escape proof by the ubiquitous clock and the machines geared to it....No other nation by now is as precise in its time sense or so time-conscious as the United States. Americans generally are aware that time runs by steadily and is being used up evenly, minute after minute,

> hour after hour, day after day - inexorable, impresonal, universal time....We have almost lost the rhymical sense of time (de Grazia, 1972, pp. 456-458).

In actuality, time is neither cyclical nor linear. Einstein demonstrated that time is relative -- it can be compressed and stretched. Today, physicists hypothesize that there are possibilities of an absence of time (in black holes) and of time moving backwards (particles that move faster than the speed of light) (Gribbin, 1978). Psychologically, however, the physical nature of time is not nearly as important as the cultural norms about time. And when there is homogeneous agreement within and between the social groups to which a person belongs, the norms are apt to accepted implicitly and the individual tends to be unaware of them (Bem, 1970).

Thus, given the overwhelming cultural bias to conceptualize time as linear, it is not surprising that the cyclical, repetitive rhythms of time tend to be ignored in this culture. Time patterns are established by industrial economic priorities, and these in turn control other activities (Pratt, 1980). All social behaviors become influenced by clock time.

Linear clock time can be incompatible with cyclical biological time because clock time cannot reflect the fact that many physiological and psychological processes fluctuate in fairly stable, rhythmic patterns. There are circadian (i.e., daily) curves of speed and accuracy on tasks, body temperature, and feelings of alertness, arousal, and energy that generally reach a maximum in the afternoon and are loest very early in morning, regardless of the sleep-wake cycle (Froberg, 1977; Kleitman, 1963; Luce, 1971).

The cultural emphasis on linear aspects of time does not tend to take into account the fact that there are individual differences in the cycles of the components of circadian activity rhythms. With clock time, all moments are the same for everyone. However, some people arise early, feeling alert and refreshed, ready to start the day's activities, whereas others arise later, and their feelings of alertness and well-being are slower to reach their daily peak (Froberg, 1977; Horne & Östberg, 1976). Morning types differ from evening types in more than the times that define their sleep-wake cycle; evening types take longer to wake fully and become alert.

Our cultural values tend to de-emphasize these individual differences in cycles. Early morning activity is connected normatively and functionally to achievement success in most contexts in this culture (cf. Melbin, 1978) -- at the latest, children are expected when they enter the school system to be able to get up early and perform tasks accurately and quickly during the morning hours. This schedule is apt to prevail until retirement. Indeed, the phrases "8-to-5" and "9-to-5" connote a normative work day.

The circadian activity rhythms of morning types are synchronized with the prevailing cultural rhythms. Their physiological and psychological cycles are compatible with morning activity and a quick pace early in the day. Evening types, on the other hand, even when they do arise early, are more apt to drag themselves out of bed and are slow to reach their performance peaks.

The research reported in this dissertation deals with biological rhythms and social time, and their effects on the social psychological aspects of individual functioning. A number of studies are presented

that explored correlates of individual differences in circadian activity rhythms (i.e., morningness-eveningness), the effects of differences in circadian activity rhythms on interpersonal interactions, and attitudes toward these rhythms and time variables.

Biological Rhythms

Every healthy adult human has a constant physiological circadian rhythm, with fairly stable cyclical patterns of temperature, heartbeat, respiration, blood pressure, blood sugar, hemoglobin, cell permeability, urine content and elimination, cell division, blood cell production, sleep, and hormone, enzyme, and amino acid levels. In addition, there are stable ultradian (i.e., within the day), monthly, seasonal, and annual cycles (Luce, 1971). Circadian rhythms have received the most research attention, perhaps because all biological rhythms are based on circadian rhythms (Weston, 1979), or perhaps because the day is the most important social unit (Luce, 1971).

Circadian rhythms are apparent in studies of people who have lived in caves or other environments in which they are isolated from all natural and man-made time cues. When completely free to set their own schedules and live according to their biological rhythms, most people report their experiences to be very pleasurable ones. "Free running," as this freedom to live according to one's biological rhythms is called, tends to result in 25-hour days of sleeping and waking, although a few people establish 50-hour days and days as short as 16 hours have been reported (Still, 1972; Weston, 1979).

When free running, most people tend to establish a 25-hour tempera- cycle. When the sleep-wake cycle and the temperature cycle are synchronized, whether the synchronization is constant or lasts only a short

while, euphoric feelings are reported (Weston, 1979).

There is evidence that social factors may have some influence on and possibly disrupt the process of activity and temperature rhythm synchronization, at least for short periods of time. For example, in a study that examined four men who lived in underground cubicles, one man consistently arose before the others, prepared the food, and initiated activities, but only until the others established a daily activity cycle that was compatible with their temperature rhythms but was much longer than his temperature cycle. That one man tried to adjust his cycles to theirs, but eventually he gave up the effort. By the end of the experiment, this one participant was awake while the others slept and ate diner while two of the others ate breakfast. The fourth participant also eventually gave up efforts to synchronize his activities with the majority -- he ate lunch while the others ate breakfast or dinner (Luce, 1971).

A study by Rockwell, Hodgson, Beljan, and Winget (1976) provides further evidence of the importance of social as well as environmental factors in rhythm synchronization. These researchers studied three groups of three males for 105 days. One triad, the control group, lived in a house and were confined to adjacent grounds while they were exposed to the functioning of the laboratory environment, the personnel involved with this study, and time cues. The other two triads were isolated and deprived of external time indicators. Their light-dark cycle was experimentally manipulated: approximately every 20 days it was changed, and it consisted of either 24 hours of light and no hours of darkness per day or 16 hours of light and 8 hours of darkness. On the 85th day,

one of the members of each triad was exchanged with a member of the other experimental triad.

All of the members of the experimental groups displayed significant increased in depression, aggression, and verbal and somatic complaints after a time shift of the light-dark cycle, a finding which suggests that disruption of established rhythms is physiologically and psychologically stressful. Of more importance from the standpoint of social factors, the exchange of one triad member for another in the experimental groups resulted in changes in the activity rhythms of the triads. A person high on pain sensitivity, verbal measures, dominance, and extraversion and, thus, a person who may have been an evening type (as will be explained later, extraversion is related to eveningness) was exchanged with a person who tolerated pain easily, was nonaggressive, and tended to be nonverbal. It was found that the psychologically dominant individual significantly altered the circadian rhythms of the other triad members. Unfortunately, problems with the analysis of the data precluded more than a statement by the authors of the report that one person in each experimental group seemed to lead the other members in recycling after a light phase shift (Rockwell, 1981, personal communication).

Synchronized social, activity, and temperature rhythms are pleasurable; desynchronized rhythms are not. Jet lag is a fairly commonly experienced example of the stress imposed by rhythms are not synchronized. The flight across several time zones from west to east is particularly disruptive because it compresses the generally preferred 25-hour biological day even more than the standard 24-hour social day compresses it. Although 15% of the flying population does not experience jet lag, most

people suffer from gastric distress, irritability, hostility, fatigue, depression, sleep problems, short-term memory loss, and reduced reaction time, peripheral vision, and night vision (Blatt & Quinlan, 1970; Weston, 1979). For most people, the sleep-wake cycle takes a day for each time zone crossed to become resynchronized to new time schedules; other physiological processes, such as kidney functioning, take weeks to become synchronized.

The euphoria experienced in free running indicates somewhat more subtly the stress of less obvious dysrhythmia than jet lag. Because the vast majority of people must live with an optimal 25-hour cycle of biological functioning in a 24-hour social day, some stress from a lack of synchronization is inevitable. Reduction of this distress may be possible, however, because both biological and social rhythms can be reset to some extent. Physiological processes eventually do change to become more compatible with activity rhythms; time schedules can be modified under some circumstances.

Morningness and eveningness. It seems that being physiologically a morning-active person in this morning-active, time-pressured culture is a primary example of synchronized rhythms. Being evening-active may be less compatible with these prevailing cultural norms of morning activity. Given that synchronization is more pleasurable than desynchronized rhythms, I expected to find in this research that the individual difference variable of morningness-eveningness as an aspect of the circadian rhythm of individuals would be important in understanding the psychology of individuals and their intentions with others.

People have long recognized individual differences in circadian rhythms in their classification of "early birds" and "night owls." In

1912, Lay classified people into four types: those who go to bed early and get up early, those who go to bed early and get up late, those who go to bed late and get up early, and those who go to bed late and get up late (Kleitman, 1963). Recently there has been disagreement about the existence of "morning types" and "evening types," and some researchers have concluded that biologically one may be an evening type of some measures and a morning type on others. The small samples that have characterized the work in this area, however, have precluded reliable factor analyses, and order effects in questionnaire studies have hindered somewhat previous attempts to establish the dimensions of physiological morningness and eveningness (Norne & Österberg, 1975; Wendt, 1977a). Nevertheless, Wendt (1977a) has concluded that the evidence suggests that self-reports of daily peaks of well-being are correlated with time of going to bed as well as measured mood, alertness, and fitness.

Froberg's (1977) study of morning and evening types' performance and subjective feelings of well-being indicated that morningness and eveningness is a difference beyond simply time of arising and retiring. Females were deprived of sleep and time cues for 72 hours. Time-of-day differences were found in performance on vigilance in detecting three odd digits in a sequence of taperecorded numbers and in cancelling letters presented in a random array using three different cancellation rules, but there were no time-of-day differences in performance on spiral maze and syllogism tasks. Self-assessed morning-active subjects (those who said they tend to be alert in the morning and tired at night) showed very clear rhythmic patterns of 24-hour duration on subjective measures of alertness, energy, and tiredness throughout the 72-hour experiment. Evening-active subjects (those who said they tend to be tired in the

morning and alert at night) had flatter, less pronounced curves on these measures. In some participants there was a significant correlation between physiological, performance, and subjective arousal measures; in others, only the subjective arousal and performance variables were significantly related. Thus there is evidence that rhythms of subjective arousal are good predictors of rhythms of performance but performance is associated with physiological rhythms only at times and only in some individuals.

In Froberg's (1977) study, the subjects were deprived of sleep, and it was suggested that sleep-wake cycles may be the best predictors of morningness-eveningness differences in performance and physiological processes. Horne and Östberg (1976) did not interfere with natural sleep cycles and found that self-assessed morningness was related to time of peak body temperature. The "average morning type" in Horne and Östberg's study awoke almost two hours earlier then the "average evening type," had a peak temperature at 7:30 PM, which was 70 minutes earlier than the evening types, and went to bed an hour and a half earlier. The highest correlation that they obtained (.79) was between time of arising and self-assessed morningness. The correlation between time of peak body temperature and time of arising was .42; between time of peak body temperature and self-assessed morningness it was .51. (The authors suggest that peak temperature time, although significant at the .01 level with a two-tailed test, might not be as strong an indicant of morning activity as had been predicted because previous research had revealed a possible conditional seasonal effect on the relationship between peak temperature time and morningness-eveningness.)

Correlates of Morningness-Eveningness. There has been some work that has found a personality difference between morning types and evening types. Blake (1971) and others (reviewed by Taub, Hawkins, & Van de Castle, 1978) have found that extreme introverts tend to be morning types and extreme extraverts tend to be evening types. In Blake's study of English naval personnel, body temperatures of introverts, as measured by the Heron Personality Inventory, rose, peaked, and fell earlier in the than did those of extraverts. Performance curves on a letter cancellation task were similar to the temperature cycles -- morning types/introverts did better in the early morning and evening types/extraverts did better in the afternoon and evening. In addition, Blake demonstrated that the level of arousal of introverts was higher than that of extraverts in the morning, but that arousal was higher in extraverts than introverts in the evening. Eysenck (1967) and others (see Blake, 1971) have hypothesized that introverts always are characterized by higher levels of arousal than extraverts, but this apparently is not always the case; time-of-day differences need to be taken into account.

Not all research has supported the relationship between introversion-extraversion and morningness-eveningness as strongly. Horne and Östberg (1977) found that peak body temperature was insignificantly later in extraverts and self-assessed morningness was not significantly correlated with introversion-extraversion, although there was a trend for extraverts to be evening types. The correlations between introversion-extraversion, bedtime, and time of arising, and amount of sleep were all very low. As in the research reported by Taub et al. (1978), Horne and Östberg (1977) used Eysenck's EPI to measure introversion-extraversion.

It is interesting to note that some of the items that Eysenck uses to measure introversion-extraversion confound the time of day events usually take place with the dimensions that he deems relevant to introversion-extraversion. On the EPI Form A (Eysenck, 1973), for example, there is the question, "Do you find it hard to enjoy yourself at a lively party?" Because parties tend to be scheduled during evening hours, a "yes" response might be due to (1) a dislike of the social aspect of parties, (2) a dislike of lively parties, or (3) a dislike of evening parties. Only the first two are directly relevant to introversion-extraversion.

The Heron Personality Inventory (Heron, 1956) Second Part (sociability), which Blake used to identify introverts and extraverts, consists of 12 items, 3 of which refer to behavior at or preference for parties and other social events. "At a gay party I can usually let myself go and have a thoroughly good time." is not only double-barrelled, it too may confound event and personal orientation.

It may be that morning types tend to classified as introverts in part because they avoid and/or dislike social events and that usually are held during the evening hours and the paper-and-pencil measures of introversion-extraversion do not take into account normative scheduling times. It also may be that morning types may develop introverted characteristics because they prefer to be active during the times that social norms dictate that goal-directed activity is more appropriate than social concerns. That is, people may become less oriented toward socializing and more oriented toward solitary activity because they physiological circadian rhythms are active during the times that most work activities are scheduled. By evening, morning people are beginning to

"wind down" for the day, whereas evening people are still in their peak activity time. Morning people may be too tired to really enjoy a late-hour party; the "party-poopers" may then label themselves and be labeled by others as not particularly sociable.

At this point, the preponderance of the evidence about biological morningness and eveningness suggests that (1) individuals do differ on one or more dimensions of circadian activity rhythms, (2) individuals are aware of their peak times and thus self-assessment of morningness-eveningness is possible, and (3) personality differences such as introversion-extraversion may be related to individual differences in circadian activity rhythms. Although it must be noted that past research in this area has not produced consistently replicated results, and caveats abound, there is sufficient reason to believe that this is an important area of research in understanding human functioning. In this dissertation, morningness-eveningness differences in circadian activity rhythms were examined from the perspective of personality and social variables.

Psychosocial Rhythms

The American culture is a very time-oriented one; it is one in which linear clock time rather than biological or environmental rhythms pervade. There are comparitively rigid schedules for working, eating, and sleeping (White, 1977; Whitrow, 1970). A quick pace and sense of time urgency are valued.

In a study that explored perceptions of time and punctuality in the United States and Brazil, it was found that clocks, watches, and respondents' estimates of the correct time all were more accurate in the United States. It was also found that the social implications of

punctuality varied significantly. Brazilians rated those who were described as always late for appointments as more successful, likable, relaxed and happy than did Americans; Brazilians rated those who were never late as less successful, likable, and happy and more nervous than did respondents in the United States. Americans tended to rate the never late person as more succesful than one who was described as chronically late; Brazilians, in contrast, felt that always-late people were most apt to be successful (Levine, West, & Reis, 1980).

A quick pace also is valued in this culture. Fast-paced speech tends to lead to more favorable evaluations than slow-paced speech. Miller, Maruyama, Beaber, and Valone (1976) approached 359 people around Los Angeles and asked them, supposedly as an interview for a radio station, to listen to a taped message about the dangers of drinking coffee. On one version of the tape, the speaker spoke slowly; on the other he spoke rapidly. On half of the tapes, the speaker was identified as a locksmith; on the others, he was said to be a biochemist. In both of the credibility conditions, the faster speaker was rated as more knowledgable and more persuasive than the slower speaker. In another study, the complexity of the message was varied as well as the speech rate. Regardless of the complexity, fast talkers were rated as more intelligent, objective, and knowledgable and were found to be more persuasive than slow talkers and those who spoke at an average rate of speed.

Electronically varying the rate of speed of an audio tape to eliminate possible voice pitch, inflection, and intensity confounds produces similar results. Be deleting segments 1/50th of a second long, normal speech can be increased 25% without distortion. Using such a technique, MacLachen (1979) found that fast-speaking males and females were rated

as more knowledgable, intelligent, and sincere than when they spoke slow ly. It also was reported that subjects found listening to faster speech preferable -- 75% preferred to listen to Alistaire Cook at a speed 25% faster than his normal rate, whereas only 3% preferred to listen to him speak 25% slower than his normal rate. When listening to commercials, subjects tended to rate the ones that were played 30% faster than the others as more interesting, and they remembered more of the details from the faster ones.

In these studies, the listeners could not interact with the speaker. A study that did include interaction, but did not manipulate it, produced similar, although weaker, results. Scherer (1979) examined simulated jury discussions among adult males recruited from adult education centers in Cologne, Germany, and Cambridge, Massachusetts. Participants met in groups of six to discuss a manslaughter case, and each session was audio- and video-taped. After an hour of discussion, a poll of the jury was taken. Each juror then rank-ordered the jurors in terms of how influential they had been in determining the final group verdict and rated all other five members on a 35-item Personality Adjective Form. The strongest predictor of perceived influence was the total length each juror's individual contribution to the discussion. Rate of speaking was also positively correlated with perceived influence. The effect was marginal for the German sample ($\underline{r}$ = .30, $\underline{p}$ = .11, n = 29), and insignificant for the American sample. The correlation coefficient was not reported, however, and the sample size was small (n = 28).

Although some health experts have warned against the ill effects of the time-pressured pace that characterizes American life (e.g., Friedman, 1969), little research has been conducted to date to explore the

psychological effects of time concerns. Melbin (1978) contends that slower-paced environments lead to more interpersonal orientations and altruistic acts in the evening than during the faster-paced day. Research that supports his contentions was conducted on the streets of Boston at various times of the day and night. This procedure, however, does not preclude the explanation that aspects other than simply time of day and environmental pressures have changed. The people who populate the night may differ significantly from those who populate the day.

Melbin had a male and a female couple approach passersby and ask for directions to a well-known location about a mile away. A score of zero was given for a nasty response and no directions given, one point was awarded for directions only, and two points were given for providing directions and expand the interaction. Highest scores were obtained in the night period, 12:15 AM to 7:29 AM; lowest scores were obtained in the daytime period, 9:30 AM to 4:14 PM.

Similarly, Melbin had a couple request a brief interview as a part of a survey on urban life. A nasty refusal received zero points, a polite refusal got one point, and consent was given two points. Again, highest scores were obtained in the night period. In this case, lowest scores were obtained during the "morning rush hour," 7:30 AM to 9:29 AM.

In a third procedure, couples visited three 24-hour grocery stores and observed the sociability of the customers. If a customer both smiled and chatted with the cashier about a topic other than the immediate transaction, two points were scored. It either happened, one point was awarded, and zero points were given if neither smiling nor chatting occurred. In this study, highest scores were obtained during the night period; lowest scores were obtained during the evening period, 6:15 PM

to 12:14 AM.

According to Melbin, "In the city during the day, the mood of pressured schedules takes hold of folk and makes their encounters specific and short. The tempo slows down markedly after midnight. The few who are out then hurry less because their are fewer places to rush to. Whereas lack of time inhibits sociability and helpfulness, available time clears the way for them" (P. 13). A fourth study conducted by Melbin (1978), however, found that helping behavior was least apt to occur in the night period. Researchers placed keys in well-lighted street locations. The brightly colored keys had an address attached on a tag with the request, "please return." Keys that were not picked up after two hours were retrieved by the researchers. Zero points were awarded for picked-up keys that were not returned, one point was given for "postage due" keys, two points for postage-paid keys, three points for postage-paid key accompanied by a personal note, and four for a telephone call to the person names on the address tag. Highest scores were obtained from drops made during the hours between 6:15 PM and 12:14 AM; lowest scores were obtained from key drops made between 12:15 AM and 7:29 AM.

Melbin speculates that perhaps it is an in-group feeling that leads to greatest helping and sociability in face-to-face situations and least helping in the impersonal requests for help in returning the key, which may have been lost by anyone at any time. However, the cause of time-of-day differences in altruism and friendliness remains uncertain. Time pressures may make people behave in a less sociable manner, more sociable people may be out at night when there are fewer time pressures, or both. Indeed, it also may be that a quick pace is interpretted as being less friendly than a slow one, but may not actually be so. In

other words, people may be friendlier at night because they are reacting to perceived, but perhaps not actual, friendliness in slower-paced others.

The early bird catches the worm. Although the American culture is marked by an emphasis on time, schedules, punctuality, and pace, not all Americans experience a great sense of time urgency. American blacks (Green, 1970), women (Levine et al., 1980), and rural dwellers (Lowin, Hottes, Sandler, & Bornstein, 1971) are less concerned about time than whites, men, and urban dwellers. One of the underlying factors associated with these differences may be differences in task and goal orientations.

According to McClelland (1961), people with low achievement motivation are not as concerned with the passage of time as people with high achievement motivation. Meade and Singe (1970) have found that Indian castes that endorse achivement goals tend to value time, and members of those castes tend to differ in their estimates of time intervals according to their motivation and their progress on the task. The castes that do not have such achievement-focused norms are less apt to value time, and their members do not tend to differ in their time estimates under various performance and motivation conditions. Meade (1966) found the same effect with American college students: subjects with high achievement motivation experienced time as shorter whem making progress toward a goal and longer when no progress was being made; subjects with low need for achievement were not affected in their time estimates by their progress on a task.

Conventional wisdom and Ben Franklin assert that achievement goals are best fulfilled by morning types. Not only does the early bird catch

the worm, but going to bed early and arising early makes a man healthy, wealthy, and wise. Direct empirical evidence of this relationship, however, is limited.

Taub et al. (1978) report a study of medical students that found academic performance was inversely related to time of arising -- lower examination scores were correlated with later times of waking up in the morning and subjectively poorer quality of sleep. Dawson (1978) found that Michigan State University undergraduates who were morning types, as measured by Hanley's Early Bird Scale, were more apt to complete more entries in an annotated bibliography for course credit than those who were evening types. These results suggest a relationship between morningness and goal directedness or a high grade point average, but because no measure of when the bibliographies were begun or completed Dawson's study, as well as the one reported by Taub et al. (1978) they do not contribute to an understanding of the relationship between these variables (i.e., morningness and achievement concerns) and punctuality or procrastination.

Using Yale undergraduates, Blatt and Quinlan (1967) compared procrastinating students (those who had not participated in psychological research as required by a year-long introductory psychology course before the final two weeks of the fall semester) with those they referred to as punctual students (those who completed the required participation within the first week of the fall semester). There were no significant differences between the 14 punctual and the 15 procrastinating students on the WAIS Vocabulary and Information subtests, the Mathematics and Verbal College Entrance Examination Board tests, college grade, number of extracurricular activities, authoritatianism, or the Guilford measure

of divergent thinking, a test for tendencies to think in unusual and unconventional ways. Punctuals and procrastinators did differ on measures of death concern (punctuals were less preoccupied with death), time perspective (punctuals' stories extended further into the future), and anticipation and planning (punctuals' WAIS picture arrangement scores tended to be higher than procrastinators'). The researchers suggested that those who completed their research participation requirement during the first two weeks of the first semester might be, "a formal, controlled, somber, ascetic group, who prefer to postpone or even avoid pleasure and satisfaction" (p. 172). They based this speculation on the fact that the one item on the WAIS Picture Arrangement task on which punctuals tended to score lower than procrastinators was an item that was said to reflect spontaneity and humor. They also contended that the marginally significant effect on a measure of interference using the Stroop Color-Work Test provides additional evidence of procrastinators' greater impulsivity and pleasure seeking.

In addition to questions about the validity of their measures, Blatt and Quinlan's (1967) research may be of somewhat limited generalizability because it is possible that their "punctual" students were an extreme group whereas their "procrastinators" were not. The authors did not disclose what percentage of the psychology students completed the year-long course requirement in the very first week of classes, nor what percentage of the psychology students had not completed the requirment by the last two weeks of the fall (not spring) semester. Thus, they may have not been looking at "punctuals" -- they may have been looking at "extremely earlies." They may have not been looking at

"procrastinators" -- they may have been looking at "still have plenty of time left" subjects (After all, more than a semester remained to participate in two hours of research.)

Together, these studies suggest that morning types may have different subjective impressions of time, pace, and punctuality than evening types, perhaps related to differences in the belief that time is a valuable, spendable resource and perhaps related to differences in achievement concerns.

Objectively, it seems obvious that a person who arises at 10:00 AM and goes to bed at 2:00 AM has the potential to accomplish as much as the person who arises at 6:00 AM and retires at 10:00 PM. Subjectively, however, sleeping late may seem to be related to "wasting" time, anathema behavior to those who believe that time is fleeting and unrecoverable.

The Type A behavior pattern includes these characteristics of time urgency and striving for successful completion of task goals. The type A behavior pattern is, by definition, displayed by those who strive to obtain an unlimited number of things in the shortest period of time possible. Type A behavior is "encouraged by the comtemporary Western environment because, unlike any previous known milieu, it appears to offer special rewards and opportunities to those who can think, perform, communicate, move, live, and even play more rapidly and aggressively than their fellow man" (Friedman, 1969, p. 84).

When put in a time-urgent, achievement situation, Type As are time-urgent, achievement-oriented people (Glass, 1977); morning-active types may be time-urgent, active, achievement-oriented people. Therefore, I hypothesized that there is a close relationship between having a morning-active circadian rhythm and being Type A.

Morning-active people may be particularly sensitive to the accelerated pace of Western time-oriented, achievement-focused society because they are physically and psychologically ready to begin the school and work day early, as is the norm. Evening-active people may be less susceptible to the influence of time and achievement norms because their natural rhythms are less compatible with the early-morning schedules of schooling and most jobs in this society.

The Social Psychology of Time and Circadian Rhythms

The purpose of this dissertation was to explore the social psychological effects of synchronized individual and social rhythms. First, it was necessary to establish taht a morningness-eveningness distinction is both a valid and a reliable individual difference variable in the population of college undergraduates at Michigan State University. Because studies of free-running suggest that living in synchrony with one's physiological rhythms is more pleasant than desynchronization, a college population with some freedom to individually establish activity cycles was expected to show individual differences in circadian activity rhythms as measured by Horne and Östberg's (1976) Morningness-Eveningness Questionnaire. This measure was developed in part to determine which Swedish workers were most suitable for shift work, but scoring and validity of the English language version of the questionnaire was based on the results from a sample of Britisch students between the ages of 18 and 32.

College students, as compared to those in the lower levels of education and as compared to those in the work force, have a great deal of freedom to set their own time schedules. Therefore, using this subject

population permitted an examination of individual preferences of activity cycles as well as socially-defined activity rhythms. Social time norms and the demands of class and work schedules impinge upon college students, of course, but there is flexibility within the undergraduate milieu that does not exist either for those whose school day begins and ends at a predetermined, rigid time for everyone or for those whose daily work schedule similiarly is defined for employees regardless of individual considerations. Thus it was expected, but was by no means certain, that the Morningness-Eveningness Questionnaire would be appropriate for use with Michigan State University undergraduates.

A longitudinal study would be required to establish the cause-and-effect relationship between morningness-eveningness and its correlated personality variables. If, as predicted, morning-active rhythms are associated with achievement and time concerns, it might be that being morning active in the American culture leads to these concerns. Likewise, it might be that those who subjectively believe that early morning activity is less wasteful of time, a precious resource, choose to be morning active. Furthermore, it might be that both factors are operating -- that is, morningness aids in the development of time and achievement concerns, and time and achievement concerns aid in the development of morning-based activity rhythms. For the purposes of this research, the causal relationship was not nearly so important as establishing that, in fact, such a relationship does exist.

In addition to establishing Morningness-Eveningness as a meaningful variable for understanding temporal norms and individual differences, the research presented here also focused on Morningness-Eveningness as a mediator of interpersonal harmony and person perception. Synchronization

of circadian activity rhythms between roommates and between strangers interacting for a short period of time was predicted to affect how well the subjects got along with one another and how they rated one another on perceived attributes. A hypothetical situation was presented to other subjects to further explore whether individual differences in morningness significantly affect the formation of impressions about others.

Others have called for such an approach in social psychology. "Natural rhythms are relatively fixed and limit the adaptability of individual behavior patterns....Researching these ideas has the potential advantages of generating somewhat of a 'new look' in the study of attraction, of being amenable to rigorous experimentation, and of having some a priori plausibility at least if everyday descriptions of human relations such as 'in tune,' 'wave-lengths,' and 'vibrations' are to be taken seriously." (Jones, 1974, pp. 176-177). "With each individual operating on slightly different rhythmic patterns, but within the range prescribed by the culture, rhythm and pace are important dimensions of successful social relationships. When our rhythms mesh with those of people around us, we scarcely notice them. When they do not, we are acutely aware of being out of step -- and often blame the other people. (But) there are almost no studies of the dysrhythmia that sometimes affects social relationships." (Bohannon, 1980, p. 20). The research presented in the following chapters is an empirical response to the raising of such issues.

CHAPTER II

Morningness-Eveningness as a Personality Variable

Study 1: Correlates of Individual Differences in Circadian Activity Rhythms

Overview

If amount of sleep is held constant, it seems that an evening person could get as much accomplished in a 24-hour period as a morning person. In this culture, however, early arising is normatively connected to achievement: The early bird catches the worm; the man who is early to bed and early to rise is rewarded with health, wealth, and wisdom. Subjectively, sleeping late may seem to be related to "wasting" time, whish is anathema to those who feel time is a valuable, fleeting resource. It was hypothesized that morning-active people have different attitudes toward time, pace, and punctuality than evening types, and that they would differ also in their achievement and task concerns.

In this study, individual differences in circadian activity rhythms were assessed via Hanley's Early Bird Scale (Dawson, 1970) and Horne and Östberg's (1976) Morningness-Eveningness Questionnaire. Morningness and eveningness correlated with a number of time concern and achievement orientation measures. Morning types completed the questionnaires more quickly than others, expressed negative attitudes toward wasting time, and scored higher on measures of achieving tendency, task leadership, ambition, and introversion than did those whose self-description reflected a morning-inactive rhythm. There were significant sex differences on many of the morningness-eveningness correlates, but the sexes did not differ

on Morningness or Eveningness.

The evidence suggests that individual differences in circadian activity rhythms are more than simply a component of a more general task orientation, and that being a morning person in this morning-active, achievement-oriented society facilitates the development of achievement and time concerns.

Temporal Norms

Time as a linear process. The concept of time as a limited, valuable resource developed in conjunction with the growth of commerce and industry in western societies. The Protestant work ethic declared that wasting time was the devil's work; the expanding Soviet industrialization of the 1920s likewise gave rise to the Time League to promote similar ideals with the same (albeit secular) fervor. Lauer (1981, p. 94) cites an appeal from a Soviet Time League leaflet:

> Measure your time, control it!
>
> Do everything on time! exactly, on the minute!
>
> Save time, make time count, work fast!

There is evidence that temporal norms are directly connected to industrialization and entrepreneurial achievement, and the causal connection apparently is bidirection. Lauer (1981) concludes that entrepreneurs directly attempt to socialize norms of time as a resource as well as evidence that industrialization is not apt to be successful in cultures with norms that emphasize the rhythmical aspects of time.

The ancient Greek philosophers focused on the cyclical aspects of time. The early Hebrews, in contrast, saw time as a linear progression from God's creation of the universe to the eventual fulfillment of divine purpose. Early Christian theology recognized two phases of

existence -- life before Christ and life after Christ -- and the addition of a unique event to the concept of uninterrupted development led to a philosophy of time as progressive and nonrepetitive (Fraser, 1975). While daily existence was intimately connected to the cycles of the day and the cycles of the seasons, however, and while astrologers focused on the cycles of the heavenly bodies, cultural norms reflected the rhythmical aspects of time (Whitrow, 1970).

When productivity became keyed to mechanical devices, work became dissociated from biological and environmental time. Clock time, fostered by the mass production of inexpensive watches and clocks in the 1800s, began to define social time. But temporal norms did not change easily:

> The temporal pattern of industrialization required mechanical periodicities, machine-determined tempos, precision timing, and ineluctable sequences. The agony of transition to such a pattern is clear in the industrialization of England, which was marked by an intense struggle between owners and workers as the former sought to impose the new pattern on the latter. The workers resisted in many ways....(But) the socialization was successful....By the 1880s, the English worker had become noted for his regularity, his methodical playing out of his energy and for his suppression of the capacity to relax in the old, uninhibited ways (Lauer, 1981, pp. 61-62).

Today, particularly in the American culture, the temporal norms introduced by industry affect just about all aspects of social life. Punctuality and a quick pace and adherence to schedules of activity are valued even when not demanded by task considerations (de Grazia, 1972; Lauer, 1981; Moore, 1963; Pratt, 1981; Schwartz, 1975).

Morningness. Until the 1800s, most human activity was contained within the daylight hours. Even today, despite the availability of numerous sources of artificial light, it is the lower-status, dirtier, lower-paying jobs that tend to be performed at night (Melbin, 1978).

Morning-based activity is the norm for schools and most occupations.

Those who do work at night often experience the effects of desynchronization like those of jet lag if they attempt a morning-based activity cycles on their days off from work. Likewise, those who rotate shifts suffer the physiological and psychological ill-effects of desynchronized rhythms (Weston, 1979). On the other hand, those whose physiological rhythms are morning-active are most compatible with normal daily work schedules that begin at 8 or 9 AM.

Since it takes significantly more time to entrain physiological synchronization to an imposed schedule than to return it to its natural rhythm, and because the synchronization of rhythms is pleasurable (Weston, 1979), it is reasonable to assume that those whose circadian rhythms rise faster and peak earlier in the day will prefer morning-based activities more than those whose rhythms tend to be slower and later to rise to their peak. Also, those whose rhythms are compatible with fast-paced morning activity are likely to be perceived as more energetic and hard-working than their counterparts who start the day's activities with lower body temperature and low adrenal hormone levels.

I hypothesized that subjects who tend to be morning active types would score high on measures of achievement and time concerns than those who are not apt to be morning active. Because living in sync with one's social and biological rhythms tends to be pleasurable, activities associated with morning activity (i.e., educational productivity and then employment productivity until retirement age) should be valued more highly by morning-active people.

Method

Subjects

Introductory psychology students from Michigan State University were recruited to participate in this research for course credit. A total of 308 students, 92 males and 216 females, completed usable questionnaires. An additional 23 students' last response on the optical-scanning answer sheet did not correspond to the number of the last item in the questionnaire booklet, and therefore, they were not included in the sample.

Instruments

Morningness-eveningness was assessed via Hanley's Early Bird Scale (Dawson, 1970) and Horne and Östberg's (1976) Morningness-Eveningness Questionnaire.

Hanley's Early Bird Scale consists of 68 items, 26 of which are "fillers" included to mask the true nature of the scale. Respondents are instructed to mark an item "true" if it expresses their attitude or feeling to a reasonable degree and "false" if it clearly is not their attitude or feeling. Some of the items ask about daily habits (for example, "Most nights I get to bed before 1"); other items ask about participation in activities that tend to occur in a particular portion of the day (for example, "I like parties better than picnics.") Hanley (personal communication, 1980) reports an internal consistency of .78 for the items of the scale. He has found no time-of-day differences in performance on examinations for Early Birds or Night Owls, and the two groups have not been found to differ on their College Entrance Examination Board scores. As mentioned in Chapter I, Early Birds have been

found to produce more work for course credit than Night Owls (Dawson, 1970). Preliminary research tentatively suggests the possibility of a genetic component of morningness-eveningness -- Hanley (personal communication, 1980) found a correlation of .75 between the responses of identical twins and a near-zero correlation between the responses of opposite-sex twins. The lack of correlational data for the responses of same-sex fraternal twins, however, makes speculations derived from these findings quite uncertain.

The Morningness-Eveningness Questionnaire (Horne & Östberg, 1976) is a modification of a Swedish-language questionnaire which was adapted for use in Great Britain. The authors administered this version of the questionnaire to 75 males and 75 females, ages 18 to 32. A smaller sample of subjects randomly selected from the 150, took their oral temperature every waking half-hour for three weeks. Three groups were composed for statistical analyses -- one third were identified as Morning types, another third as Intermediates, and the others as Evening types. Self-assessed Morning types had a peak temperature time, a bedtime, and a time of arising all significantly earlier in the day than Evening types. Bedtime, arising, and peak temperature were correlated significantly with Morningness-Eveningness score; the only measure not significantly correlated with Morningness-Eveningness was amount of sleep.

Concern with task achievement was assessed via Mehrabian's (1969) Achieving Tendency Scale for Males. In a review of the measures of achievement motivation, Fineman (1977) concluded that only Mehrabian's measure is internally consistent (split-half $\underline{r}$ = .76), stable (test-retest over 10 weeks. $\underline{r}$ = .78), valid (significantly related to the

Zeigarnik effect and number of match stick problems attempted and solved), controls for deliberate distortion of responses, is quick and easy to complete, and is self-administered. The long (26-item) scale was used in this study, since Fineman states that it is unlikely the 9-item version of the scale will "do justice to the concept" (p. 17). Some of the psychometric properties of the instrument, however, were known only for the short version. The Scale for Males was used for all subjects because the Scale for Females contains a number of similar items but includes items that refer to cooking meals and organizing parties. Because the wording of these items might be considered sexist by some respondents, and because the wording of the Scale for Male items was more appropriate for the hypotheses being tested, the (unlabeled) Achieving Tendency Scale for Males was administered to all participants.

Other measures of task orientation were included in this study. Gordon's Survey of Interpersonal Values, as revised by Watts, Messe', and Vallacher (in press) provided measures of task leadership, task competence, and task-related goal independence. The former two were predicted to be positively related to morning-active cycles; the latter was predicted to be negatively related to morningness. To be biologically a morning person in an achievement- and time-oriented society is to be 'in sync'; being biologically an evening person in such as environment is unsynchronized and possible distressful. It may be that the "beat of the different drummer" -- being an evening-active person in a morning-active world -- results in increased independence, marked by less conformity to the normative work values of the morning-active, time-urgent society.

The belief that time is a valuable, fleeting resource was predicted to be an important correlate of morningness. If "time is money," then morning types should value both time and money more than evening types. To test this hypothesis, items were included that assessed the respondents' desire to earn a great deal of money and the respondents' pleasure in having and spending money. Aversion to "wasting" time was measured with items such as "I go out of my way to avoid standing in line," and, "I am a bit lazy at times." Behavioral, as well as these paper-and-pencil items were included in the measurement of time concern. Respondents used the clock in the room to note the time the questionnaire was begun (respondents were given the opportunity to begin the questionnaire between 15 minutes before and 15 minutes after the scheduled starting time of the research session) and the time the questionnaire was completed. Respondents were asked how many research credits they had earned for their psychology course prior to their participation in this research and whether they were wearing a watch.

Procedure

The questionnaire booklet containing the Morningness-Eveningness Questionnaire, the Achieving Tendency Scale for Males, the Revised Survey of Interpersonal Values, and the time and money attitude items was administered in large, mixed-sex groups of 50 to 100 people during the middle to late afternoon during the middle week of Fall Quarter, 1980. Those hours were chosen because the body temperature curves of Morning types and Evening types tend to be most similar at that time (Blake, 1971; Horne & Östberg, 1976). It was stressed when the introductory psychology students were given the opportunity to volunteer that the study would be conducted only during the designated week. The limited

opportunity to participate was emphasized to minimize procrastinators' tendencies to put off participation to a later date, which would have been a liability if morning types, as compared to evening types, not only do things early in the day but also earlier in the term.

Male and female researchers arrived 15 minutes prior to the scheduled starting time for each session and distributed questionnaires to those who had already arrived and as participants arrived. All instructions were presented in written form, so respondents could begin immediately and work at a self-determined pace. The first and the last thing subjects were asked to do was write down the time as indicated by the wall clock in the room.

Results

Responses to the 19 Morningness-Eveningness Scale items and the 42 Early Bird Scale items were separately subjected to factor analyses with varimax rotation for factors with eigenvalues greater than 1.00.

Two factors emerged from the Morningness-Eveningness items. The subscale comprised of the items that loaded on the first factor had a coefficient alpha of .80; it contained 11 items that dealt with time of arising and early morning activities. The other subscale included items that generally asked about bedtime and evening activities. The coefficient alpha for this subscale, Eveningness, was .61.

Two factors emerged for the Early Bird items. Standard score coefficient for the two subscales constructed from these two factors were low (.69 and .58), and little rational sense could be made of the item loadings. Therefore, and because the Morningness-Eveningness Scale

factors were stronger rationally and empirically, the Early Bird response were not included in further analyses.

The items that comprised the Morningness and Eveningness subscales are presented in Table 1. Interscale correlations are presented in Table 2.

Table 2 reveals that moderate, positive correlations were found between describing oneself as a morning person and achievement tendency, valuing of task leadership, and having negative attitudes toward wasting time. A moderate, positive relationship between describing oneself as an evening person and having a favorable attitude toward making and spending large amounts of money was also found; an opposite result had been predicted. It is likely that the items used reflected an "I want it all" attitude more than the desire to earn money as an indicant of success task performance and a concerned valuing of resources.

Predictors of Morningness-Eveningness

To test the hypothesis that concern with time, money, achievement, task leadership, and traditional work goals are distinct correlates of individual differences in circadian activity rhythms, stepwise multiple regression analyses were performed on these variables with Morningness and Eveningness as the criteria two separate analyses. With Morningness as the criterion, the multiple R was significant, $R = .44$, F (5, 236) = 11.36, $p < .001$. Stepwise Fs for the predictors (achieving tendency, attitudes toward time and money, traditional work goals, and task leadership values) all were significant. The multiple R for the Eveningness criterion was significant also, $R = .30$, F (5, 236) = 4.59, $p < .001$. Attitudes toward time and money significantly predicted Eveningness. The stepwise Fs are presented in Table 3.

Table 1

Morningness and Eveningness Scales

Morningness Items

Considering only your own "feeling best" rhythm, at what time would you get up if you were entirely free to plan your day?

If there is a specific time at which you have to get up in the morning, to what extent are you dependent on being woken up by an alarm clock?

Assuming adequate environmental conditions, how easy do you find getting up in the morning?

How alert do you feel during the first half-hour after having woken in the morning?

How is your appetite during the first half-hour after having woken in the morning?

During the first half-hour after having woken in the morning, how tired do you feel?

You have decided to engage in some physical exercise. A friend suggests that you do this one hour twice a week and the best time for the friend is between 7:00 AM and 8:00 AM. Bearing in mind nothing else but your own "feeling best" rhythm, how do you think you would perform?

You wish to be at your peak performance for a test which you know is going to be mentally exhausting and lasting for two hours. You are entirely free to plan your day and considering only your "feeling best" rhythm, which one of the four testing times would you choose?

For some reason you have gone to bed several hours later than usual, but there is no need to get up at any particular time the next morning. Which one of the following events is most likely?

Suppose that you can choose your own work hours. Assume you work a five hour day (including breaks) and that your job is interesting and pays by results. The five hours must be consecutive. What time would you choose to begin work?

One hears about "morning" and "evening" types of people. Which one of these types do you consider youself to be?

Eveningness Items

Considering only your own "feeling best" rhythm, at what time would you go to bed if you were entirely free to plan your evening?

Table 1 (cont.)

When you have no commitments the next day, at what time do you go to bed compared to your usual bedtime?

At what time in the evening do you feel tired and as a result in need of sleep?

If you went to bed at 11:00 PM, at what level of tiredness would you be?

One night you have to remain awake between 4:00 AM and 6:00 AM in order to carry out a night watch. You are entirely free to plan your day. Considering only your own "feeling best" rhythm, which one of the following alternatives will suit you best?

You have to do two hours of hard physical work. It you were entirely free to plan your day, and if you consider only your own "feeling best" rhythm, which one of the following times would you choose to do this work?

You have decided to engage in some hard physical exercise. A friend suggests that you do this for one hour twice a week. The best for the friend is between 10:00 PM and 11:00 PM. Bearing in mind nothing else but your own "feeling best" rhythm, how well do you think you would perform?

At what time of day do you reach your "feeling best" peak?

Table 2

Correlates of Morningness and Eveningness

Study 1

	MORNINGNESS	EVENINGNESS	ACHIEVEMENT	LEADERSHIP	COMPETENCE	INDEPENDENCE	TIME
EVENINGNESS	-.33***						
ACHIEVEMENT Tendency	.27***	-.01					
LEADERSHIP Values	.19**	-.03	.12*				
COMPETENCE Values	-.01	.05	.13*	-.10			
INDEPENDENCE Values	-.09	.05	.20**	-.16**	.21**		
Aversion to Wasting TIME	.26***	-.08	.03	.20**	.07	.01	
Desire for MONEY	-.13**	.24***	-.17**	.22**	.04	.00	.28***

Note. Ns vary from 254 to 304 due to missing data on the Values subscales. Tests of significance are one-tailed.

*p < .05
**p < .01
***p < .001

Table 3

Stepwise *Fs* for Predicting Morningness and Eveningness

Morningness		
Predictor	F	p
Achievement Tendency	13.97	.001
Aversion to Wasting Time	18.59	.001
Desire for Money	7.81	.006
Independence Values	3.94	.048
Leadership Values	4.96	.027
Eveningness		
Predictor	F	p
Achievement Tendency	0.00	.936
Aversion to Wasting Time	5.17	.024
Desire for Money	19.40	.001
Independence Values	.18	.668
Leadership Values	1.06	.302

As predicted, pace was related to Morningness -- the earlier the circadian rhythm began and peaked, the faster the completion time, r = .11, $p < .05$. A marginal correlation between Morningness and pace remained after both time attitudes and achievement tendency were taken into account, r = .09, $p < .06$. Time of arrival, however, was not related to Morningness or Eveningness, perhaps due to the overriding influence of class schedules.

Sex Differences

Males and females differed significantly in their responses to the achieving tendency scale, the measure of task leadership values, and the time attitude items. Males were more achievement oriented (t (303) = 2.65, $p < .01$), valued being a leader more highly (t (259) = 4.38, $p < .001$), and were more averse to wasting time (t (304) = 5.19, $p < .001$). There were, however, no sex differences in Morningness (t (300) = 1.21, $p < .20$) or in Eveningness (t (297) = 1.42, $p < .15$).

Study 2: The Type A Behavior Pattern, Introversion, and Morningness

Subjects who participated in Study 1 were recruited to participate in a further exploration of the time urgency component of Morningness and to replicate previous research on the relationship between being morning active and introversion. To maximize participation in Study 1, introductory psychology students were told that they might be eligble for additional research credits (in Study 2) and/or pay (in Study 4) if they completed the first questionnaires. Thus, by gathering personality data on two separate occasions, the length of the first session was not prohibitably long and subjects were encouraged to maximize their opportunity for earning course credits.

Method

Subjects

A total of 22 subjects completed the questionnaire administered several weeks after they had participated in Study 1.[1] Respondents received additional course credit.

Instruments and Procedure

The 14-item Bortner (1969) Pattern A Self-Rating Scale and Eysensk's (1973) EPI Form A scale were administered (in random order) in small groups. Bortner's scale measures the two components of the Type A behavior pattern -- aggressive drive and time urgency. These items were modified slightly for this research by presenting the items with a 5-point response scale ranging from "extremely like me" to "not like me" rather than a nonsegmented 1½ inch line, which is what Bortner uses.

Eysenck's measure of introversion-extraversion normally contains a Lie Scale to measure social desirability of response tendencies and a Neuroticism Scale. The latter subscale was not included in the items administered to respondents in this study because of time considerations and a lack of hypotheses concerning the relationship between neuroticism as measured by Eysenck and any of the other variables of interest.

Results

To examine the relationship between the time urgency component of the Type A behavior pattern and morningness-eveningness, responses to the seven items of the Pattern A Self-Rating Scale were summed and correlated with Morningness and Eveningness scores. Although there were no

significant relationships between this time urgency measure and Morningness or Eveningness with this small subsample, some of the individual items were significantly related to Morningness. Morning-active respondents did not describe themselves as doing things like talking or eating faster than others, but they did tend to agree that they never take things one at a time (r = .63, p < .001) and that they tend to go "all out" (r = .34, p < .10).

The aggressive drive items were also summed and correlated with responses to the Morningness and Eveningness scales. This measure was strongly related to Morningness, r = .51, p < .01.

As some previous researchers had found, Morningness was correlated with introversion, r = .45, p < .02. Eveningness was correlated with extraversion, r = .47, p < .02. However, Morningness scores were negatively related to responses to the item "Are you slow and unhurried in the way you move," r = -.37, p < .05 -- an item designed by Eysenck to be answered positively by introverts.

Study 3: Replication of Morningness Correlates

Approximately three months after participating in Study 1, some respondents were contacted and recruited, along with their roommate, to participate in a study of roommate relationships. The roommate compatibility portion of that research study is presented as Study 5 (see Chapter IV). Additional information about individual difference correlates of Morningness was obtained also, and is presented here.

Method

Subjects

Participants in Study 1 who said they were freshman living on campus with one roommate and who were identified as morning active or morning inactive (i.e., those who scored half of a standard deviation above or below the mean on Morningness) were contacted 12 to 15 weeks after the completion of the first study. All of those we were able to contact by phone and who still lived on campus with one roommate agreed to participate along with their roommate. The 76 roommates received $2 for their participation.

Procedure

An undergraduate interviewer who was the same sex as the roommate pair administered the roommate questionnaire in the dormitory room with both roommates present. Respondents were reminded that their answers were confidential and would not be disclosed to the roommate (or anyone else).

Instruments

The roommate compatibility section of the questionnaire (see Chapter IV) was followed by two sets of semantic differential scales. Roommates rated themselves and their cohabitant on eight evaluative and activity bipolar adjective scales -- good/bad, intelligent/unintelligent, polite/rude, considerate/inconsiderate, fast/slow, hard-working/lazy, people-oriented/work-oriented, and active/passive.

The Mehrabian Achieving Tendency Scale for Males that was used in Study 1 and the Bortner Pattern A Self-Rating Scale that was used in Study 2 followed the semantic differential items. The final scale

completed by the respondents was the 11 Morningness items.

Results

Test-Retest Reliabilities

Test-retest reliabilities were computed for Morningness and Achieving Tendency, using the responses of the 38 subjects who participated in Study 1 and Study 3, which were conducted 12 to 15 weeks apart. Reliability for the 11 morning activity items was high, r = .88. For Achieving Tendency, the figure was lower than had been reported previously. Fineman (1977) reported a test-retest reliability correlation of .78 over 10 weeks; I found test-retest for Achieving Tendency to be .58 for this sample.

Correlates of Morningness

As predicted, and in replication of Study 1's results Morningness was positively correlated with Achieving Tendency, r = .23. Unlike Study 1, with these subjects there was a significant positive relationship between the time urgency component of the Pattern A scale and Morningness, r = .20. Morningness was also related to self-descriptions on the slow/fast bipolar adjective scale, r = .24. The interscale correlations are presented in Table 4.

Again, there was no sex difference in Morningness, t (74) = 1.34, $p < .15$.

Table 4

Correlates of Morningness and Other Self-ratings

Study 3

	Pattern A			I Am			
	ACHIEVEMENT	COMPETITIVENESS	TIME URGENCY	FAST	ACTIVE	HARD-WORKING	WORK-ORIENTED
COMPETITIVENESS	.26						
TIME URGENCY	.02	.18					
Slow/FAST	.21*	.25*	.03				
Passive/ACTIVE	.12	.24*	.18	.41***			
Lazy/HARD-WORKING	.33**	.01	.17	.28**	.32**		
People-/WORK-ORIENTED	.39***	.28**	.19	.08	.24*	.24*	
MORNINGNESS	.23*	.08	.20*	.24*	.17	.15	.01

Note. N = 76. Tests of significance are one-tailed.

*p < .05
**p < .01
***p < .001

Discussion

The generally moderate and low (albeit significant) levels of the correlations revealed in Studies 1, 2, and 3 were not unexpected. The individual difference variable of Morningness is best conceptualized as possibly one of a number of moderators of task concern and time urgency. It is the pattern of correlations presented in this chapter and the ones that follow that suggests that Morningness should be a variable of concern to social and personality psychologists.

The preponderance of the evidence presented in this chapter indicates that people who awake early, alert and refreshed, are task-oriented, time-urgent, hard-driving people who prefer to lead rather than follow and who avoid wasting time by doing things fairly quickly and by trying to do more than one thing at a time. These morning-active types seem to literally and figuratively have more "get up and go" than others have.

Although correlational, the pattern of results from these studies provide some tentative information about the possible direction of causality in the relationship between circadian activity rhythm and achievement and time concerns. Intuitively, it seems quite likely that these concerns might well lead to morningness -- subjectively, getting up and starting work early in the day may seem to waste the least amount of time; actually, in many work and educational environments, morning activity may be the most productive. Conversely, however, being morning active in a culture in which achievement is connected to morning activity, starting with the earliest years of schooling and often continuing through a lifetime of 8-to-5 or 9-to-5 work, may aid in the

internalization of that culture's time and achievement norms.

The research findings of these studies provides evidence that this latter interpretation is a tenable one. If circadian activity rhythms are simply a component of a more general task orientation, one would expect that males -- who had significantly higher scores on the task-oriented and time-concern predictors of Morningness scores -- would differ significantly from females in their responses to the Morningness items. Such, however, was not the case; there was no sex difference in Morningness scores in either study in which it was assessed (and, it should be noted, repeated administrations of the Morningness measure with very large samples has yet to produce a significant sex difference in responses). A null result, of course, does not provide strong support for any hypothesis. It is reasonable to speculate, however, that although there may be some adjustment to morning-active rhythms in those who hate to waste time and want to get tasks done (and done quickly), there also may be a significant facilitation effect of morningness that leads to greater achievement strivings and a sense of time urgency within this time-urgent, achievement-oriented, morning-active culture.

CHAPTER III

The Impact of Pace and Time of Arising on Evaluation of Others

Study 4: Scenario Descriptions of Hypothetical Others

Because the temporal norms of the American culture stress morning activity and a quick pace, I expected that evaluations of others would be affected by these norms. Particularly Jones and Davis' formulation of attribution theory (1965) stresses the importance of the normativeness of behavior as mediator of impressions formed of actors. Socially desirable, expected behavior, according to Jones and Davis, provides little information about the dispositional nature of the actor, but counternormative behavior is assumed to reflect the actor's true character, and thus leads to dispositional attributions about the actor.

Given the pattern of correlations presented in the preceding chapter, I expected that college students at Michigan State would perceive late risers and slow-paced others to be significantly less achievement- and leadership-oriented than their early-rising, fast-paced counterparts. Also, given the general social acceptance and endorsement of task-related temporal norms (de Grazia, 1972; Lauer, 1981; Pratt, 1981), it was predicted that these evaluations would occur in situations that were not task-focused as well as in situations that were achievement-related.

Levine, West, and Reis (1980) demonstrated that Americans tend to perceive punctuality as related to happiness and success, at least within the context of appointments. Students at California State University, Fresno, simply rated a person who is always, occasionally, or never late

for appointments on likability, nervousness, happiness, and success scales. They also indicated how important punctuality was in their assessments of a business person and a friend. Punctuality for appointments was considered to be significantly more important for business people.

The present study provided a richer context in which to evaluate the impact of temporal norms on evaluations of others. It used a between-subjects design and description imbedded in scenarios that did not refer specifically to temporal norms, and varied several aspects of time concerns.

In this research, a large number of undergraduates read a paragraph that described a male or female who awoke a few minutes before 6, 8:30, or 11 AM. The actor was consistently fast-paced or slow in doing things. In one phase of the study, the target of the subjects' evaluations was described in a mundane, non-task oriented situation -- getting up and going to breakfast. In the other phase, the target was described as getting up, preparing for, and then taking an exam. Responses to the Morningness-Eveningness Scale were obtained from each subject.

Method

Subjects

A total of 657 introductory psychology students at Michigan State received course credit for their participation in this study.

Design

For the two types of scenarios -- one that focused on routine morning activity of waking, dressing, and eating breakfast, and one that focused

on waking, studying, and taking an exam -- the independent variables were sex of subject, sex of the target of the evaluation, speed of activity (fast or slow) and time of awaking (6, 8:30, and 11 AM).[2] A median split separated respondents into morning-active and morning-inactive types based on responses to the Morningness subscale items. Data were analyzed for the two groups separately. There were four dependent variables -- three subscales constructed from the factors that emerged from the semantic differential scales on which the target was evaluated, and the responses to the introversion/extraversion scale.

Instruments and Procedure

The Morningness-Eveningness Scale was presented first to half of the subjects and last to the remainder. An Agency-Communion Values scale being pretested for another project was completed; second by all of the respondents, which, it was hoped, would direct attention away from the experimental hypotheses in this study. The lack of order effects for the placement of the Morningness measure indicates that this probably was successful. Those who read the scenario first completed the Morningness scale last, and vice versa.

The scenario portion of the study began with a little, "First Impressions," and the information that "people tend to form opinions about others even when they have limited information about them. The purpose of this questionnaire is to explore some of the dimensions of first impressions." Instructions about reading the paragraph and marking responses on the semantic differential scales then followed.

After reading the descriptive paragraph, subjects rated their evaluations of the target person on 32, 7-point bipolar adjective scales.

Results

Data Reduction Procedures

Responses to 31 bipolar adjective scales -- all but introversion/extraversion, which was analysed separately to determine if subjects are cognizant of the relationship between morningness and introversion as this and previous research programs have found -- were factor analyzed with varimax rotation for eigenvalues greater than 1.0. Three factors emerged, and subscales were created from each, using the items that loaded substantially on one factor. The first factor contained items which dealt with good sense (i.e., practical, rational, responsible, wise, intelligent, successful, and so forth). Ten items comprised this scale. Factor 2 contained agentic items -- active, outgoing, leader-oriented, assertive, aggressive, etc. -- and factor 3 was a communal dimension -- warm, friendly, likable, considerate, etc. All scales had a coefficient alpha above .88.

Responses to the Task-Oriented Target

Morning-Active respondents. Evaluations of those who scored above the median on Morningness were examined via 2 (sex of subject) X 2 (sex of target) X 3 (time of arising) X 2 (speed of activity) analyses of variance for the four dependent variables. Speed of activity affected these respondents judgments of the target person, who was described waking, studying for an exam, and then taking the exam. Those who did things quickly -- showered, dressed, and ate breakfast quickly, strode to the exam, and finished the items quickly -- were rated as significantly more agentic than those who were described as doing those same activities slowly, F (1, 69) = 14.19, $p < .001$. (The mean rating of the

fast-paced target was 5.3, and the mean for the slow-paced counterpart qas 4.5).

Similarly, perceived extraversion was related to speed of activity, F (1, 69) = 10.43, $p < .01$. Slow targets were rated on the introversion end of the 7-point scale (M = 3.6) and quick targets were rated on the extraversion end (M = 4.5).

There were no significant effects for "good sense" or "communion" for morning-active subjects responding to the exam scenario.

Morning-inactive respondents. Like morning-active types, these respondents rated fast-acting targets as more agentic (M = 5.33) than slow targets (M = 4.55), F (1, 80) = 16.83, $p < .001$.

Introversion/extraversion produced a speed of activity by time of arising interaction, F (2, 80) = 3.13, $p < .05$. Morning-inactive respondents rated slow-acting 11 AM risers as significantly more extraverted than fast-acting 11 AM risers, F = 3.80, $p < .05$. The means that produced this interaction are presented in Table 5.

Morning-inactives rated fast-paced targets as higher in good sense than slow-paced target, F (1, 80) = 5.81, $p < .02$. The mean for the slow targets was 5.27; for the fast ones it was 5.84.

On the communion dimension, there was a significant speed of activity by time of arising interaction, F (1, 80) = 3.50, $p < .05$. The fast-acting late-riser was perceived as being significantly more likable and friendly than were the other targets. As Table 5 reveals, morning-inactive respondents tended to perceive slow-paced late risers as significantly less communal than their fast-paced counterparts, F = 12.12, $p < .01$.

Table 5

Means for the Speed of Activity X Time of Arising Interactions for Morning-Inactive Subjects/Exam Scenario

Introversion/Extraversion		
	Speed	
Time of Arising	Fast	Slow
6:00 AM	3.50	4.11
8:30 AM	3.78	3.80
11:00 AM	4.40	3.53

Communal Characteristics		
	Speed	
Time of Arising	Fast	Slow
6:00 AM	4.5	4.8
8:30 AM	4.8	4.7
11:00 AM	4.4	5.3

Thus, for the scenario that described a task-oriented, scheduled activity (taking an examination), it seems that morning-active people are particularly concerned with the time urgency component of behavior. Both speed of activity and time of arising affected morning-inactive subjects' evaluations, but simple effects tests revealed that it was the difference in speed of activity of the late risers that underly these interactions.

Responses to the Non-Task Oriented Target

Morning-active respondents. As in the previous phase of this study, morning-active subjects rated fast-paced targets as more agentic than slow-paced ones, even though the described activity involved no scheduling or an implicit need for punctuality or a quick pace, F (1, 155) = 24.93, $p < .001$. A person striding to breakfast and devouring the meal was considered to be significantly more agentic (M = 4.99) than one strolling to breakfast and lingering over the meal (M = 4.14).

The complex interactions that emerged for the extraversion scale are best described as indicating that subjects did not perceive either speed or activity or time of arising as directly related to the introversion of the target. There was a significant sex of subject by sex of target by time of arising interaction, F (2, 155) = 3.57, $p < .05$, and a speed by time interaction, F (2, 155) = 4.83, $p < .01$. Simple effects tests of the first interaction revealed that male and female subjects differed in the extent to which they assigned introversion/extraversion to the targets, which for this study is an uninteresting finding that is relegated to the appendix section. Simple effects tests of the latter interaction revealed that 6 AM risers who were described as slow-moving were perceived as more extraverted (M = 4.78) than those who were

fast-paced (M = 3.89), F = 4.18, p < .05; for 8 AM risers, the pattern was reversed -- slow pace was seen as more introverted (M = 3.63) and fast pace was seen as more extraverted (M = 4.59), F = 5.59, p < .05. These morning-active respondents did not differentiate between slow (M = 4.33) and fast (M = 4.00) 11 AM risers, F = .67.

As for the task-oriented situation, there were no significant effects on the communal and good sense dimensions rated by morning-active respondents.

Morning-inactive respondents. Again, there was a significant main effect for speed of activity on the Agency scale, $F(1, 154) = 26.03$, $p < .001$. Fast actors were more agentic (M = 5.04) than slow ones (M = 4.27) in the eyes of the morning-inactive respondents. These subjects also perceived 11 AM risers as significantly less agentic (M = 4.36) than 8:30 risers (M = 4.84) and 6 AM risers (M = 4.87), $F(2, 154) = 6.94$, $p < .001$.

Morning-inactive respondents to the non-task situation rated the fast-paced actor as more extraverted (M = 4.54) than the slow-paced actor (M = 3.92), $F(1, 154) = 6.77$, $p < .01$. They also perceived the earliest riser to be more extraverted (M = 4.75) that the 8:30 riser (M = 4.00) or the 11 AM one (M = 3.97), $F(2, 154) = 5.19$, $p < .01$.

A sex of subject X sex of target X time of arising interaction for the measure of good sense, $F(2, 154) = 5.86$, $p < .01$, was based on male subjects' rating females who were described as getting up at 11 AM lowest on the good sense dimension. The means simple effects tests for thisinteraction are presented in the appendix.

Responses of the morning-inactive males also underlay the significant sex of subject X sex of target X speed ($F(1, 154) = 5.04$, $p < .05$)

and sex of subject X sex of target X time of arising ($F(2, 154) = 3.64$, $p < .05$) interactions on the Communion scale. These males rated females who arose at 11 as least communal, as well as perceived slow-acting males and fast-acting females as less communal than others.

The Morningness Dimension

Factor analysis with varimax rotation for eigenvalues greater than 1.0 of responses to the Morningness-Eveningness scale yielded a structure comparable to that found in Study 1. Only a single item, one that could refer to either morning or evening activity level, loaded on a different factor.[3] Coefficient alpha for the first factor, again the dimension on which the morning activity items tended to fall, was .77.

Coefficient alpha of the 11 items that constituted the Morningness scale as used in the previous studies (and this one) was .76.

As in all of the samples, there was no sex difference in Morningness scores, $t(624) = .59$, $p < .55$. Certainly there was more than sufficient power to detect a sex difference had there been one (Cohen, 1977).

Because the data for this study were collected over the course of a term (specifically, Fall 1981), it was possible to test the hypothesis that Morningness is related not only to getting up and doing things early in the day, but also doing things early in general. As expected, the Morningness scores of those who participated in the first half of the term were significantly higher than those who participated in the second half of the term, $t(618) = 2.4$, $p < .01$.

Discussion

In summary, the results of these two scenario studies strongly support the hypothesis that time-urgent behaviors influence the impressions people form of others. In particular, agentic characteristics (i.e., assertiveness, leadership, ambitiousness, and so forth) were perceived as related to fast-paced activity in both task-focused and task-irrelevant situations and by both morning-active and morning-inactive respondents.

Time of arising was found to be a more salient characteristic in morning-inactive subjects' responses than in those of morning-active subjects. However, only on ratings of agency and extraversion were there main effects for time of arising, and these occurred only when the situation was not a specifically task-oriented one.

The responses to the introversion/extraversion scale suggest that subjects did not perceive a direct relationship between introversion and the tendency to be morning active, a relationship that some studies, including this dissertation research, have shown to exist. In fact, the the research evidence suggests that morning-active, fast-paced people might well be the most introverted, but these subjects tended to equate a quick pace and morning activity with extraversion.

Morning-active subjects did not seem to believe that being morning active is related directly to success and intelligence (i.e., the "good sense" items), and thus there is some evidence that those concerned with achievement on tasks are not simply and only arising early to fulfill achievement goals. As in the previous chapter, a null result can only provide very limited support for a hypothesized relationship, but again

there is a pattern that tentatively suggests that achievement concerns are not seen as specifically causing morning activity.

Also, there is little evidence, especially for morning-active subjects, that the likability of another person is tied directly to the time of day they wake up in the morning. Those who tend to be lower than the median of Morningness did tend to rate late risers who are slow-paced in task-oriented situations as lower in communal characteristics than their fast-paced counterparts, and morning-active males did rate females who arose at 11 as least communal, but there is little suggestion from this study that time-of-arising differences, in the absence of any other information, specifically affect perceptions of others' sociability attributes. These results are important in light of the findings of the compatibility of roommates as a function of the similarity of their Morningness tendencies, which are presented in the following chapter.

The reliability of the Morningness dimension -- the robustness of the factors, the continued finding of no sex difference, and its acceptable internal consistency -- that was revealed in this research supports the continued use of the Morningness scale. In addition, the finding that, relative to less morning-active undergraduates, Morning types tend to avoid procrastination, lends further support to the contention that people who arise early, alert and refreshed, tend to be more time urgent in their behaviors.

The results of the experimental design portion indicate that temporal norms, particularly those that emphasize the pace of activity, influence perceptions of others in this culture. A quick pace is not only

valued, but is perceived as being related to agentic dispositions, extraversion, and, in some cases, intellectual capabilities and successful performance. It seems reasonable, then, to speculate that those who are not able to maintain a quick pace -- for example, the aged and the physically handicapped -- as well as those whose learned pace is relatively slow -- for example, Southerners, laid-back Californians, and so forth (cf. Buchanon, 1980) -- might well be perceived more negatively than faster-acting counterparts who actually perform the same behaviors and achieve the same goals.

CHAPTER IV

Circadian Activity Rhythms and Roommate Relationships

The synchronization of the schedules of those who live together has been recognized as a potentially important variable in understanding interpersonal relationships, but extremely little empirical research has been done to date on this issue (Bohannon, 1980; Lauer, 1981). In a discussion of family interaction processes, Kantor and Lehr (1975) state, "If people are out of phase with one another, they may not even be able to be home together at the same time, much less make love or fight with one another," which suggests that lack of synchronization may have positive (no fighting) as well as negative (lack of opportunity to make love) effects.

According to Jones (1974), "(I)nvestigators of the similarity-attraction phenomenon some day may be talking about similarity of natural rhythms along with, and perhaps even with greater frequency than, similarity of attitudes, traits, upbringing.... (I)t may turn out that popular personalities are either those with patterns or frequencies of activities that fall at the average for the population where there are lots of similar styles, or those with more flexible 'clocks' which can stretch to encompass a greater variety of individual routines and rhythms.... Researching these ideas has the potential advantages of generating somewhat of a 'new look' in the study of attraction, of being amenable to rigorous experimentation, and of having some a priori plausibility at least if everyday descriptions of human relations such as 'in tune,'

'wave-lengths,' and 'vibrations' are to be taken seriously." (pp. 176, 177). However, the bases of such empirical research do not have to rest only on common wisdom's recognition of "being in sync."

If synchronized activity schedules and biological rhythms is more pleasureable than unsynchronized rhythms, as evidence presented in Chapter 1 suggests that it is, then it is reasonable to hypothesize that people prefer, on the whole, to lead lives compatible with their internal clocks. That is, most people will choose, whenever possible, to go to bed when they are tired, awake when they are rested, eat when they are hungry, and so forth. (This statement may not seem so simplisitic when one realizes that the temporal norms of this culture do not tend to take such individual differences into account.) The scheduling of two people's daily activities, then, is undoubtedly influenced by each person's internal and external constraints as well as the differences between the two people on both of these dimensions. Studies of jet lag indicate that synchronization of internal and external rhythms is healthier physically and psychologically than lack of synchronization. When two people's rhythms are not in phase in a living-together situation, it is likely that this social situation is more stressful than one in which the individuals are similar in their circadian activity rhythms.

The effects of differences between college roommates' circadian activity rhythms on ratings of their relationship were explored in two studies. It was predicted that the closer the roommates were in their scores on Morningness, the greater the interpersonal harmony within the relationship. Results of the research presented in Chapter II indicated that morning-active students are more similar to one another on time and task concerns than morning-active and morning-inactive students are, a

difference that might account for some of the predicted effect (cf. the research on attitude and personality similarity and interpersonal attraction, e.g., Byrne, 1971; Meyer & Pepper, 1977). Results of the studies presented in Chapter III suggest that morning activity versus morning inactivity, per se, will have little stereotypic influence on the evaluation of a roommate. Therefore, if differences in activity rhythms are found to be related to roommate compatibility, independent of similarities of roommates on the correlates of Morningness, then it will be reasonable to conclude that lack of synchronization of roommates' rhythms is a meaningful component of disharmony among those who live together.

Study 5: Roommate Relationships -- The First Sample

In this study, subjects were undergraduate roommate pairs who were examined at one point in time. Respondents completed the Morningness subscale, measures of time and task concerns, and rated the roommate relationship as well as themselves and their roommate on several interpersonal dimensions.

Method

Subjects

Participants in Study 1 (see Chapter II) who said they were freshman living on campus with one roommate and who scored at least half a standard deviation above or below the mean on the Morningness measure were recruited to participate, along with their roommate in this study. None of those who could be located on campus and still lived with just one other person declined to fill out the questionnaires. The 76 roommates each received $2.

Procedure

An undergraduate interviewer who was the same sex as the roommate pair contacted them by phone 12 to 15 weeks after Study 1 had been conducted and arranged a time convenient to all to administer the questionnaire in the dormitory room of the pair. Participants were told that their answers were confidential and would not be disclosed to the roommate (or anyone else).

Instruments

The booklet that each roommate completed included a 12-item "Roommate Compatibility" section. First impressions, how well the roommates get along, enjoyment of living together, the closeness of their friendship, and the perceived similarity of the roommates were assessed on 7-point scales. There were six items that asked about similarity — in general and in political beliefs, political attitudes, academic interests, athletic interests, and preferred leisure-time activities.

The roommate compatibility section was followed by two sets of semantic differential scales. Respondents rated themselves and then their roommates on eight evaluative and activity-based adjectives -- good/bad, intelligent/unintelligent, polite/rude, considerate/inconsiderate, fast/slow, lazy/hardworking, people-oriented/work-oriented, and active/passive.

The Mehrabian Achieving Tendency Scale for Males that was used in Study 1 was administered next, followed by the Bortner Type A Behavior Pattern scale, which was utilized in Study 2. The last thing the respondents completed was the 11 Morningness items derived from the Morningness-Eveningness Questionnaire in the first study.

Results

The absolute difference between roommates' Morningness scores was computed and correlated with the average rating of the roommate and the relationship within each pair. As can be seen in Table 6, differences in morning activity tendencies were negatively related to how well the pair said they got along, how much they enjoyed the relationship, how much they wanted to continue to live together, and the closeness of the roommates' friendship. The absolute difference in roommates' Achieving Tendency, time urgency, and aggressive drive scores, however, were not significantly related to these measures, which indicates that it may be more than task-related personality differences that caused conflict between these roommates.

Partialling out the absolute difference between roommates' scores on the measures of achievement tendency and time urgency tested the hypothesis that these variables contributed substantially to the significant correlation between Morningness differences and interpersonal disharmony. As predicted, the partial correlations were significant on the measure of how well the roommates said they got along, $r = .34$, $p < .05$, and on the measure of the closeness of the friendship, $r = .33$, $p < .05$, and the partial correlations for enjoyment of the relationship, $r = .23$, $p < .10$, and for desire to continue to live together, $r = -24$, $p < .10$, were marginal.

Differences in Morningness scores were unrelated to pairs' perceptions of most types of dissimilarity between the roommates. Pair ratings of political similarity ($r = -.34$, $p < .02$) and preferred leisure-time activities ($r = .43$, $p < .005$), however, were negatively related to the absolute difference in roommates' Morningness scores.

Table 6

Correlates of Roommate Compatibility

Study 5

	Absolute Difference in Roommates' Scores			
Pair Rating	Morningness	Achieving Tendency	Competitiveness	Time Urgency
Getting along	-.33*	-.15	.17	-.17
Enjoyment	-.28*	-.23	.18	-.26
Continuation	-.27*	-.17	.16	-.19
Friendship	-.33*	-.06	.14	-.12

Note. N = 38. Significance tests are one-tailed.

*$p < .05$.

Partial correlations revealed that when similarity of preferred leisure-time activities is held constant, the correlations between differences in roommates' Morningness scores and the measures of compatibility no longer reach significance. Political attitude similarity, when partialled out, also reduced the magnitude of the correlations, but only on the desire to continue to live together did the correlation no longer reach at least marginal significance ($p < .075$). Perhaps the significant leisure-time-activity effect is due to a sense that one person would rather sleep while the other would rather play at various times of the day.

Of the eight semantic differential ratings of the roommate, averaged within each pair, only general evaluation (i.e., ratings on the good/bad scale) was correlated with absolute difference in morningness tendencies, $r = -.28$, $p < .05$.

Discussion

This study confirms the expectation that differences in daily activity rhythms affect the relationship between those who live together. Certainly, however, these results do not indicate that morning-active people are unable to live harmoniously with morning-inactive types, nor vice versa. But it does empirically support previous speculations about the impact of individual's rhythms on interpersonal interactions.

These results may seem intuitive (not an uncommon after-the-fact phenomenon in social psychological research), but it is important to note that little attention has been paid previously to such issues. Those with synchronized circadian activity rhythms cycles get along better, enjoy living with one another more, have a greater desire to continue the

roommate relationship, and tend to describe themselves as closer friends than those whose rhythms are not synchronized. Similarity of Morningness scores is related to interpersonal attraction, and therefore, synchronization of activity schedules should be recognized as a distinct component of roommate compatibility.

As in the other correlational research described in this dissertation, the cause-and-effect nature of the reported relationships can only be debated. It is possible that the participants of Study 5 who liked one another became more similar in their circadian activity rhythms over the course of the relationship than those who did not particularly like one another. To begin to explore the dynamic nature of synchronized rhythms, another study was conducted with roommates; that one (Study 6) followed a group of roommates over the course of an academic year.

Study 6: Roommate Relationships -- The Second Sample

To examine more closely the relationship between synchronized rhythms and interpersonal attraction in roommate situations, introductory psychology freshmen and their roommates were recruited to participate in this study, which began during the first half of Fall term, 1981, and continued through the last weeks of Spring term, 1982. Those participants who were rewarded with extra credit in their introductory psychology classes agreed to continue participation beyond the completion of their class, but failure to contact some of these participants, refusals by both introductory psychology and other respondents to answer follow-up questions, and terminations of roommate arrangements did somewhat reduce the intended scope this study. Nevertheless, by obtaining information several times over the course of an academic year, changes in Morningness differences as well as in roommate compatibility could be explored.

Method

Subjects

Females in introductory psychology courses at Michigan State University who were living on campus with one roommate were recruited to participate in this study for course credit.[4] A total of 35 roommate pairs completed the first questionnaires. Because some of the roommates did not receive credit for their participation (those who were not taking Introductory Psychology during Fall term) and some had obtained as many extra credits as they could use in the course, there was differential willingness to agree to continue participation for the remainder of the year. Drop-out for this and other reasons (returned mail, roommate arrangements that had changed, and so forth) reduced the number of roommate dyads in the final sample to 14 pairs.

Procedure

Female undergraduate assistants contacted those who had signed up to participate in this research and arranged a time to administer the questionnaires to the roommates in their dormitory rooms during the middle of Fall term. The first two follow-up questionnaires were administered by phone, one at the end of Fall term, and one at the end of Winter term. The final questionnaire was mailed to all those who had participated previously who were not known to have ended the roommate living arrangements. These were mailed four weeks before the end of final exam week of Spring term.

Instruments

The first questionnaire consisted of the Roommate Compatibility items used in Study 5, as well as the same semantic differential items on which respondents rated themselves and their roommate. The 19-item

Morningness-Eveningness Questionnaire was administered last.

The telephone interviewers asked questions about how the roommates had been getting along recently and about activity scheduling conflicts for the second and third phases of the study. The final questionnaire, which was mailed, asked participants to rate their roommate and their relationship and then to complete the Morningness-Eveningness items. The mailed version reminded participants that "it is very important that you do not discuss your responses with your roommate before or during the completion of this set of questionnaires." Phone questions, for the most part, required a numerical response (e.g., "On a scale of 0 to 5, where 0 means 'not at all' and 5 means 'very much'...) and thus, since the roommate could not hear the question to which the participant was responding, confidentiality was assured.

Results

Panel Analyses

The absolute difference between roommates' Morningness and Eveningness scores for those pairs who participated in both the fall and spring were correlated with a measure of compatibility obtained by summing the roommates' responses to the four items found to relate to roommate harmony in Study 5 (i.e., how well they were getting along, how much they enjoyed the roommate relationship, their desire to continue the relationship, and the closeness of their friendship). Thus, there were measures at two points in time of compatibility, differences in Morningness, and differences in Eveningness. The correlations are presented in Figure 1 as cross-lagged panel data. As inspection of Figure 1 reveals, the correlation between differences in Morningness and compatibility at

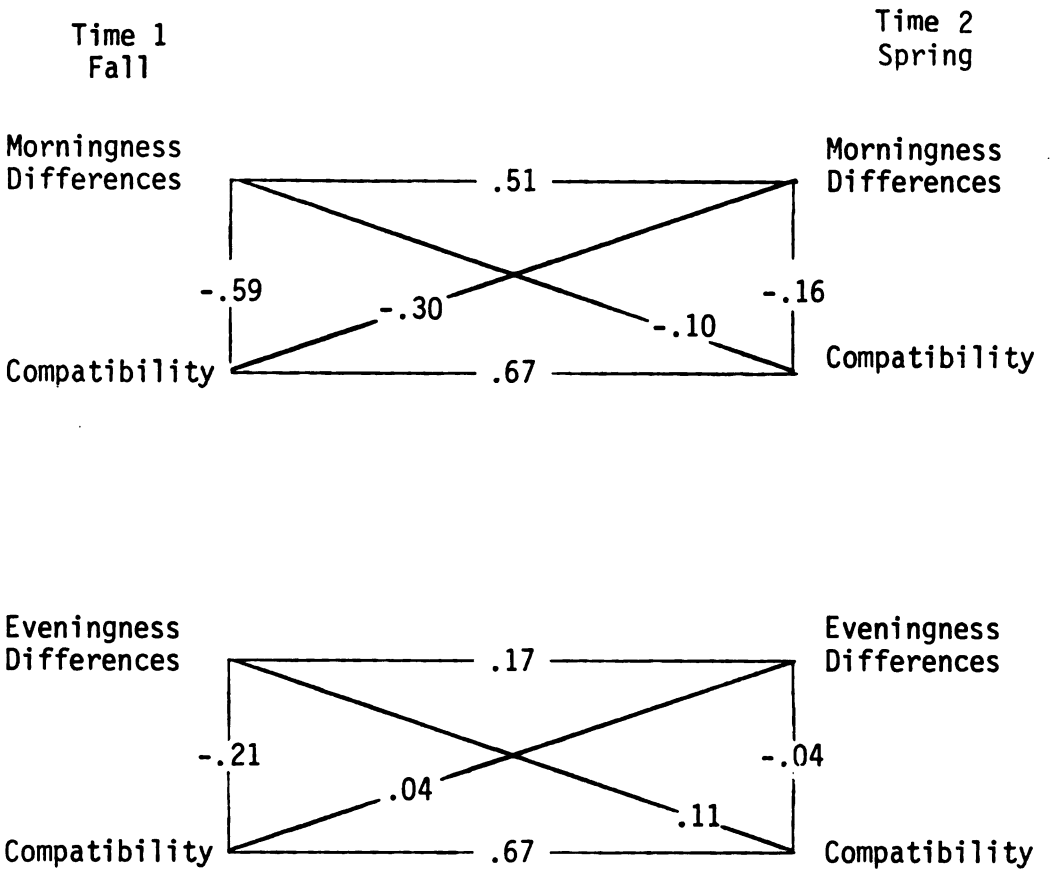

Figure 1

Roommates' Panel Data

Study 6

the beginning of the academic year is not equal to the correlation between differences in Morningness and compatibility at the end of the year (r = -.58 and r = -.09, respectively). Therefore, since the pivotal assumption of cross-lagged analysis is stationarity (equal synchronous correlations), this analysis could not be performed (Kenny, 1979). This indicates that there is not a simple cause-and-effect relationship between circadian activity rhythm synchronization and interpersonal attraction in roommate relationships, at least with this subsample of respondents who continued to participate in this research throughout the course of the year.

The data presented in Figure 1 for the differences in Eveningness variable indicate, as they had in the previously reported studies, that the dimension of Eveningness, at least as measured by the items from Horne and Östberg's (1976) scale, contributes little to personological or social psychological analysis. The correlation between differences in Eveningness score and compatibility, while in the predicted directions at the beginning of the year (r = -.21), is less than half that of the correlation between difference in Morningness and the same measure of compatibility at that time (r = -.58). Again, the synchronous correlations are not equal, and therefore further cross-lagged panel analysis was not performed.

Test-Retest Reliabilities

An individual's score on Morningness at the beginning of the academic year was significantly correlated with her Morningness score at the end of that year, r = .49, p < .01. Test-retest reliability for Eveningness, however, was quite for this span of seven months, r = .10, p < .30.

A paired t-test for non-independent samples revealed that changes in Morningness and Eveningness scores were unlikely to have been due to roommates' scores converging. The mean difference between the roommates Morningness score at the beginning of this study (M = 6.23) dropped insignificantly (M = 5.00) by the end of the study, t (12) = 1.09, $p > .29$. Eveningness differences (M = 2.57 at the beginning) actually increased slightly, albeit insignificantly, by the end (M = 2.79), t (13) = -.30, $p > .76$.

Other Synchronization Correlations

In addition to the significant correlations on the measures of roommate compatibility, for the 14 complete pairs there was a significant relationship found at the onset between difference in Morningness and not doing things together, $r = .60$, $p < .02$. At the beginning of the study, difference in Eveningness was negatively correlated with friendship closeness, $r = -.48$, $p < .05$, and positively correlated with similarity of academic interests, $r = .50$, $p < .05$, and never doing things together, $r = .49$, $p < .05$. At the end of Spring term, the only correlation to reach significance was between difference in Eveningness and ratings on how often differences in sleep schedules created problems between the roommates, $r = .49$, $p < .05$.

There was no significant relationship found between differences in activity rhythm scores and those who stayed together and those who ended the roommate relationship.[5] At the end of Fall term, 3 of the 31 pairs had split up, but the difference in Morningness for those still together (M = 9.39) was slightly higher than for those who were not (M = 7.67), t (32) = -.48, $p < .63$. Eveningness difference of those who were living together (M = 2.42) was insignificantly higher than the Eveningness

difference of those who had made other living arrangements (M = 2.00), t (32) = -.41, p > .68. By the end of Winter term, one more roommate pair was no longer together. The pattern of means remained the same. On Morningness, those who stayed together (M = 9.57) did not differ significantly from those who split up (M = 6.75), t (32) = -.90, p > .37. Likewise, on Eveningness differences, those who stayed together (M = 2.4) did not differ from those who did not (M = 2.25), t (32) = -.17, p > .87.

Discussion

The evidence provided by Studies 5 and 6 suggests that differences in roommates' circadian activity rhythms are related to the interpersonal attraction between them, but at least for those willing to participate throughout the year without additional reward, it seems that the phenomenon is a complex one. It may well be that these respondents were more willing to work somewhat more altruistically than most at keeping the relationship together (after all, they were altruistic in their participation in this research), and thus were able to overcome the initial debilitating effects of unsynchronized rhythms of activity.

Study 5 was conducted during Winter term (1981) and Study 6 began Fall term (1982), so there is some support for the notion that the relationship between Morningness similarity and interpersonal harmony does not necessarily dissipate over time. The samples are not from the same population, so direct comparison over time is inappropriate (e.g., at least one roommate from the pair was significantly high or low on Morningness in Study 5; only females participated in Study 6), but the patterns of correlation are such that it is reasonable to conclude the differences in morning-based activity rhythms are related to how well roommates get along at least while they face continuing to live together for more than a few weeks.

CHAPTER V

The Effects of Activity Rhythm Synchronization on Compatibility and Productivity Among Strangers

Study 7

The previous chapter provided evidence that synchronization of the morningness component of circadian activity rhythms between roommates is related to interpersonal harmony. The more similar the roommates' Morningness scores, in general, the better they liked one another, the more they desired to continue the roommate relationship, and the less conflict was reported. The study presented in this chapter explored the generalizability of these results to a very different social situation: strangers interacting for approximately an hour in order to solve several puzzle tasks.

Roommates' primary interpersonal task may be assumed to be avoiding interpersonal conflict over long periods of time. The experiment reported here was of short duration and was focused on the completion of specific work. If differences between subjects' Morningness scores are related to perceptions of one another in situations that do not involve long-term scheduling of activities, it would indicate that activity rhythm synchronization is a variable that has implications for understanding interpersonal behavior beyond that directly related to daily temporal patterning (e.g., sleep schedules).

In Study 7, each dyad member received half of the information needed to solve four puzzles. Instructions were brief, and subjects were told simply that the purpose of the study was to examine the process of getting to know someone in a task-oriented situation. Assumption of a leadership

role (if any), order and manner of completing the puzzles, decisions about joint versus individual efforts, and so forth were left up to the subjects. Subjects' activities had minimal structure imposed upon them. It was necessary to combine puzzle pieces, but after that, procedures were determined by subjects for the puzzle completion phase of the study.

Because Morningness was found to be related to a sense of time urgency, a quick pace, valuing of task leadership, and concerns with achievement (see Chapter II), I expected to find that Morning-active subjects who participated in this study would work faster, be more influenced by leadership concerns, and contribute more to puzzle solutions than morning-inactive subjects.

Heterogeneous pairs (i.e., those with one member who had a low Morningness score and one member who had a high score) were expected to indicate less enjoyment of working together than homogeneous pairs, a result which would demonstrate the social psychological importance of circadian rhythms. Chapple and his colleagues have examined patterns of verbal interactions and concluded that states of equilibrium are characteristic of groups, and those that do not adjust their rhythms of speech and pauses are unable to work together effectively (e.g., Chapple & Coon, 1962). Although the homeostatic concept is inappropriate (rhythms indicate stable cycles of change, not equilibrium), it might well be that synchronizations of various rhythms, including those of circadian activity, are conducive to group harmony. If it is true that "circadian rhythms lie at the heart of chronobiology — the twenty-four hour unit of one solar day almost certainly cues the other changes, whether they are monthly, seasonal, annual or any other duration" (Weston, 1979, p. 11), then differences between people's circadian cycles should have some

effect on their interaction rhythms. In turn, this was expected to affect both social perceptions and behavior in the situation.

Method

Subjects

A total of 322 introductory psychology students completed the 19-item Morningness-Eveningness Questionnaire (Horne & Östberg, 1976). Selection questionnaires for a number of research projects were distributed to the class members on the first day of the term; there was no apparent connection between completion of the Morningness-Eveningness items and recruitment for participation in the experimental phase of the study. The 30 males and 30 females who took part in working with another subject on the puzzle tasks for an hour scored at least half a standard deviation above or below the mean on the Morningness measure. They received course credit for their participation.

Design

The independent variables in this study were the sex of the subjects in a dyad (subjects were always paired with a same-sex partner), the subject's level of Morningness (high or low), and the partner's Morningness score (high or low). Of course, this design also permitted examination of the data in terms of dyads as the unit of analysis, with the focus on homogeneous versus heterogeneous pairs.

The major dependent variables included desire to work with the same partner if given the opportunity, preference for working alone, preference for being a leader, actual assumption of the leadership role, and time taken to complete the various portions of the study.

Procedure

Introductory psychology students who scored half a standard deviation above or below the mean on Morningness were telephoned and offered course credit for participating in a study that involved working on a series of word and picture puzzles. All sessions were conducted with up to four same-sex pairs in a room. As in Study 1, sessions were run in the mid to late afternoon. The rooms were arranged so that dyad members sat across from one another at a table and were separated from other pairs.

Subjects were told the purpose of the research was to study the process of getting to know someone in a task-oriented situation, and they were asked to inform the researcher if they had been paired with someone they knew, so the pairings could be switched. They were told that each person would be given half of the information needed to complete the puzzles, but that how they worked on the puzzles was up to them, except for the requirement that the group not consult members of other groups. The instructions included the direction to raise a hand to indicate completion of all four puzzles, at which time the researcher would hand out the final questionnaire, which was to be completed individually. The procedure was presented in writing to the subjects and was also read aloud by the experimenter. After the instructions were given, consent forms were signed by the participants.

The puzzles included a 25-item translation task (e.g., subjects had to match "caveat emptor" with "let the buyer beware"); a 4-part compound word puzzle in which subjects had to unscramble the letters to form the words; a famous quotation that was formed from scrambled letters; and a puzzle that consisted of identifying geometric figures hidden in 12

designs. The puzzles used in this study were chosen from a book of puzzles (Edwards, 1977) and had been pretested with a group of undergraduate research assistants and found to be challenging but possible for some to complete in just over half an hour.

After 45 minutes of work on the four puzzle tasks, the experimenter announced time was up for all those who had not yet indicated completion of the task. The time the puzzles were completed (or when the task-period was ended by the experimenter) was recorded. Upon completion of the puzzle phase of the study, dyad members were separated, given the final questionnaire to fill out. The times the subjects began and finished this instrument were recorded by the experimenter as well.

Instrument

The questionnaire asked the participants to first describe their interactions with their partner and then indicate, on a 6-point scale, the pace of their work compared to the pace of their partner, followed by a 4-point rating of their desire to work with the same partner if the opportunity arose in another research study. On the latter scale, a response of "I would like to work with a different person" was given a value of 1, and "I would like to work with the same person" was awarded a value of 4.

Next the respondents rated their perceptions of the four tasks individually, with presentation of the specific puzzle task randomly ordered. For each task, they estimated the amount of time spent on it, identified the person who contributed most to its solution and the person who acted most as group leader, and then responded on 4, 7-point scales to questions about working on the task with their partner. Specifically, these latter items asked about increased efficiency and enjoyment if they

had worked alone or had been appointed leader on the task. Because there tends to be a positivity bias in rating others, these items were designed to appear more procedural than evaluative, and thus to be more precise in measuring actual reactions to one's partner.

Results

Selection on Morningness

The median for Morningness (29.08) is approximately equivalent to the mean (28.94), and the curve of the distribution is bell-shaped. Likewise, the Eveningness scores are normally distributed, with a median of 22.62 and a mean of 22.55. Therefore, it was appropriate to use the cut-off of half a standard deviation to select subjects to participate in the experimental phase of this study.

Preliminary Analyses

A series of 2 (Morningness of person 1 in the dyad -- high or low) X 2 (Morningness of person 2 -- high or low) X 2 (sex of dyad) unweighted means analyses of variance were performed on responses to the questionnaire items (with specific task items summed over the four tasks). These analyses found few effects for dyad per se -- that is, the within-dyad error terms tended to be approximately equal to the between terms. Therefore, between-subject analyses of variance were performed on the data and are presented below.

Morningness Effects

It was predicted that those with high Morningness scores would complete the questionnaires faster than those with low scores. The correlation between Morningness and questionnaire completion time was in the predicted direction and marginally significantly $r = -.19$, $p < .09$.

A 2 (Morningness of subject) X 2 (Morningness of partner) X 2 (sex of subject) analysis of variance on perceived pace on the puzzle tasks (i.e., responses to comparison of own versus other's pace, where 1 = "my partner seemed to have a tendency to work much faster than me" and 5 = "I seemed to have a tendency to work much faster than my partner") revealed no significant effects.

The same ANOVA on time to complete the final questionnaire revealed a significant main effect for the Morningness score of the partner, $F(1, 46) = 5.11$, $p < .05$. Apparently having had a morning-active partner spurred the subject to finish the final questionnaire more quickly (M = 13.97 minutes) than having had a morning-inactive one (M = 16.48 minutes).

If Morningness is a component of a leadership orientation, then Morningness should have been related to assuming a leadership role, but the analysis of responses to "Who acted most as group leader?" (summed over the four tasks) yielded no significant effects. Those with high Morningness scores also were no more likely to have been perceived as contributing the most to the completion of the puzzle tasks.

Homogeneous Pairs

It was predicted that pairs of subjects with similar Morningness scores would work better together than would heterogeneous pairs. The evidence for this hypothesis tends to support this hypotheses with some qualifications.

On the desire to work together with the same person, there was a marginal own Morningness x other's Morningness interaction, F (1, 52) = 3.34, $p < .075$. High Morningness dyads were more apt to want to work together at a later time (M = 3.75) than homogeneous low Morningness pairs (M = 3.00) or heterogeneous pairs (M = 3.07 for both pairings).

There also was a significant main effect for sex on this dimension -- females were more apt to want to work with the same person again (M = 3.5) than males (M = 2.97), F (1, 52) = 6.47, p < .02.

The means that produced the significant own Morningness X other's Morningness interaction, F (1, 52) = 7.15, p < .01, on the aggregated responses to "Would you have enjoyed this task more if you had been appointed group leader?" indicated that even though homogeneous high Morningness dyads showed the greatest desire to work with their partner, they would have enjoyed the work even more if they had been appointed leader of the group. These means are presented in Table 7. Homogeneous pairs did not differ significantly from one another, but high Morningness pairs produced higher ratings than the heterogeneous pairs (Fs = 7, p < .05), whereas the simple effects tests revealed no significant differences between the ratings produced by low Morningness pairs and those of any of the other types of pairings.

A similar pattern of means (also presented in Table 7) underlies the significant own Morningness X other's Morningness interaction, F (1, 52) = 9.68, p < .005, for "Do you think you could have done a more efficient job if you had been appointed group leader on this task?" Members of the homogeneous pairs did not differ significantly, nor did the members of the heterogeneous pairs, but high Morningness pair members rated their increased efficiency if leader significantly higher than the high Morningness subjects who were paired with low Morningness subjects, F (1, 52) = 7.37, p < .01, as well as low Morningness subjects paired with high Morningness types, F = 4.97, p < .05. Low Morningness subjects who were paired with other low Morningness subjects did not differ from their counterparts who were paired with a high Morningness person, but did

Table 7

Means for Own Morningness X Other's Morningness Interactions

Increased Enjoyment if Leader		
	Other's Morningness	
Own Morningness	Low	High
Low	3.11	2.70
High	2.67	3.58

Increased Efficiency if Leader		
	Other's Morningness	
Own Morningness	Low	High
Low	3.45	2.94
High	2.82	3.57

differ in their ratings from those high Morningness participants who were paired with a low Morningness partner, $F = 4.66$, $p < .05$. Homogeneous pairs were no more successful on the puzzles than were heterogeneous pairs. Three (type of dyad - both low Morningness, both high Morningness, and heterogeneous) X 2 (sex of dyad) analyses of variance found no effects on the amount of time used to work on the puzzles and no effects on three of the four puzzle success measures. Only on the famous quotation task was there as effect for composition of dyad, and that effect was only marginally significant. Heterogeneous pairs completed more words in the phrase ($M = 8.27$) than homogeneous low Morningness ($M = 4.86$) or homogeneous high Morningness ($M = 5.25$), F (2, 24) = 2.59, $p < .10$. There also was a main effect for sex of dyad on this variable. Females completed significantly more words ($M = 8.67$) than males ($M = 4.67$), F (2, 24) = 8.59, $p < .01$.

Discussion

The results of this study suggest that Morningness does make some difference in short-term interactions, and that circadian rhythms are an important social psychological variable in relationships that do not involve sleep schedules. If Morningness is solely a difference of time of arising and feeling alert, and synchronization effects apparent only when living-together relationships are examined, then they would not be expected to have an impact on choice of a work partner in the late afternoon hours. Yet homogeneous high Morningness pairs preferred more than others to continue their relationship with the same partner.

The pattern of results suggests that Morningness synchronization effects are quite complex. It seems that both level of morning activity

tendencies as well as morningness synchronization must be taken into account. Thus it would be inappropriate to conclude that similarity of Morningness scores leads to maximum task or socio-emotional outcomes. Rather, it seems that Morningness differences is one of a number of potentially influential variables, including Morningness, that has an effect on the willingness to continue interacting with another.

Morningness of one's work partner also influenced the speed at which one completed the final questionnaire. Given the results of the scenario studies (presented in Chapter III), which revealed that speed of activity is valued and seen as related to performance competencies, it is reasonable to conclude that the interaction rhythm of a morning-active person can act as a model for others' pace.

As previously found, this study also supported the hypothesis that morning-active people tend to do things somewhat more quickly than morning-inactive types. There was a marginally significant correlation between own Morningness score and time taken to complete the questionnaire, although this effect was not significant when examined in terms of the own Morningness level X other's Morningness level x sex analysis of variance.

Although Morningness had been found to be related to achievement and leadership values in other of these studies, there was no relationship between being perceived as the leader or key contributor to the solution of the puzzle tasks in this research. It could be that leadership and task focus were not particularly salient because the situation was presented as a study of "how people get to know one another in a task-oriented situation" -- possibly this was interpretted by subjects as a socio-emotional goal.

This study is perhaps best considered as strong support for the hypothesis that individual's circadian activity rhythms do make a difference in short-term encounters, as well as evidence that further research needs to be done -- and at various times of the day -- to further explore these effects and the personality correlates of Morningness. The primary measure of compatibility -- desire to continue the relationship -- was found to be related to the morning-activity level of the members, but the measures of desire to work alone (intended as a more subtle measure of compatibility -- it seemed that those who did not feel comfortable denigrating their partner might have opted for saying it would have been better to be alone) did not reveal any significant effects. Whether the problem was in the measure, it is apparent that continuing efforts need to be directed at uncovering the components of interpersonal harmony and task effectiveness and roles that are affected by individual differences in morningness tendencies.

CHAPTER VI

Conclusion

The Morningness Variable as the Beat of the Different Drummers

Time is a cultural synchronizer -- "the last man on earth will not need a wtach" (Maxwell, 1972, p. 51). Agreement about the time an activity will commence as well as agreement about temporal aspects such as punctuality leads to greater efficiency in carrying out that and other activities. For example, planning to meet others for a meal with the understanding that it will be done "on time" permits the preparers to efficiently coordinate their activities, knowing that the others will arrive on the same day, probably within the same hour or even minute. Everyone involved can try to schedule their other eating times that day in order to be hungry, but not painfully so, when that meal is served.

Such temporal patterning may be efficient, especially in a complex society, but it does not take into account biological as well as social time. In the American culture, social time tends to emphasize linear components, whereas biological time is a cyclical process. This dissertation focused on the issue of social and individual circadian rhythm synchronization, particularly in terms of morning-based rhythms. Our educational and work enviroments tend to be morning active; only some individuals tend to be.

The cause-and-effect nature of morning-inactive people being out of sync with a morning-active environment is, at this point, only speculative. The series of research studies reported here is a first look at the nature of this relationship and is best conceptualized as an

instigator of future research. These studies have established fairly strongly that individual differences in the tendency to be morning active are social psychologically and personologically meaningful; the development and specific impact of such differences remain to be explored.

It was found that Morningness, as hypothesized because of its cultural value, was a more important correlate of behavior, evaluations, values, and characteristics than Eveningness. This pattern of results may be due, at least in part, to the poorer psychometric qualities of the Eveningness scale, but whatever the cause, the separate dimensions of morning activity and evening activity are apt to be a valuable distinction not often made previously.

Lay proposed in 1912 that there are four types of circadian rhythms -- both morning active and evening active, morning active and evening inactive, morning inactive and evening active, and morning and evening inactive (Kleitman, 1963). The results of the factor analyses of the Morningness-Eveningness Questionnaire suggest that this is a more appropriate classification scheme than considering morning activity and evening activity as the end points of one continuum.

These results also are compatible with the research that has found that those living in caves or underground bunkers, with or without time cues, were more apt to tend to awake at the same time each day than they were to fall asleep (Palmer, 1976). Morningness does seem to be the more significant dimension, both culturally and physiologically.

Of course, circadian activity rhythms may have more facets than a two dimensional system. There is some evidence that individuals differ on their flexibility in adjusting their rhythms (Blatt & Quinlan, 1970; Palmer, 1976). There are age differences in length of cycles, with

children having longer preferred days than adults, and aging is related to disrupted sleep patterns and longer adjustment periods for jet lag (Palmer, 1976; Weston, 1979). It is important to note that sex differences do not seem to be a significant aspect of this complexity. With an undergraduate population, repeated sampling in the studies done for this dissertation never uncovered a sex difference in Morningness or Eveningness.[6]

There does seem to be reason to conclude that circadian activity rhythms are not simply a matter of morning activity versus evening activity. And, even if they are more than morning activity versus morning inactivity, that perspective does yield reliable, meaningful information about the characteristics and behavior of individuals and groups.

Morningness was found to be significantly, though moderately, related to achievement and leadership values, having an aversion to wasting time, doing things more quickly and sooner than others, and introversion. Similarity of Morningness was found to correlate with desire to continue group interactions. Time of arising did not appear to have a primary impact on evaluations of others, but the cultural value of time urgency did seem to be reflected in the finding that speed of one's activities (even in the absence of an implicit deadline) was a significant component of these evaluations.

Future Perspectives

Longitudinal studies may well be the key to unlocking some of the causal relationships of morningness, but such studies tend to be expensive, difficult to conduct, and inefficient in terms of research publication volume. Therefore, a sereis of correlational studies is more apt to be the practical approach to studying the social psychological and

personological aspects of circadian activity rhythms. Given the hypothesized importance of a morning-based educational system, it seems appropriate to study the nature of morningness and achievement and time orientation of those in the lower elementary grades. Given the results of the roommate studies, it seems appropriate to shift the focus to family interactions and activity rhythm differences among their members. Likewise, the results of the study of the morning-activity level differences of strangers on their interactions indicate research should examine the causal components of the synchronization effects.

The advent in recent years of flextime work schedules, stores open 24 hours a day, continuously available automated bank tellers, 24-hour television news services, and videotape recorders for TV shows has begun a process of freeing Americans from some imposed schedules. If this trend continues, people will have greater opportunity to schedule their activities according to their preferred rhythms. It might well take a major change in this society to bring about modifications of our general sense of fleeting, valuable time, but greater freedom of scheduling might well have an important impact on people and their interactions with others.

Reference Notes

1. Snowstorms and the Thanksgiving break period may account for the small number of research participants.
2. A more traditional approach would have been a 2 (sex of subject) X 2 (Morningness level of subject) X 2 (sex of target) X 2 (speed of target) X 3 (time of arising) X 2 (types of situation presented: directly or not directly task-focused) design. Such an approach, however, encompasses a number of problems. First, the range of cell sizes would have been very large. Second, many of the potential main effects and interactions are theoretically trivial even if statistically significant. It was similarities of patterns, not magnitudes, that were the primary research focus. The approach employed here is, in a sense, a series of replications with different populations and different scenarios. Third, a six-factor design causes analysis difficulties because the SPSS program handles up to five factors.
3. The item "You have to do two hours of hard physical work. If you were entirely free to play your day, and if you consider only your own "feeling best" rhythm, which one of the following times would you choose to do the work?" loaded on the Morningness factor with this sample and on the Eveningness factor with the previous sample.
4. Males were also recruited, but so few (8) originally volunteered to receive additional information about the study that only females

were used.

5. None of the roommates who I tried to contact at the end of Spring term indicated that she had terminated her roommate relationship. One set of questionnaires was returned as undeliverable, however.
6. Wendt (1977b) found different patterns of correlation between males' and females' rhythm components. One fourth of their correlated physiological and psychological measures produced opposite signs of significant differences in magnitude. For example, thinness in males was related to self-reported earlier activity, whereas the opposite result tended to be true of females. However, the research tended to be characteristic by small sample sizes.

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"APPENDICES"

APPENDIX A

Appendix A

This appendix consists of the questionnaires used for Studies 1 and 2. Scales used more than one time are not repeated. Items 1-68 following the SIV-R items are Hanley's Early Bird Scale; items 71-96 comprise Mehrabian's Achieving Tendency Scale for Males; and items 118-136 are from Horne and Östberg's Morningness-Eveningness Questionniare.

The next items, 1-14, are from Bortner's Pattern A Rating Scale, and the following items, 1-31, are from Eysenck's EPI Form A scale.

The items used for Study 3 are presented in Appendix C along with the items used in the roommate compatibility research.

You may begin this research immediately.

FIRST READ THE EXPLANATION AND INSTRUCTIONS.

Complete everything in the order it has been given to you. Try not to skip any items. If you have any questions or concerns at any time, please raise your hand, and one of the researchers will assist you.

First, we need to know how long this questionnaire takes to complete. Write down the time, to the closest minute. Use the clock on the wall in this room.

The time is now _____.

This study is part of the doctoral dissertation research being conducted by Barbara Watts, under the supervision of Dr. Lawrence Messe', professor of psychology. This is the first segment of a multi-faceted research program. A large number of students will complete these questionnaires; many of these students will be asked to volunteer ro participate in the later phases for class credit or pay. Today you will be completing questionnaires; the other studies will involve interviews and/or laboratory research, the details of which you will be given if you choose to participate in them.

Please be as honest as possible in your responses. Although we must ask for your name, student ID number, and telephone number to keep our records straight and to contact you at a later date, ALL OF YOUR RESPONSES WILL BE KEPT COMPLETELY CONFIDENTIAL. We believe we have not asked any highly personal questions, but remember that you have the right to omit any item that you wish to omit.

Read, sign, and date the consent form before you begin the questionnaire. When you have completed the questionnaire, fill out your subject credit card, with today's date and the name of this research ("FIRST TIME"), and bring everything to one of the researchers. (Extra credit cards are available if you need one.)

NAME _____

STUDENT ID #_____

TELEPHONE #_____

AGE _____

CLASS LEVEL _____

MAJOR (OR PROBABLE MAJOR) _____

(You should have completed SURVEY OF INTERPERSONAL VALUES-R before responding to this portion of the questionnaire. If you have not, please do so at this time. If it was omitted from your booklet or you have a question, please raise your hand.)

The following 70 questions are true-false items. If the statement in the questionnaire expresses your attitude or feeling to a reasonable degree, mark it "true" on the answer sheet; if it clearly is not your attitude or feeling, mark it "false."

1. In high school, I preferred math to literature courses.
2. Eight o'clock in the morning is too early for classes.
3. I like to get the basic ideas clear in my head before coming to a decision.
4. I don't like New Year's Eve parties.
5. On a test, my first hunch about the right answer is apt to be better than an answer I spend time thinking over a lot.
6. I like to watch the midnight movies on TV.
7. I tend to finish my work early, then relax the rest of the evening.
8. When I play cards, I play more slowly than my opponents.
9. Most nights I get to bed before 12.
10. I like parties better than picnics.
11. On Sunday, I like my big meal in the early afternoon with a lighter one in the evening.
12. Going to sleep is easier for me than waking up.
13. I schedule my study and recreation periods well ahead.
14. Sunday morning is a good time to get things done.
15. At heart, I'm more of a farmer than a city slicker.
16. I tend to get up at the same time every day.
17. I like midnight snacks.
18. Someday we will discover that human behavior is the result of a few natural laws we have not yet discovered.
19. I'm at my best in the morning and slow down as the day goes by.

20. I'm more afraid of animals than I am of the dark.

21. I tend to wake up before the alarm goes off.

22. The bustle and noise of the large American city are not for me.

23. I prefer dinner late rather than early in the evening.

24. I like things that make life complicated.

25. I have to feel the answer to a problem before I can reason it out.

26. I usually arrive late at parties.

27. For me, a good breakfast is more important than a good lunch.

28. If I wake up early in the morning, it's hard for me to go back to sleep.

29. I crush paper cups after using them.

30. I'd rather go to the 9 o'clock movie than the 7 o'clock show.

31. I put the stamp on the envelope before I address it.

32. I like onions on my hamburger.

33. Light coming into the room after the sun rises tends to wake me up.

34. I swallow the seeds when I eat grapes.

35. I hate being tickled.

36. When I get up in the morning, I soon am wide awake.

37. I make a depression in my mash potatoes before I add gravy or butter.

38. On a day off, my first meal is brunch.

39. I brush my teeth before breakfast.

40. I prefer a soft mattress to a hard one.

41. Night time is more exciting than day time.

42. I feel more alert after dinner than after breakfast.

43. I think I would enjoy Yellowstone more than Las Vegas.

44. I sometimes go back to bed after I've been up for awhile.

45. If I could get the same amount of sleep either way, I'd go to bed late and sleep late rather than go to bed early and get up early.

46. Most parites drag on too long.

47. In high school, I liked afternoon classes better than morning classes.

48. If I had to wait tables, I'd rather work in a night club than in a restaurant.

49. I leave a little liquid in my glass or cup at meal times.

50. To me, sunrise is more invigorating than sunset.

51. I was afraid of the dark when I was a child.

52. I'd rather make my own breakfast than lunch.

53. I do better on a test if I get up early in the morning of the day I take it and study for it than I do when I study late the night before.

54. I prefer food cooked plain rather than with a sauce.

55. I like to read the Sunday paper in bed.

56. I let my clothing lay around awhile before putting it away.

57. Taking a anp after dinner usually knocks me out for the rest of the evening.

58. I can make myself belch.

59. I like to start the day with a good walk.

60. I drink a lot of coffee during the day.

61. I'd rather be a milkman than a night watchman.

62. I like the idea of masquerade parties.

63. I seem to be more energetic than the average person.

64. It's boring to lie in the sun just to get a tan.

65. I like a big breakfast.

66. I'd rather nap after lunch than after dinner.

67. I think evening weddings are better than morning weedings.

68. I shine my shoes at least once a week.

69. I try to complete assignments as soon as possible rather than wait until just before they are due.

70. I am wearing a watch right now.

ANSWER THE ITEMS 71 THROUGH 110 USING THE FOLLOWING SCALE:

1 = I strongly agree with the statement.

2 = I agree somewhat with the statement.

3 = I neither agree nor disagree with the statement.

4 = I disagree somewhat with the statement.

5 = I strongly disagree with the statement.

71. I worry more about getting a bad grade than I think about getting a good grade.

72. I would rather work on a task where I alone am responsible for the final product than one in which many people contribute to the final product.

73. I more often attempt difficult tasks that I am not sure I can do than easier tasks I believe I can do.

74. I would rather do something at which I feel confident and relaxed than something which is challenging and difficult.

75. If I am not good at something I would rather keep struggling to master it than move on to something I may be good at.

76. I would rather have a job in which my role is clearly defined by others and my rewards could be higher than average, than a job in which my role is to be defined by me and my rewards are average.

77. I would prefer a well-written informative book to a good movie.

78. I would prefer a job which is important, difficult, and involves a 50 percent chance of failure to a job which is somewhat important but not difficult.

79. I would rather learn fun games that most people know than learn unusual skill games which only a few people know.

80. It is very important to me to do my work as well as I can even if it means not getting along well with my co-workers.

81. For me, the pain of getting turned down after a job interview is greater than the pleasure of getting hired.

Continue to answer the questions using the following scale:

1 = I agree strongly with the statement.
2 = I agree somewhat with the statement.
3 = I neither agree or disagree with the statement.
4 = I disagree somewhat with the statement.
5 = I disagree strongly with the statement.

82. If I am going to play cards I would rather play a fun game than a difficult thought game.

83. I prefer competitive situations in which I have superior ability to those in which everyone involved is about equal to ability.

84. I think more of the future than of the present and past.

85. I am more unhappy about doing something badly than I am happy about doing something well.

86. In my spare time I would rather learn a game to develop skill than for recreation.

87. I would rather run my own business and face a 50 percent chance of bankruptcy than work for another firm.

88. I would rather take a job in which the starting salary is $15,000 and could stay that way for some time than a job that has a starting salary of $10,000 and there is a guarantee that within five years I will be earning more than $15,000.

89. I would rather play on a team than compete with just one other person.

90. The thing that is most important for me about learning to play a musical instrument is being able to play it very well, rather than learning it to have a better time with my friends.

91. I prefer multiple-choice questions on exams to essay questions.

92. I would rather wait one or two years and have my parents buy me one great gift than have them buy me several average gifts over the same period of time.

93. I think that I hate losing more than I love winning.

94. I would rather wait one or two years and have my parents buy me one great gift than have them buy me several average gifts over the same period of time.

95. If I were able to return to one of two incompleted tasks, I would rather return to the difficult than the easy one.

96. I think more about my past accomplidhments than about my future goals.

Continue to answer the questions using the following scale:

1 = I agree strongly with the statement.
2 = I agree somewhat with the statement.
3 = I neither agree nor disagree with the statement.
4 = I disagree somewhat with the statement.
5 = I disagree strongly with the statement.

97. I care very little about earning a great deal of money.

98. I hate to waste time.

99. I would rather enjoy my work than make a lot of money.

100. I intend to be rich someday.

101. A person can never have too much money.

102. Buying things makes me feel good.

103. I could never be happy unless I was financially successful.

104. I go out of my way to avoid standing in line.

105. The more money in my wallet, the better I feel about myself.

106. I tend to be a bit lazy at times.

107. Time is money.

108. My college major is (will be) one that will help me get a high-paying job.

109. Most people rush through life too quickly.

110. When I am going to meet with other people, I am rarely late.

111. I am impulsive.

112. I am answering these questions as honestly as I can.

113. I am a

1. male
2. female

114. I live in a

1. a dorm
2. off-campus housing

115. I have ____ roommates.

1. zero
2. one
3. two
4. three
5. four or more

116. Prior to this academic year, have you ever had a roommate (other than a relative)?

1. yes
2. no

117. Prior to this research you are participating in right now, how many extra credit points for your introductory psychology class have you earned?

1. zero
2. 1 - 2
3. 3 - 4
4. 5 - 6
5. more than 6

118. Considering your own "feeling best" rhythm, at what time would you get up if you were entirely free to play your day?

1. between 5:00 a.m. and 6:30 a.m.
2. between 6:31 a.m. and 7:45 a.m.
3. between 7:46 a.m. and 9:45 a.m.
4. between 9:46 a.m. and 11:00 a.m.
5. between 11:01 a.m. and noon

119. Considering only your own "feeling best" rhythm, at what time would you go to bed if you were entirely free to play your evening?

1. between 8:00 p.m. and 9:00 p.m.
2. between 9:01 p.m. and 10:15 p.m.
3. between 10:16 p.m. and 12:30 p.m.
4. between 12:31 p.m. and 1:45 a.m.
5. between 1:46 a.m. and 3:00 a.m.

120. If there is a specific time you have to get up in the morning, to what extent are you dependent on being woken up by an alarm clock?

1. not at all dependent
2. slightly dependent
3. fairly dependent
4. very dependent

121. Assuming adequate environmental conditions, how easy do you find getting up in the mornings?

1. not at all easy
2. not very easy
3. fairly easy
4. very easy

122. How alert do you feel during the first half hour after having woken in the mornings?

1. not at all alert
2. slightly alert
3. fairly alert
4. very alert

123. How is your appetite during the first half hour after having woken in the morning?

1. very poor
2. fairly poor
3. fairly good
4. very good

124. During the first half-hour after having woken in the morning, how tired do you feel?

1. very tired
2. fairly tired
3. fairly refreshed
4. very refreshed

125. When you have no commitments the next day, at what time do you go to bed compared to your usual bedtime?

1. seldom or never later
2. less than one hour later
3. 1 - 2 hours later
4. more than 2 hours later

126. You have decided to engage in some physical exercise. A friend suggests that you do this one hour twice a week and the best time for the friend is between 7:00 a.m. and 8:00 a.m. Bearing in mind nothing else but your own "feeling best" rhythm, how do you think you would perform?

1. I would be in good form.
2. I would be in reasonable form.
3. I would find it difficult.
4. I would find it very difficult.

127. At what time in the evening do you feel tired and as a result in need of sleep?

1. between 8:00 p.m. and 9:00 p.m.
2. between 9:01 p.m. and 10:15 p.m.
3. between 10:16 p.m. and 12:45 a.m.
4. between 12:46 a.m. and 2:00 a.m.
5. between 2:01 a.m. and 3:00 a.m.

128. You wish to be at your peak performance for a test which you know is going to be mentally exhausting and lasting for two hours. You are entirely free to plan your day and considering only your own "feeling best" rhythm, which ONE of the four testing times would you choose?

1. 8:00 - 10:00 AM
2. 11:00 AM - 1:00 PM
3. 3:00 - 5:00 PM
4. 7:00 - 9:00 PM

129. If you went to bed at 11:00 p.m., at what level of tiredness would you be?

1. not at all tired
2. a little tired
3. fairly tired
4. very tired

130. For some reason you have gone to bed several hours later than usual, but there is no need to get up at any particular time the next morning. Which ONE of the following events are you most likely to experience?

1. will wake up at usual time and will not fall asleep again
2. will wake up at usual time and will doze thereafter
3. will wake up at usual time but will fall asleep again
4. will not wake up until later than usual

131. One night you have to remain awake between 4:00 a.m. and 6:00 a.m. in order to carry out a night watch. You are entirely free to plan your day and considering your own "feeling best" rhythm, which ONE of the following alternatives will suit you best?

1. would not go to bed until watch was over
2. would take a nap before and sleep after
3. would take a good sleep before and a nap after
4. would take all sleep before watch

132. You have to do two hours of hard physical work. You are entirely free to plan your and considering only your own "feeling best" rhythm, which ONE of the following times would you choose to do the work?

1. 8:00 - 10:00 AM
2. 11:00 AM - 1:00 PM
3. 3:00 - 5:00 PM
4. 7:00 - 9:00 PM

133. You have decided to engage in hard physical exercise. A friend suggests that you do this for one hour twice a week and the best time for the friend is between 10:00 - 11:00 PM. Bearing in mind nothing else but your own "feeling best" rhythm, how well do you think you would perform?

1. would be on good form
2. would be on reasonable form
3. would find it difficult
4. would find it very difficult

134. Suppose that you can choose your own work hours. Assume you worked a FIVE hour day (including breaks) and that your job was interesting and paid by results. The five hours must be consecutive. What time would you choose to begin work?

1. sometime between 4:00 AM and 8:00 AM
2. sometime between 8:00 AM and 9:00 AM
3. sometime between 9:00 AM and 2:00 PM
4. sometime between 2:00 PM and 5:00 PM
5. sometime between 5:00 PM and 4:00 AM

135. At what time of day do you reach your "feeling best" peak?

1. sometime between 5:00 AM and 8:00 AM
2. sometime between 8:00 AM and 10:00 AM
3. sometime between 10:00 AM and 5:00 PM
4. sometime between 5:00 PM and 10:00 PM
5. sometime between 10:00 PM and 5:00 AM

136. One hears about "morning" and "evening" types of people. Which ONE of these types do you consider yourself to be?

1. definitely a "morning" type
2. more a "morning" type than an "evening" type
3. more an "evening" type than a "morning" type
4. definitely an "evening" type

BEFORE YOU HAND IN THESE FORMS AND GET YOUR CREDIT CARD SIGNED, PUT YOUR STUDENT ID # ON THE ANSWER SHEET. BE CERTAIN THAT YOU BLACKEN THE APPROPRIATE SPACES ACCURATELY.

WRITE THE TIME THAT IT IS RIGHT NOW, USING THE CLOCK ON THE WALL OF THIS ROOM, ON THE LINE UNDER THE ONE ON WHICH YOU WROTE THE TIME THAT YOU STARTED.

THANK YOU VERY MUCH FOR YOUR PARTICIPATION IN TODAY'S RESEARCH. IF YOU HAVE ANY QUESTIONS OR COMMENTS ABOUT THIS RESEARCH, YOU MAY CONTACT BARB WATTS IN 436 BAKER HALL.

Do not mark on this page; put all of your answers on the answer sheet.

The following 14 items ask you to rate where you think you fall between two extremes. Use the following scale to indicate where you think you are. Consider yourself in terms of the underlined word. The word in parentheses is included to help you think in terms of the two extremes. Thus, if the item was "happy (sad)," and your response was a 3, it would indicate that you tend to be somewhat happy and somewhat sad. If you marked a 5, it would indicate that you tend to be not very happy and extremely sad.

1 = Extremely like me.
2 = Very much like me.
3 = Somewhat like me.
4 = A little like me.
5 = Not like me.

I Tend to Be

1. never late (casual about appointments)
2. not competitive (very competitive)
3. apt to anticipate what others are going to say--nod, interrupt, and finish for them (a good listener, hearing others out)
4. always rushed (never feel rushed, even under pressure)
5. patient when waiting (inpatient when waiting)
6. apt to go "all out" (casual)
7. apt to take things one at a time (try to do many things at once--think about what I'm going to do next)
8. emphatic in speech (slow, deliberate talker)
9. apt to want to do a good job, recognized by others (only care about satisfying myself not what others may think)
10. fast--eating, walking, etc. (slow doing things)
11. easy going (hard driving)
12. apt to "sit" on feelings (expresses feelings)
13. involved in many interests (have few interests outside school)
14. satisfied (ambitious)

Do not mark on this page; put all of your answers on the answer sheet.

The following items are to be answered either "yes" or "no". Put a Y next to the item number on the answer sheet for yes; N for no.

1. Do you often long for excitement?
2. Are you susally carefree?
3. Do you stop and thing things over before doing anything?
4. If you say you will do something do you always keep your promise, no matter how inconvenient it might be to do so?
5. Do you generally do and say things quickly without stopping to think?
6. Would you do almost anything for a dare?
7. Once in a while do you lose your temper and get angry?
8. Do you often do things on the spur of the moment?
9. Generally, do you prefer reading to meeting people?
10. Do you like to go out a lot?
11. Do you prefer to have few but special friends?
12. When people shout at you, do you shout back?
13. Are all your habits good and desirable ones?
14. Can you usually let yourself go and enjoy yourslef at a party?
15. Do other people think of you as lively?
16. Are your mostly quiet when you are with other people?
17. Do you sometimes gossip?
18. If there is something you want to know about, would you rather look it up in a book than talk to someone about it?
19. Do you like the kind of work that you need to pay close attention to?
20. Would you always declare everything at the Customs, even if you knew that you could never be found out?
21. Do you hate being with a crowd who plays jokes on one another?

22. Do you like doing things in which you have to act quickly?

23. Are you slow and unhurried in the way you move?

24. Have you ever been late for an appointment or work?

25. Do you like talking to people so much that you never miss a chance to talk to a stranger?

26. Would you be very unhappy if you could not see lots of people most of the time?

27. Would you say that you are fairly self-confident?

28. Do you find it hard to really enjoy yourself at a party?

29. Can you easily get some life into a rather dull party?

30. Do you sometimes talk about things you know nothing about?

31. Do you like playing pranks on others?

APPENDIX B

Appendix B

In this section are samples of the scenarios described in Chapter 3 (Study 4), followed by the results of the analyses that did not pertain directly to the issues of temporal norms addressed in the chapter.

NAME _____ STUDENT ID # _____ SEX ___

FIRST IMPRESSIONS

People tend to form opinions about others even when they have limited information about them. The purpose of this questionnaire is to explore some of the dimensions of first impressions. First read the paragraph carefully and then mark your first impressions on the bipolar adjective rating scales that follow. Do not spend more than a few seconds on each scale -- remember, it is your first impression that we would like to learn.

Each pair of adjectives forms a scale. By marking an "X" along the scale, you cn indicate what characteristics you associate with the person described in the paragraph. Never put more than one "X" on any scale. Be certain that you mark every scale. If you are undecided, place the "X" in the center space. Do not leave any blank lines.

If you have any questions, do not hesitate to ask one of the researchers.

The alarm rang at 6:00 AM. Gail had awakened a few minutes earlier and was ready to turn it off as the first shrill sounds disturbed the silence. Slowly she showered, dressed, and walked to a nearby restuarant. The morning was crisp and clear. She enjoyed the walk, but even more she enjoyed lingering over her mushroom omlet, fresh baked pastry, and coffee. Breakfast in a good restaurant was an indulgence that she rarely could afford but even more rarely denied herself. She tipped the waitress $1.00 for her $5.00 meal and strolled back to the dorm.

First Impressions

good ___ ___ ___ ___ ___ ___ ___ bad

active ___ ___ ___ ___ ___ ___ ___ passive

admirable ___ ___ ___ ___ ___ ___ ___ not admirable

aggressive ___ ___ ___ ___ ___ ___ ___ unaggressive

ambitious ___ ___ ___ ___ ___ ___ ___ not ambitious

The alarm rang at 6:00 AM. John had awakened a few minutes earlier and was ready to turn if off as the first shrill sounds disturbed the silence. Quickly he showered, dressed, and ate breakfast before beginning to study for an exam. He was able to review all of his notes before the class period. The material had been difficult at first, but he was bigging to feel that he understood it fairly well now. Confidently he strode over the classroom. The tension in the room mounted and began to make John feel a bit nervous, but once he began working on the exam, his anxiety lessened. He finished all of the items quickly.

assertive	____ ____ ____ ____ ____ ____ ____	unassertive
considerate	____ ____ ____ ____ ____ ____ ____	inconsiderate
cooperative	____ ____ ____ ____ ____ ____ ____	uncooperative
dependable	____ ____ ____ ____ ____ ____ ____	not dependable
efficient	____ ____ ____ ____ ____ ____ ____	inefficient
friendly	____ ____ ____ ____ ____ ____ ____	unfriendly
introverted	____ ____ ____ ____ ____ ____ ____	extraverted
kind	____ ____ ____ ____ ____ ____ ____	unkind
leader	____ ____ ____ ____ ____ ____ ____	follower
likable	____ ____ ____ ____ ____ ____ ____	unlikable
practical	____ ____ ____ ____ ____ ____ ____	impractical
rational	____ ____ ____ ____ ____ ____ ____	irrational
responsible	____ ____ ____ ____ ____ ____ ____	irresponsible
successful	____ ____ ____ ____ ____ ____ ____	unsuccessful
slow	____ ____ ____ ____ ____ ____ ____	fast
uncaring	____ ____ ____ ____ ____ ____ ____	caring
unhappy	____ ____ ____ ____ ____ ____ ____	happy
understanding	____ ____ ____ ____ ____ ____ ____	not understanding
warm	____ ____ ____ ____ ____ ____ ____	cold
wise	____ ____ ____ ____ ____ ____ ____	unwise
unhealthy	____ ____ ____ ____ ____ ____ ____	healthy
unintelligent	____ ____ ____ ____ ____ ____ ____	intelligent
wealthy	____ ____ ____ ____ ____ ____ ____	poor
weak	____ ____ ____ ____ ____ ____ ____	strong
outgoing	____ ____ ____ ____ ____ ____ ____	not outgoing
popular	____ ____ ____ ____ ____ ____ ____	unpopular
lazy	____ ____ ____ ____ ____ ____ ____	not lazy

Table 8

Means for the Sex of Subject X Sex of Target X Time of Arising Interactions in the Scenario Studies

Introversion/Extraversion Ratings			
Morning-active Respondents Non-Task Oriented Target			
		Sex of Subject	
Time of arising	Target	Male	Female
6:00	Male	4.33	4.79
	Female	3.57	4.11
3:30	Male	3.67	4.33
	Female	4.40	3.87
11:00	Male	5.00	4.21
	Female	3.33	4.06
Ratings of Good Sense			
Morning-inactive Respondents Non-Task Oriented Target			
		Sex of Subject	
Time of arising	Target	Male	Female
6:00	Male	4.18	5.20
	Female	5.14	4.96
8:30	Male	5.06	4.66
	Female	4.90	5.20
11:00	Male	4.85	4.40
	Female	2.98	4.97

Table 8 (cont.)

Ratings of Communion

Morning-inactive Respondents
Non-Task Oriented Target

Time of Arising	Target	Sex of Subject: Male	Sex of Subject: Female
6:00	Male	4.72	5.72
	Female	5.69	5.39
8:30	Male	5.79	5.47
	Female	5.47	5.50
11:00	Male	5.16	5.33
	Female	4.25	5.45

Simple effects tests revealed no significant effects for time of arising or sex of target for the sex of subject X sex of target X time of arising interaction for morning-active respondents who rated a non-task oriented target on the introversion/extraversion dimension. The "good sense" scale produced a significant two-way interaction for male subjects who were morning-inactive types, F (2, 154) = 4.41, $p < .01$ for the sex of target X time of arising interaction. These males rated a female target who arose at 11 as significantly lower in good sense than a male target who arose at that time, $F = 6.92$, $p < .01$. Similarly, there was a simple two-way interaction for male subjects on the communal dimension, F (2, 154) = 3.99, $p < .05$. These morning-inactive males rated males who arose at 6 AM as lower in communal characteristics than females who arose at that time, F = 4.70, and the simple, effects for time of arising were significant with male targets, $F = 3.48$, $p < .05$, and female targets, $F = 3.24$, $p < .05$.

Table 9

Means for the Sex of Subject X Sex of Target X Speed Interaction in the Scenario Studies

Ratings of Communion			
Morning-inactive Respondents Non-Task Oriented Target			
		Sex of Subject	
Time of arising	Target	Male	Female
Slow	Male	4.93	5.54
	Female	5.50	5.34
Fast	Male	5.48	5.45
	Female	4.91	5.50

Simple effects tests of the means that produced the sex of subject X sex of target X speed of activity interaction, presented in Table 9, revealed a speed of activity X sex of target interaction for the morning-inactive male subjects who read a non-task situation, F (1, 154) = 4.42, $p < .05$. Males who were morning-inactive tended to rate as least communal slow-moving males and fast-paced females, but the simple, effects tests did not reach .05 levels of significance.

APPENDIX C

Appendix C

Materials used in the roommate compatibility studies follow in the order they were used in successive administration.

The undergraduate research assistants who administered the questionnaires in the dormitory rooms rated their perceptions of the roommate relationship as well as noted the attempts to set up the interview. In the first of these studies (Study 5), the interviewers' notes tended to vary in quantity and quality so much that coding attempts were fruitless. These served, however, as the basis for scaling the interview in Study 6. The number of times the assistant called to arrange the interview was positively correlated with the absolute difference in the roommates' Eveningness score, r = .47, p .01. Perceptions of the friendliness of the roommates toward each other and the setting up of different areas of the room that seemed to reflect differences between them (e.g., same or different bedspreads, similar or different posters, and other alike or unlike styles of decor) were unrelated to differences in Morningness and Eveningness scores.

ALL YOUR RESPONSES TO THIS QUESTIONNAIRE WILL BE CONFIDENTIAL

Name _____

Student ID Number _____

Class level _____ Major _____

1. How long have you and your roommate known each other? _____

2. How long have you and your roommate lived together? _____

3. What circumstances led to your becoming roommates?

4. Including this one, how many college roommates have you had? _____

5. If you have had previous roommates, what was/were the reasons you are no longer roommates?

On the following two pages you will be rating your roommate relationship, your roommate, and yourself. Please be as honest as possible in your responses -- no one, including your roommate, will be given information about your response.

You will be doing your ratings on 7-point scales. For each scale, you should mark an "X" on the line closest to the point that best expresses your feelings or attitude. For example, if the question asked how close you feel to your roommate, and you feel extremely close, you'd mark an X on the line closest to "very close" and if you did not feel at all close to your roommate, you'd mark the line next to "not at all close." If you feel slightly less than extremely close, you'd mark the next line over, and so on. Do not leave any scales blank -- if you do not know how to answer one of the items, use the center line of the scale.

ROOMMATE COMPATIBILITY

1. Think back a moment about the first time you met your roommate. How favorable was your first impression of him/her?

   very unfavorable:____:____:____:____:____:____:very favorable

2. In general, how well do you and your roommate get along?

   very well:____:____:____:____:____:____:not at all well

3. How much do you enjoy living with your roommate?

   very much:____:____:____:____:____:____:not at all

4. Do you want to continue living with your roommate?

   very much:____:____:____:____:____:____:not at all

5. What kind of friend do you consider your roommate to be?

   very close:____:____:____:____:____:____:not a friend

6. In general, how similar are you and your roommate?

   not at all:____:____:____:____:____:____:very similar

7. How similar are you and your roommate in your religious beliefs?

   not at all:____:____:____:____:____:____:very similar

8. How similar are you and your roommate in your political attitudes?

   not at all:____:____:____:____:____:____:very similar

9. How similar are you and your roommate in your academic interests?

   not at all:____:____:____:____:____:____:very similar

10. How similar are you and your roommate in your athletic interests?

    not at all:____:____:____:____:____:____:very similar

11. How similar are you and your roommate in your preferred leisure-time activities

    not at all:____:____:____:____:____:____:very similar

12. List (below and on the back) the things that are most apt to cause friction between you and your roommate.

I AM

good:____:____:____:____:____:____:bad

fast:____:____:____:____:____:____:slow

active:____:____:____:____:____:____:passive

rude:____:____:____:____:____:____:polite

intelligent:____:____:____:____:____:____:unintelligent

work-oriented:____:____:____:____:____:____:people-oriented

lazy:____:____:____:____:____:____:hard-working

considerate:____:____:____:____:____:____:inconsiderate

MY ROOMMATE IS

good:____:____:____:____:____:____:bad

fast:____:____:____:____:____:____:slow

active:____:____:____:____:____:____:passive

rude:____:____:____:____:____:____:polite

intelligent:____:____:____:____:____:____:unintelligent

work-oriented:____:____:____:____:____:____:people-oriented

lazy:____:____:____:____:____:____:hard-working

considerate:____:____:____:____:____:____:inconsiderate

EXPERIMENTER FORM -- ROOMMATE COMPATIBILITY

1. List the date and times you tried to contact the roommates. Code each conversation.

CODES

A = meeting arranged
B = only 1 person in
C = no one in
D = disagreement over whether to fill out questionnaire
E = disagreement over time to meet
(if other, specify)

2. List the dates and times you tried to administer the questionnaire to each roommate. Code each attempt.

A = both filled questionnaire
B = only 1 filled - other declined
C = only 1 - other not in
D = no one in
(if other, specify)

3. Rate how friendly the roommates seem to be to each other.

1 = extremely unfriendly
2 = very unfriendly
3 = somewhat unfriendly
4 = slightly unfriendly
5 = slightly friendly
6 = somewhat friendly
7 = very friendly
8 = extremely friendly

4. Rate the set-up of the room.

1 = very definite territories
2 = somewhat defined territories
3 = slightly defined territories
4 = no apparent territories

5. List any other impressions or incidents that occurred.

NAME_____

1. In general, how well do you and your roommate get along?

   not at all well:____:____:____:____:____:____:very well

2. How much do you enjoy living with your roommate?

   very much:____:____:____:____:____:____:not at all

3. Do you want to live with your roommate next year?

   very much:____:____:____:____:____:____:not at all

   Why?

4. What kind of friend do you consider your roommate to be?

   very close:____:____:____:____:____:____:not a friend

5. How often do you and your roommate avoid each other?

   very often:____:____:____:____:____:____:never

6. How often do differences in sleep schedules creat problems between you and your roommate?

   never:____:____:____:____:____:____:very often

7. How often do you and your roommate quarrel?

   never:____:____:____:____:____:____:very often

8. How often do you and your roommate do things together?

   never:____:____:____:____:____:____:very often

9. My roommate is

   good:____:____:____:____:____:____:bad

10. My roommate is

    inconsiderate:____:____:____:____:____:____:considerate

APPENDIX D

Appendix D

Materials used for Study 7, which is presented in Chapter 5, are presented in this appendix section. Subjects received four copies of the form that begins "Task _____" -- the name of one of the four puzzles was written in the blank.

Puzzling

The purpose of this research is to study the process of getting to know someone in a task-oriented situation. You will be paired with someone you do not know (Please inform the researcher if you do know the person with whom you are paired) and will be given four puzzle tasks to complete. Each person in a pair will be given half of the information needed to complete the puzzles. How you work on the tasks is up to you — except for the requirement that your group of two NOT consult any other group. As soon as all four puzzles have been completed, just raise your hand and the researcher will give you a questionnaire booklet to fill out. The questionnaires must be completed alone — do NOT consult your partner on ANY questionnaire item. As soon as you have finished the questionnaire booklet, raise your hand, and the researcher will sign your credit card and give you 3 credits for your participation.

Puzzling

YOUR NAME _____ PARTNER'S NAME _____ DATE _____

The purpose of this research is to study the process of getting to know someone in a task-oriented situation. Please answer the following questions with as much detail as needed to explain this process from your point of view. You may use the back of each page if you need more room than that provided under each question.

A. What was interacting with your partners like?

A1. Briefly describe the first few minutes of time you spent together.

A2. Briefly describe your interactions while working on the tasks.

A3. Did anything about your interactions with your partner make you feel uncomfortable? If so, briefly describe.

A4. Was there anything you particularly enjoyed when you were working with your partner? If so, briefly describe.

A5. Was there a rhythm (harmonious or not) to your interactions with your partner? That is, did there seem to be patterns of activity or discussions or feelings (or whatever) that you detected? Please describe.

A6. Did you every interrupt each other? If so, please describe.

A7. Check the ONE statement that best describes the pace of your interactions?

___ My partner and I seemed to work best at the SAME pace.
___ My partner seemed to have a tendency to work somewhat FASTER than me.
___ My partner seemed to have a tendency to work much FASTER than me.

___ I seemed to have a tendency to work somewhat FASTER than my partner.
___ I seemed to have a tendency to work much FASTER than my partner.
___ I was unaware of the pace of our interactions, one way or the other.

A8. If called back to participate in another research study, would you prefer to work with the same partner? (check one)

___ I would like to work with the same person.
___ I would like to work alone.
___ I would like to work with a different person.
___ Undecided

A9. In what order did you work on the four puzzle tasks? How did you decide on that order?

TASK: _____

1. Approximately how much time did you spend on this task? ____ minutes

2. Who contributed the most to its solution (or attempted solution)?

2. Who acted most as group leader?

Place an "X" between (not on) the vertical lines on each of the following four scales to indicate the degree of your response.

3. Do you think you could have done a more efficient job if you would have worked alone on this task?

extremely	somewhat	slightly	about the same	slightly	somewhat	extremely

MORE EFFICIENT ALONE LESS EFFICIENT ALONE

4. Do you think you could have done a more efficient job if you had been appointed group leader on this task?

extremely	somewhat	slightly	about the same	slightly	somewhat	extremly

MORE EFFICIENT AS LEADER LESS EFFICIENT AS LEADER

5. Would you have enjoyed the task more if you could have worked alone?

extremely	somewhat	slightly	about the same	slightly	somewhat	extremely

MORE ENJOYMENT ALONE LESS ENJOYMENT ALONE

6. Would you have enjoyed the task more if you had been appointed group leader on this task?

extremely	somewhat	slightly	about the same	slightly	somewhat	extremely

MORE ENJOYMENT AS LEADER LESS ENJOYMENT AS LEADER

7. How would you characterize your and your partner's behavior on this task?

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