



# LARK-OWL CHRONOTYPE INDICATOR

## ABSTRACT

This bulletin includes two forms of this assessment of morningness-eveningness, translated into several languages, notes on background of the assessment and test administration, various validity studies (both published and unpublished), and a prototype feedback scheme.

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## 1. INTRODUCTION

### 1.1 Overview

The term “circadian” denotes: “The near 24-hour physiologic rhythm that has been observed under free-running conditions, at every system level in nearly all plants and mammals, under near constant environmental conditions” (Brown, 1982, p. 9). Within individual differences approaches to this phenomenon, there is a stated assumption that there exist definite types corresponding to diurnal preference (e.g., Kerkhof, 1985; Roberts, Irvine, & Kyllonen, 1998; Tankova, Adan, & Buela-Casal, 1994). This notion has a long history with anecdotal evidence deriving from several sources, including Johnson’s purported “love of lying till noon” (Boswell, 1785/1961), to populist notions of the “early bird” (or “lark”) and “night owl”. Following Kleitman’s (1939/1963) pioneering research, these propensities were formally conceptualized as a trait, lying along a continuum, that has come to be known as the Morningness-Eveningness (M-E) dimension.

However, extant measures of diurnal preference (also known as circadian type or sometimes also chronotype) appear prone to several conceptual and psychometric limitations (e.g., see Roberts, 1997; Roberts & Kyllonen, 1998). This technical bulletin provides the following:

1. Sample items comprising the LOCI, and a complete form of LOCI (Alpha). The complete inventory measures three dimensions of chronotype (i.e., Morningness, Eveningness, and Propensity for Sleep Debt). Note that there are two forms of this instrument: LOCI (Alpha) and LOCI (Beta). Our decision to create two forms allows the researcher (or practitioner) the opportunity to examine the stability of circadian type over time, treatments, or experimental interventions.
2. The LOCI protocol was originally examined in three studies totaling nearly 1800 participants. These data (means, reliabilities etc.) are provided in Section 3 of this paper. Data from these studies suggest that our intention to create a conceptually richer instrument, with superior psychometric qualities to previous measures, was largely realized.

3. A more expansive validation study in which self-reported LOCI scores are compared (and contrasted) with peer-report LOCI, a sleep-wake diary, and biodata is given in Section 4. This study, conducted with an Australian university population who had friends and family members rate them (and each other) on the LOCI scales, also offered the first “cross-cultural” comparisons of chronotype dimensions since the first three studies were conducted exclusively with USAF enlistees.

## **1.2 Information on using LOCI**

The alpha form of the test instrument is included in this report, but the beta-form may be obtained from RAD Science. A condition of use for both forms is that it will be used for research purposes only. Because of a variety of commercial applications (e.g., selecting appropriate individuals for shiftwork) and strong interest in marketing this instrument, it is restricted to this use and this use only. A more formal technical report detailing conceptual precursors, development, validation, and correlates of this instrument is planned, but will likely only become a reality if it is productized. Any inquiries concerning the use of this scale should be directed to the following email address: [richard@raddscience.com](mailto:richard@raddscience.com).

## **2. TEST CHARACTERISTICS**

### **2.1 Administration**

LOCI is (in the fashion most self-report psychometric tests) easy to administer. Instructions to Form Alpha are included in the present package, which the experimenter can read aloud with the participant (if they see fit). Preferably however, the researcher should seek to put it on a suitable IT platform. Pictorial forms have even been created in the past to aid in understanding for young children.

The six-point rating scale used in the LOCI represents one founded on a solid research tradition. Note that the no items contain qualifiers (e.g., ‘usually’) in the stem, which otherwise is thought to confuse respondents. The readability statistics of Forms Alpha and Beta are particularly impressive: Flesch Reading Ease = 90.3%, Flesch-Kincaid Grade Level = 2.8. This suggests that individuals having three or more years of formal schooling easily understand the scale.

## **2.2 Scoring**

Users of LOCI are encouraged to score the test from 1 ('Never') to 6 ('Always') for each and every item, entering it directly into an appropriate data file. Roberts has written SPSS programs for correcting reverse keying, summing composites, running factor analysis and so forth; and is willing to share these scripts if requested. Note that information by item is valuable because it allows the researcher to check reliability, factor structure and so forth across the various samples that are tested. It is hoped that users of LOCI (in the research context) will make available all findings to RAD Science. (By this is meant only that data pertaining to the scale, as well as a few meaningful demographics) In so doing, we hope to add to an impressive array of correlates, outcomes, treatments, interventions etc. related to this instrument.

## **2.3 Preliminary Validation Studies**

Results from three (of the first) validation studies of LOCI may be found at the bottom of the section detailing sample items from each scale. In each of these initial studies, participants were military enlistees undergoing their sixth week of basic training at Lackland Air Force Base, Texas, USA.

## **2.4 Validation Study: Peer- vs Self-Report LOCI**

The first validity study of the LOCI involved approximately 200 Australian University students who were given Form Alpha. These 200 students then administered this scale to two other people (denoted Person A and Person B) who in addition to completing self-reports made peer-reports on the experimenter and the other person. The student sample also completed a sleep-wake diary and various 'biodata' questions related to their sleep patterns and meal times. These results, presented in Section 5, provided the first real validity evidence for the LOCI since the correlation between peer-report and self-reports are among the highest found in the individual differences literature.

## **2.5 Further Validity Studies**

Many additional studies have been conducted with the LOCI since these first efforts given in the report. These studies have focused on elementary, middle, and high school students, college students, and shift-work populations in Australia, Germany, the USA, England,

Uruguay, the Russian Federation, Norway, and Yugoslavia. Not all have yet been published, though it is worth noting several have been included in meta-analytic studies. And the assessment is now being used in a series of behavioral genetics studies:

<https://www.cambridge.org/core/journals/twin-research-and-human-genetics/article/current-twin-studies-in-germany-report-on-cosmos-soep-and-chronos/9A6A708FEC08813F33DE7EFB4D22D853>

Below we give the citation to a selection of these articles, along with respective abstracts (in essence, distilling ongoing validity evidence):

1. Lipnevich, A. A., Crede, M., Hahn, E., Spinath, F. M., Roberts, R. D., & Preckel, F. (2017). How distinctive are morningness and eveningness from the Big Five Factors of personality? A meta-analytic investigation. *Journal of Personality and Social Psychology, 112*, 491-509. This study explores relations between measures of individuals' circadian preferences and the Big Five. To this end, we compared a model of circadian preferences that acknowledges morningness (M) and eveningness (E) as separate dimensions to that of a model that places M and E on a single continuum (M-E). Analyses of 620 correlations from 44 independent samples (N = 16,647) revealed weak to modest relations between both dimensions of circadian preferences and the Big Five personality traits. The strongest observed relation was found between Conscientiousness and M ( $\rho = .37$ ). In the next step, regression analyses revealed that personality traits accounted for between 10.9% and 16.4% of the variance in circadian preferences. Of all the Big Five dimensions, Conscientiousness exhibited the strongest unique relation with M ( $\beta = .32$ ), E ( $\beta = -.26$ ), and M-E ( $\beta = .32$ ). Extraversion and Openness exhibited moderate unique relations with E ( $\beta = .23$  and  $\beta = .17$ , respectively), whereas relations with M ( $\beta = .00$  and  $\beta = .04$ ), and M-E ( $\beta = -.05$  and  $\beta = -.06$ ) were relatively weak. Neuroticism exhibited a modest unique and negative relation with M ( $\beta = -.16$ ), and Agreeableness was largely unrelated to all circadian preference variables. To determine whether these findings translated into anything of applied significance, we explored relations between circadian preference and academic performance. M

and E incremented slightly over the Big Five factors in predicting grade-point average. Theoretical and practical implications of these findings are discussed.

2. Preckel, F., Lipnevich, A. A., Boehme, K., Brandner, L., Georgi, K., Könen, T., Mursin, K., & Roberts, R. D. (2013). Morningness-eveningness and educational outcomes: The lark has an advantage over the owl at high school. *British Journal of Educational Psychology, 83*, 114-134. Background. Chronotype refers to individuals' preference for morning or evening activities. Its two dimensions (morningness and eveningness) are related to a number of academic outcomes. Aims. The main goal of the study was to investigate the incremental validity of chronotype as a predictor of academic achievement after controlling for a number of traditional predictors. In so doing, a further aim was ongoing validation of a chronotype questionnaire, the Lark-Owl Chronotype Indicator. Sample. The sample comprised 272 students attending 9th and 10th grades at five German high schools. Data was also obtained from 132 parents of these students. Method. Students were assessed in class via self-report questionnaires and a standardized cognitive test. Parents filled out a questionnaire at home. The incremental validity of chronotype was investigated using hierarchical linear regression. Validity of the chronotype questionnaire was assessed by correlating student ratings of their chronotype with behavioral data on sleep, food intake, and drug consumption and with parent ratings of chronotype. Results. Eveningness was a significant (negative) predictor of overall grade point average (GPA), math–science GPA, and language GPA, after cognitive ability, conscientiousness, need for cognition, achievement motivation, and gender were held constant. Validity evidence for the chronotype measure was established by significant correlations with parent-ratings and behavioral data. Conclusions. Results point to the possible discrimination of adolescents with a proclivity towards eveningness at school. Possible explanations for the relationship between chronotype and academic achievement are presented. Implications for educational practice are also discussed.
3. Preckel, F., Lipnevich, A. A., Schneider, S., & Roberts, R. D. (2011). Chronotype, cognitive abilities, and academic achievement: A meta-analytic investigation. *Learning and Individual Differences, 21*, 483-492. Four meta-analyses examined relationships between morningness and cognitive ability (total  $N = 2177$ ),

eveningness and cognitive ability (total  $N = 1519$ ), morningness and academic achievement (total  $N = 3220$ ), and eveningness and academic achievement (total  $N = 700$ ). The analyses focused on the population effect size (to reveal the effect across studies) and the homogeneity (to determine if the results of the several experiments are sufficiently similar to warrant their combination into an overall result). In all four cases, the aggregated correlations between chronotype and cognitive ability, as well as chronotype and academic achievement were found to be significant. Eveningness was found to be positively related to individuals' cognitive ability ( $r = .08$ ), yet negatively related to indicators of academic achievement ( $r = -.14$ ). Conversely, morningness had a negative relationship with cognitive ability ( $r = -.04$ ) and a positive correlation with academic indicators ( $r = .16$ ). Practical implications, including those pertaining to educational policy, are discussed.

4. Scherrer, V., Roberts, R. D., & Preckel, F. (2016). Parents' assessment of circadian preference in elementary school-aged children: Validity and relations to educational outcomes. *Chronobiology International*, *33*, 1188-1207. Meta-analyses suggest that morning-oriented students obtain better school grades than evening-oriented students. This finding has generally been found for students in high school using self-report data for the assessment of circadian preference. Two studies ( $N = 2718/192$ ) investigated whether these findings generalize across samples (i.e. elementary school-aged students) and methods (i.e. parent reports). These studies also explored whether the relation between circadian preference and school achievement could be explained within an expectancy-value framework. To this end, the Lark-Owl Chronotype Indicator (LOCI) was modified to obtain parents' evaluations of their children's circadian preference, while students completed a battery of assessments designed to explore the test-criterion evidence. Structural equation modeling and correlational analyses revealed: (1) morning and evening orientation were two separable factors of children's circadian preference; (2) correlations with behavioral (e.g. sleep and eating times) and psychological (e.g. cognitive ability) data supported the test-criterion validity of both factors; (3) morning orientation was positively related to school achievement and (4) consistent with an expectancy-value framework this relation was mediated by children's academic self-concept (ASC).

These findings have important research and policy implications for considering circadian preference in the schooling of elementary students.

5. Ruffing, S., Hahn, E., Spinath, F. M., Brünken, R., & Karbach, J. (2015). Predicting students' learning strategies: The contribution of chronotype over personality. *Personality and Individual Differences, 85*, 199-204. Students' learning strategies as well as the search for its determinants have gained expanding interest in psychology and educational research. The present study investigated the contribution of chronotype, another construct of increasing importance in the academic context, to students' learning strategies controlling for the established predictor of personality and its relations to chronotype. A sample of 318 college students (mean age = 22.6, SD = 2.5; age range = 19–34) was assessed online through self-report questionnaires. We discriminated between two learning strategy factors aggregated by a diverse set of learning strategies, learning discipline and elaboration. First, results confirmed significant associations between most personality scales and students' strategy use. Furthermore, we found evidence for significant associations between chronotype and personality, as well as chronotype and learning strategies. Finally, structural equation modeling revealed that openness, agreeableness, conscientiousness, and morningness were significant predictors for elaboration, whereas learning discipline was significantly predicted by conscientiousness and morningness. We conclude that chronotype plays an important role explaining students' learning strategies over and above personality.

### 3. INSTRUCTIONS (LOCI-ALPHA)

On the pages below, you will find a number of statements that you should read and decide how well each one of them describes the way you think or feel. Here is an example:

I am happy.	Never Rarely S'times Often Usually Always
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You might respond:

I am happy.	Never Rarely S'times Often <b>Usually</b> Always
-------------	--

You should reply to all statements. Give your first impression of whether each statement describes the way you think and feel about it. Don't spend too long on deciding what your answer should be. Answer all statements even if you're not entirely sure of your answer. There are NO right or wrong answers.

#### 4. SAMPLE ITEMS AND STATISTICS (STUDIES 1-3)

##### 4.1 LOCI 'Morning' Scale (Alpha-Beta Forms)

LOCI (Morning) is composed of 13 items, two of which are reverse-keyed (indicated by an asterisk). Participants respond on the six-point rating scale given in Section 3. Examples of three items from each scale are given below. Item numbers correspond to an item's order of presentation in the full form.

Alpha-Form	Beta-Form
4. I am a 'morning' person.	10.* I feel tired after waking in the morning.
8. I do my best work in the morning.	12. I recover my senses just after rising from a night's sleep.
10. I rise before 0600.	14. I have lots of energy in the morning.

Summary statistics and reliabilities for both LOCI (Morning-Alpha) and LOCI (Morning-Beta), obtained in three studies, are given below. The correlation between parallel forms is also given. Study 3 involved a computer-administered version of LOCI.

	Study 1 (N = 465)	Study 2 (N = 300)	Study 3 (N = 367)
<b>Alpha Form</b>			
Mean	28.30	30.60	32.70
S.D.	11.00	10.50	11.50
Cronbach $\alpha$	0.90	0.88	0.88
<b>Beta Form</b>			
Mean	28.60	31.10	33.90
S.D.	11.10	11.00	12.00
Cronbach $\alpha$	0.90	0.90	0.90
<b>Combined</b>			
R (forms)	0.94	0.93	0.93

#### 4.2 LOCI 'Evening' Scale (Alpha-Beta Forms)

LOCI (Evening) is composed of 13 items, four of which are reverse-keyed (indicated below by an asterisk). Participants respond on the six-point rating scale given in Section 3.

Examples of three items from each scale are given below. Item numbers correspond to an item's order of presentation in the full form.

Alpha-Form	Beta-Form
5. I enjoy working unusual hours.	6.* I need to relax, not doing much, in the evening.
7.* I feel tired next day when I stay up late, past midnight.	8. I can manage on a few hours sleep.
12.* As soon as the sun goes down, I 'shut down'.	13. I eat a midnight snack.

Summary statistics and reliabilities for both LOCI (Evening-Alpha) and LOCI (Evening-Beta), obtained in three studies, are given below. The correlation between parallel forms is also given. Study 3 involved a computer-administered version of LOCI.

	Study 1 (N = 465)	Study 2 (N = 300)	Study 3 (N = 367)
<b>Alpha Form</b>			
Mean	22.90	22.40	21.70
S.D.	9.40	9.30	9.90
Cronbach $\alpha$	0.84	0.83	0.82
<b>Beta Form</b>			
Mean	23.00	22.50	22.60
S.D.	8.80	8.10	9.20
Cronbach $\alpha$	0.80	0.76	0.78
<b>Combined</b>			
R (forms)	0.91	0.90	0.91

#### 4.3 LOCI 'Propensity for Sleep Debt' Scale (Alpha-Beta Forms)

LOCI (Sleep) is composed of 12 items. Unlike the LOCI (Morning) and LOCI (Evening) scales, all items are common to both the LOCI (Alpha) and LOCI (Beta) forms of LOCI (Sleep). No item is reverse-keyed. Participants respond on the six-point rating scale given in Section 3. Examples of two items from each scale are given below. Item numbers correspond to an item's order of presentation in the full form.

<b>Alpha-Form</b>	<b>Beta-Form</b>
<b>11.</b> On the weekends, I sleep past noon.	<b>25.</b> I need 8 hours sleep.
<b>13.</b> I get up later on holidays.	<b>34.</b> I can fall asleep any time I choose.

Summary statistics and reliabilities for LOCI (Sleep) obtained in three studies, are given below. In these early studies, time constraints dictated that questions composing this scale be 'spread across' both the LOCI (Alpha) and LOCI (Beta) forms. (Recall that in the final forms of this scale, all items are the same [i.e., essentially they represent a replication]). Therefore, these data are relevant only to a single administration. Study 3 involved a computer-administered version of LOCI.

	<b>Study 1 (N = 465)</b>	<b>Study 2 (N = 300)</b>	<b>Study 3 (N = 367)</b>
<b>Single Form</b>			
Mean	43.60	40.60	44.40
S.D.	9.10	9.20	10.10
Cronbach $\alpha$	0.81	0.82	0.84

## 5. VALIDATION STATISTICS (STUDY 4)

### 5.1 Peer- vs Self-Report LOCI

This validation study was conducted with LOCI (Alpha) only. In the Tables below, Person E refers to participants composing the student population, while Person A and Person B are people that they tested on both self-report and peer-report versions of LOCI. Although there are some missing data, the average sample size for all three groups approaches N = 200. This table contains descriptive statistics and reliabilities for the self-report data obtained as part of this investigation.

The reliabilities of the peer-report measures were only marginally lower than that obtained for the self-report measures on all three scales (i.e., Morningness, Eveningness, Sleepiness). Moreover, the means and standard deviations were remarkably similar. These data are available from the PI upon request. In the table below, correlations between self-report and peer-report LOCI scores are reported.

<b>Measure</b>	<b>Morning</b>	<b>Evening</b>	<b>Sleep</b>
<i>Person E (Self-Report)</i>			
Mean	24.40	22.40	43.00
S.D.	11.10	10.10	7.70
Cronbach $\alpha$	0.91	0.89	0.74
<i>Person A (Self-Report)</i>			
Mean	28.50	16.30	38.90
S.D.	11.60	11.70	8.70
Cronbach $\alpha$	0.89	0.90	0.77
<i>Person B (Self-Report)</i>			
Mean	30.10	16.20	37.80
S.D.	12.40	11.10	9.10
Cronbach $\alpha$	0.90	0.88	0.80

<b>Peer-Report</b>	<b>Morning (Self-Report)</b>	<b>Evening (Self-Report)</b>	<b>Sleep (Self-Report)</b>
Person E about Person A	0.66	0.68	0.50
Person E about Person B	0.69	0.62	0.56
Person A about Person E	0.57	0.60	0.37
Person A about Person B	0.73	0.63	0.58
Person B about Person E	0.59	0.56	0.40
Person B about Person A	0.61	0.74	0.51

## 5.2 LOCI Correlation with Sleep-Wake Diary and 'Biodata'

It is worth noting that this data set also has high discriminant validity (i.e., correlations between unrelated measures is generally near zero). The investigation also included information on a sleep-wake diary and biodata completed by person E. This information was correlated with Person E's self-reported Morning, Evening, and Sleep score and is provided in the table that follows.

<b>Measure</b>	<b>Morning (Self-Report)</b>	<b>Evening (Self-Report)</b>	<b>Sleep (Self-Report)</b>
Person E's Bedtime (Diary)	-0.45	0.60	0.29
Person E Wake Time (Diary)	-0.52	0.42	0.42
Person E's Bedtime (Self-Report)	-0.42	0.57	0.14
Person E Wake Time (Self-Report)	-0.50	0.32	0.32
Person E's Breakfast (Self-Report)	-0.42	0.34	0.18
Person E's Lunch (Self-Report)	-0.22	0.18	0.15
Person E's Dinner (Self-Report)	-0.24	0.31	0.07

## 6. LOCI-ALPHA SCALE

On the pages below, you will find a number of statements that you should read and decide how well each one of them describes the way you think or feel.

Here is an example:

I am happy.	Never Rarely S'times Often Usually Always
-------------	---

You might respond:

I am happy.	Never Rarely S'times Often <b>Usually</b> Always
-------------	--

You should reply to all statements. Give your first impression of whether each statement describes the way you think and feel about it. Don't spend too long on deciding what your answer should be. Answer all statements even if you're not entirely sure of your answer. There are NO right or wrong answers.

1. I find it easy to get up in the morning.	Never Rarely S'times Often Usually Always
2. I have lots of energy in the morning.	Never Rarely S'times Often Usually Always
3. I fall asleep before 2300.	Never Rarely S'times Often Usually Always
4. I am a 'morning' person.	Never Rarely S'times Often Usually Always
5. I enjoy working unusual hours.	Never Rarely S'times Often Usually Always
6. On the weekend, I sleep during the day and do things at night.	Never Rarely S'times Often Usually Always
7. I feel tired next day when I stay up late, past midnight.	Never Rarely S'times Often Usually Always
8. I do my best work in the morning.	Never Rarely S'times Often Usually Always
9. I love the 'night-life'.	Never Rarely S'times Often Usually Always
10. I arise before 0600.	Never Rarely S'times Often Usually Always
11. On the weekends, I sleep past noon.	Never Rarely S'times Often Usually Always
12. As soon as the sun goes down, I 'shut down'.	Never Rarely S'times Often Usually Always
13. I get up later on holidays.	Never Rarely S'times Often Usually Always
14. I feel refreshed after waking in the morning.	Never Rarely S'times Often Usually Always
15. I go to bed after 2200.	Never Rarely S'times Often Usually Always
16. When I catch up on lost sleep, I find it easy to fall asleep quickly.	Never Rarely S'times Often Usually Always
17. I watch late night movies, shows on TV.	Never Rarely S'times Often Usually Always

<b>18.</b> On the weekend, I stay up 2 hours later than through the week.	Never Rarely S'times Often Usually Always
<b>19.</b> My eyes feel heavy in the morning.	Never Rarely S'times Often Usually Always
<b>20.</b> On the weekend, I like to sleep in longer.	Never Rarely S'times Often Usually Always
<b>21.</b> I need 8 hours sleep.	Never Rarely S'times Often Usually Always
<b>22.</b> If I get up early, I feel tired all day.	Never Rarely S'times Often Usually Always
<b>23.</b> I need more sleep than other people.	Never Rarely S'times Often Usually Always
<b>24.</b> I like hustle and bustle in the morning.	Never Rarely S'times Often Usually Always
<b>25.</b> I need to relax, not doing much, in the evening.	Never Rarely S'times Often Usually Always
<b>26.</b> I am an 'evening' person.	Never Rarely S'times Often Usually Always
<b>27.</b> I feel 'alive, ready to go' in the evening.	Never Rarely S'times Often Usually Always
<b>28.</b> Even when I go to bed late, I wake up at my usual time the next morning.	Never Rarely S'times Often Usually Always
<b>29.</b> I sleep in 2 hours longer on the weekend than through the week.	Never Rarely S'times Often Usually Always
<b>30.</b> I can fall asleep any time I choose.	Never Rarely S'times Often Usually Always
<b>31.</b> If I have to stay up late, I take a nap during the day.	Never Rarely S'times Often Usually Always
<b>32.</b> I wake up before the alarm.	Never Rarely S'times Often Usually Always
<b>33.</b> On the weekend, I get up early to do the things I like.	Never Rarely S'times Often Usually Always
<b>34.</b> I study after midnight.	Never Rarely S'times Often Usually Always
<b>35.</b> I like to see the sun rise.	Never Rarely S'times Often Usually Always
<b>36.</b> I can stay up 24 hours without feeling bad.	Never Rarely S'times Often Usually Always
<b>37.</b> I am happy doing things in the middle of the night.	Never Rarely S'times Often Usually Always
<b>38.</b> I find it difficult to talk to people in the morning.	Never Rarely S'times Often Usually Always

**LOCI 'MORNING' SCALE (ALPHA FORM)**

**Scoring Key (\* = reverse keyed item):**

<b>Alpha-Form</b>
1. I find it easy to get up in the morning.
2. I have lots of energy in the morning.
4. I am a 'morning' person.
8. I do my best work in the morning.
10. I rise before 0600.
14. I feel refreshed after waking in the morning.
19.* My eyes feel heavy in the morning.
24. I like hustle and bustle in the morning.
28. Even when I go to bed late, I wake up at my usual time the next morning.
32. I wake up before the alarm.
33. On the weekend, I get up early to do the things I like.
35. I like to see the sun rise.
38.* I find it difficult to talk to people in the morning.

**LOCI 'EVENING' SCALE (ALPHA FORM)**

**Scoring Key (\* = reverse keyed item):**

<b>Alpha-Form</b>
3.* I fall asleep before 2300.
5. I enjoy working unusual hours.
7.* I feel tired next day when I stay up late, past midnight.
9. I love the 'night-life'.
12.* As soon as the sun goes down, I 'shut down'.
15. I go to bed after 2200.
17. I watch late night movies, shows on TV.
25.* I need to relax, not doing much, in the evening.
26. I am an 'evening' person.
27. I feel alive, ready to go in the evening.
34. I study after midnight.
36. I can stay up 24 hours without feeling bad.
37. I am happy doing things in the middle of the night.

**LOCI 'PROPENSITY FOR SLEEP DEBT' SCALE**

**Scoring Key:**

<b>Alpha-Form</b>
<b>6.</b> On the weekend, I sleep during the day and do things at night.
<b>11.</b> On the weekends, I sleep past noon.
<b>13.</b> I get up later on holidays.
<b>16.</b> When I catch up on lost sleep, I find it easy to fall asleep quickly.
<b>18.</b> On the weekend, I stay up 2 hours later than through the week.
<b>20.</b> On the weekend, I like to sleep in longer.
<b>21.</b> I need 8 hours sleep.
<b>22.</b> If I get up early, I feel tired all day.
<b>23.</b> I need more sleep than other people.
<b>29.</b> I sleep in 2 hours longer on the weekend than through the week.
<b>30.</b> I can fall asleep any time I choose.
<b>31.</b> If I have to stay up late, I take a nap during the day.

## 7. LOCI /DE (Selbstauskunft)

Weiter unten finden Sie eine Reihe von Aussagen. Bitte lesen Sie diese Aussagen sorgfältig durch und entscheiden Sie, wie gut jede einzelne von ihnen Ihre Meinungen und Gefühle beschreibt.

Hier ein Beispiel:

Ich bin glücklich	nie	selten	manchmal	öfters	meistens	immer
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Sie könnten antworten:

Ich bin glücklich	nie	selten	manchmal	öfters	<del>meistens</del>	immer
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Sie sollten alle Aussagen beantworten. Entscheiden Sie dabei möglichst spontan, wie gut jede Aussage Ihre Meinungen und Gefühle beschreibt. Denken Sie nicht zu lange über Ihre Antwort nach. Beantworten Sie alle Aussagen, auch wenn Sie sich nicht ganz sicher über Ihre Antwort sind. Es gibt **keine** richtigen oder falschen Antworten.

1. Es fällt mir leicht, morgens aufzustehen.	nie	selten	manchmal	öfters	meistens	immer
2. Ich habe morgens viel Energie.	nie	selten	manchmal	öfters	meistens	immer
3. Ich schlafe vor 23 Uhr ein.	nie	selten	manchmal	öfters	meistens	immer
4. Ich bin ein „Morgenmensch“ (Frühaufsteher).	nie	selten	manchmal	öfters	meistens	immer
5. Ich arbeite gerne zu ungewöhnlichen Zeiten.	nie	selten	manchmal	öfters	meistens	immer
6. Am Wochenende schlafe ich tagsüber und bin nachts aktiv.	nie	selten	manchmal	öfters	meistens	immer
7. Wenn ich bis nach Mitternacht aufbleibe, fühle ich mich am nächsten Tag müde.	nie	selten	manchmal	öfters	meistens	immer
8. Meine Arbeit gelingt mir morgens am besten.	nie	selten	manchmal	öfters	meistens	immer
9. Ich liebe das „Night-life“ (Nachtleben).	nie	selten	manchmal	öfters	meistens	immer
10. Ich stehe vor 6 Uhr auf.	nie	selten	manchmal	öfters	meistens	immer
11. An den Wochenenden schlafe ich bis mittags oder länger.	nie	selten	manchmal	öfters	meistens	immer
12. Sobald die Sonne untergeht, schalte ich ab.	nie	selten	manchmal	öfters	meistens	immer
13. Im Urlaub stehe ich später auf.	nie	selten	manchmal	öfters	meistens	immer
14. Ich fühle mich frisch und erholt, wenn ich morgens aufwache.	nie	selten	manchmal	öfters	meistens	immer
15. Ich gehe nach 22 Uhr ins Bett.	nie	selten	manchmal	öfters	meistens	immer
16. Wenn ich Schlaf nachholen will, fällt es mir leicht, schnell einzuschlafen.	nie	selten	manchmal	öfters	meistens	immer
17. Ich schaue das Nachtprogramm im Fernsehen.	nie	selten	manchmal	öfters	meistens	immer
18. Am Wochenende bleibe ich 2 Stunden länger auf als in der Woche.	nie	selten	manchmal	öfters	meistens	immer
19. Morgens fällt es mir schwer, die Augen aufzuhalten.	nie	selten	manchmal	öfters	meistens	immer
20. Am Wochenende schlafe ich gerne länger.	nie	selten	manchmal	öfters	meistens	immer
21. Ich brauche 8 Stunden Schlaf.	nie	selten	manchmal	öfters	meistens	immer
22. Wenn ich früh aufstehe, fühle ich mich den ganzen Tag müde.	nie	selten	manchmal	öfters	meistens	immer

<b>23.</b> Ich brauche mehr Schlaf als andere Leute.	nie	selten	manchmal	öfters	meistens	immer
<b>24.</b> Ich mag geschäftiges Treiben am Morgen.	nie	selten	manchmal	öfters	meistens	immer
<b>25.</b> Abends brauche ich Entspannung und Muße.	nie	selten	manchmal	öfters	meistens	immer
<b>26.</b> Ich bin ein „Abendmensch“ (Nachtmensch).	nie	selten	manchmal	öfters	meistens	immer
<b>27.</b> Abends fühle ich mich lebendig und unternehmungslustig.	nie	selten	manchmal	öfters	meistens	immer
<b>28.</b> Selbst wenn ich spät zu Bett gehe, wache ich am nächsten Morgen zur gewohnten Zeit auf.	nie	selten	manchmal	öfters	meistens	immer
<b>29.</b> Ich schlafe am Wochenende 2 Stunden länger aus als in der Woche.	nie	selten	manchmal	öfters	meistens	immer
<b>30.</b> Ich kann zu jeder Zeit einschlafen.	nie	selten	manchmal	öfters	meistens	immer
<b>31.</b> Wenn ich lange aufbleiben muss, mache ich tagsüber ein Nickerchen.	nie	selten	manchmal	öfters	meistens	immer
<b>32.</b> Ich wache auf, bevor der Wecker klingelt.	nie	selten	manchmal	öfters	meistens	immer
<b>33.</b> Am Wochenende stehe ich früh auf, um das zu tun, was ich möchte.	nie	selten	manchmal	öfters	meistens	immer
<b>34.</b> Ich arbeite/lerne auch nach Mitternacht.	nie	selten	manchmal	öfters	meistens	immer
<b>35.</b> Ich sehe gerne den Sonnenaufgang.	nie	selten	manchmal	öfters	meistens	immer
<b>36.</b> Ich kann 24 Stunden aufbleiben, ohne mich schlecht zu fühlen.	nie	selten	manchmal	öfters	meistens	immer
<b>37.</b> Ich bin gerne mitten in der Nacht aktiv.	nie	selten	manchmal	öfters	meistens	immer
<b>38.</b> Morgens fällt es mir schwer, mit Leuten zu reden.	nie	selten	manchmal	öfters	meistens	immer

## 8. LOCI (NORWEGIAN VERSION)

På sidene nedenfor vil du finne et nummer av utsagn. Les disse og bestem deg for hvor godt hvert utsagn beskriver hvordan du føler og tenker.

Her er et eksempel:

Jeg er glad	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
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Du vil kanskje svare

Jeg er glad	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
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Svar på alle utsagnene. Angi ditt førsteinntrykk på hvorvidt hvert utsagn beskriver hvordan du tenker og føler om det. Ikke bruk for lang tid på å bestemme svaret. Besvar alle utsagnene selv om du ikke er helt sikker på ditt svar. Det er *ingen* rette og gale svar.

1. Jeg finner det enkelt å stå opp om morgenen.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
2. Jeg har masse energi om morgenen.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
3. Jeg sovner før 23.00	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
4. Jeg er et morgenmenneske	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
5. Jeg trives med uvanlig arbeidstid.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
6. I helgene sover jeg på dagen og gjør ting om kvelden.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
7. Jeg føler meg trøtt dagen etter at jeg har vært våken til over midnatt.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
8. Jeg gjør det beste arbeidet om morgenen.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
9. Jeg elsker "nattelivet".	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
10. Jeg står opp før 06.00.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
11. I helgene sover jeg lengre enn klokken 12.00	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
12. Straks solen går ned, slokner jeg som et lys.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
13. Jeg står opp senere i ferier.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
14. Jeg føler meg forfrisket når jeg våkner om morgenen.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
15. Jeg går og legger meg etter klokken 22.00.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
16. Når jeg tar igjen fortløst søvn, synes jeg det er lettere å sovne raskt inn.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid

17. Jeg ser på sene programmer og filmer på TV.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
18. I helgene er jeg oppe to timer lengre enn på hverdager.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
19. Øynene mine føles tunge om morgenen.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
20. I helgen liker jeg å sove lenge.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
21. Jeg behøver 8 timers søvn.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
22. Hvis jeg står opp tidlig, føler jeg meg trøtt resten av dagen.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
23. Jeg trenger mer søvn enn andre mennesker.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
24. Jeg liker å stulle og stelle om morgenen.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
25. Jeg trenger å slappe av, å ikke gjøre noen ting om kvelden.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
26. Jeg er et "kveldsmenneske".	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
27. Jeg føler meg "levende" og "klar til dyst" om kvelden.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
28. Selv når jeg går sent og legger meg, våkner jeg til det samme og vante tidspunktet om morgenen.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
29. I helgene sover jeg to timer lengre enn til hverdags.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
30. Jeg kan sovne når jeg måtte ønske.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
31. Hvis jeg må holde meg våken i løpet av kvelden, tar jeg meg en blund i løpet av dagen.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
32. Jeg våkner før vekkeklokken.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
33. I helgene står jeg opp tidlig for å gjøre ting jeg liker.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
34. Jeg studerer etter midnatt.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
35. Jeg liker å se soloppgangen.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
36. Jeg kan være våken i 24 timer uten å føle meg dårlig.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
37. Jeg trives med å gjøre ting midt på natten.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid
38. Jeg finner det vanskelig å snakke med folk om morgenen.	Aldri	sjelden	noen ganger	ofte	vanligvis	alltid

## 9. LOCI (SERBO-CROATIAN VERSION)

### ALPHA

1	2	3	4	5	6
NIKADA	RETKO	PONEKAD	CESTO	UOBIČAJENO	UVEK

1. Uočio sam da mi je lako da ustanem rano iz kreveta
2. Ujutro imam mnogo energije
3. Zaspim pre 23 sata
4. Ja sam "jutarnja" osoba
5. Uživam da radim u neobičajene sate, kada ljudi obično ne rade
6. Tokom vikenda, spavam tokom dana a radim noću
7. Osećam se izmoreno sledećeg dana ako predhodne noći "zaglavim" posle ponoći
8. Najkvalitetnije radim ujutru
9. Volim "noćni život"
10. Ustajem pre 6 sati
11. Tokom vikenda prespavam i podne
12. Čim sunce zađe meni se spava
13. Ustajem kasno tokom vikenda
14. Osećam sevže kada se probudim rano
15. Idem u krevet posle 22 sata
16. Ako treba da nadoknadim propušten san, lako mi je da zaspim
17. Gledam kasne noćne filmove i zabavne programe na TV
18. Tokom vikenda ostajem 2 sata duže budan nego tokom nedelje
19. Ujutro osećam kako su mi kapeći teški
20. Tokom vikenda, volim duže da spavam
21. Potrebno mi je 8 sati sna
22. Ako ustanem rano, osećam umor ceo dan
23. Treba mi više sna nego drugim ljudima
24. Volim energične aktivnosti ujutro
25. Uveče mi je potrebno da se relaksiram i da ne radim puno
26. Ja sam "nocna" osoba
27. Uveče se osećam "živ, spreman za akciju"
28. Čak i kada kasno odem u krevet, ujutro se probudim u vreme kada obično ustajem
29. Tokom vikenda spavam 2 sata duže nego tokom nedelje
30. Mogu da zaspim u bilo koje vreme
31. Ako moram da se zadržim duže uveče, dremnem tokom dana
32. Probudim se pre nego što sat zazvoni
33. Tokom vikenda, probudim se rano da obavim poslove koje sam planirao
34. Učim ili čitam posle ponoći
35. Volim da gledam izlazak sunca
36. Mogu da ne spavam 24 sata a da se ne osećam loše
37. Prija mi kada obavljam poslove usred noći
38. Uočavam da mi je teško da razgovaram sa ljudima rano ujutro

### BETA

1	2	3	4	5	6
NIKADA	RETKO	PONEKAD	CESTO	UOBIČAJENO	UVEK

1. Tokom vikenda spavam 2 sata duže nego tokom nedelje
2. Gledam kasne noćne filmove i zabavne programe na TV
3. Ako treba da nadoknadim propušten san, lako mi je da zaspim
4. I kada mi radno vreme nije tačno određeno, ustajem rano ujutro
5. Tokom vikenda ostajem 2 sata duže budan nego tokom nedelje
6. Uveče mi treba relaksacija i da ne radim mnogo
7. Više volim da ozbiljna razmišljanja ostavim za ujutro
8. Mogu da funkcionišem spavajući samo po nekoliko sati

9. Tokom vikenda prespavam i podne
10. Osećam se umorno kad ujutro ustanem
11. Čim sunce zađe meni se spava
12. Odmah nakon noćnog sna osećam se potpuno oporavljeno i orno
13. Oko ponoći prezalogajim nešto
14. Ujutro sam pun energije
15. Vikendom kasnije ustajem
16. Prija mi kad obavljam poslove usred noći
17. Ustajem pre 8.00 sati
18. Čim ujutro ustanem osećam se sasvim budno
19. Ako ustanem rano osećam umor čitav dan
20. Osećam se izmoreno sledećeg dana ako prethodne noći 'zaglavim' posle ponoći
21. Osećam se sveže kad se ujutro probudim
22. Ako se isforsiram da ostanem 2 sata duže da ne spavam prethodne noći, sutradan se još uvek osećam dobro
23. Tokom vikenda, spavam tokom dana i radim noću
24. Prespavam zvonjavu budilnika
25. Treba mi 8 sati sna
26. Mogu da ne spavam 24 sata a da se ne osećam loše
27. Meni treba više sna nego drugim ljudima
28. Lako mi je da ustanem ujutro
29. Ja sam 'noćna' osoba
30. Ostajem budan do kasno da bih završio poslove
31. Mislim da me "rano leži, rano ustani" čini "zdravim, imućnim i mudrim"
32. Najaktivniji sam ujutro
33. U krevet idem nakon ponoći
34. Mogu da zaspim u bilo koje vreme
35. Ja sam 'jutarnja' osoba
36. Tokom vikenda, volim duže da spavam
37. Ako ostanem budan do kasno, dremnem preko dana
38. Osećam se umoran posle 22.00 sata

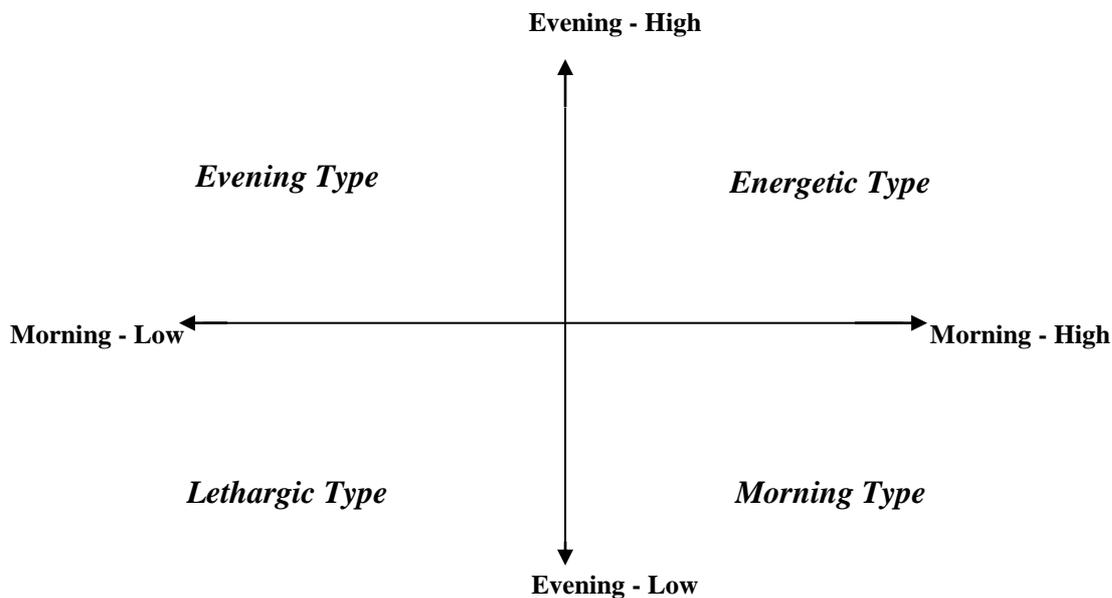
## 10. LOCI (POSSIBLE FEEDBACK)

MORNINGNESS	General interpretation:	At work likely to:
	<p><b>High score:</b> Described as a lark, the early bird that catches the worm. This person will function at peak efficiency levels during the early morning phase (i.e., between 6 and 10am).</p> <p><b>Average:</b> Whilst this person may not be especially energetic in the morning, they are unlikely to be lethargic (for very long) after having woken up.</p> <p><b>Low score:</b> This person does not like to engage in early morning activity, typically taking some time to wake up before they perform at peak efficiency.</p>	<p>At work likely to:</p> <ul style="list-style-type: none"> <li>• Be extremely alert during the early morning</li> <li>• Meet demands placed on them during the morning</li> <li>• Enjoy (and be proficient) in morning activities, meetings, and assignments</li> </ul> <ul style="list-style-type: none"> <li>• Be moderately active during the early morning, but possibly after taking a bit of time to wake themselves up</li> <li>• Meet demands placed on them during the morning, provided that it is not too early</li> <li>• Can participate in morning activities, meetings, and assignments; though this may not be the most optimal time</li> </ul> <ul style="list-style-type: none"> <li>• Need a considerable amount of time to 'energize' after waking up in the morning</li> <li>• Find this person eases into the activities of the day</li> <li>• Find that this person is not as active or alert when attending morning meetings, scheduled activities, or completing an assignment early in the day</li> </ul>

<p><b>EVENINGNESS</b></p>	<p><i>General interpretation:</i></p> <p><b>High score:</b> Described as a night owl, this person typically enjoys afternoon and evening activities, tending to stay alert and energized well into the night.</p> <p><b>Average:</b> This person can remain energetic during the late afternoon, early evening, and into the night, but will tend not to keep exceptionally late hours on a regular basis.</p> <p><b>Low score:</b> This person does not like to engage in late afternoon and evening activities. Thus, they will typically perform below peak efficiency at these times.</p>	<p><i>At work likely to:</i></p> <ul style="list-style-type: none"> <li>• Be extremely alert during the late afternoon and evenings</li> <li>• Meet demands placed on them towards the end of the day, when others are tiring</li> <li>• Enjoy (and be proficient) in late afternoon and evening activities, meetings, and assignments.</li> <li>• Be prepared to stay back late to finish an assignment, when at peak efficiency</li> </ul> <ul style="list-style-type: none"> <li>• Is reasonably alert in the late afternoon and evening, and can thus engage in activity during this time</li> <li>• May enjoy late afternoon and evening activities, provided they don't go for too long</li> <li>• Meet demands placed on them during the late afternoon and evenings, provided that it is not too late</li> <li>• Can participate in late afternoon and evening activities, meetings, and assignments; though this may not be the most optimal time</li> </ul> <ul style="list-style-type: none"> <li>• Refrain from staying back late to complete assignments</li> <li>• Prefer not to focus energy and attention during the late afternoon and early evening</li> <li>• Find that this person is not as active or alert when attending late afternoon and evening meetings, scheduled activities, or completing an assignment later in the day</li> </ul>
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<p><b>SLEEP PATTERN (EXPERIMENTAL SCALE)</b></p>	<p><i>General interpretation:</i></p> <p><b>High score:</b> <i>This person is likely to have a need for a certain amount of sleep, each day. However, they can gain the necessary amount with some flexibility (e.g., through taking naps or sleeping for different durations on different nights)</i></p> <p><b>Average:</b> <i>This person is likely to exhibit a combination of rigidity, in the amount of sleep required, and some flexibility in how this is acquired.</i></p> <p><b>Low score:</b> <i>This person will typically maintain a (reasonably) regular sleep-wake pattern. They won't often deviate from this pattern, but if they happen to miss sleep, they may not need to catch up on it.</i></p>	<p><i>General tendencies include:</i></p> <ul style="list-style-type: none"> <li>• <i>May keep a changeable or irregular sleep-wake schedule</i></li> <li>• <i>May fit sleep in around other activities</i></li> <li>• <i>May find that they accumulate a 'sleep debt' which will stay around until they catch up on their lost sleep</i></li> </ul> <ul style="list-style-type: none"> <li>• <i>Have difficulty sleeping outside of their regular hours but not be troubled by sometimes missing sleep</i></li> <li>• <i>Sometimes accumulate a 'sleep debt' but can catch it up by sleeping outside of usual times</i></li> <li>• <i>Cope reasonably well with sleeping at irregular times and for different durations</i></li> </ul> <ul style="list-style-type: none"> <li>• <i>Has a routine bed time and getting up time</i></li> <li>• <i>May not be able to sleep outside of their usual hours</i></li> <li>• <i>Will cope well with missing small amounts of sleep</i></li> </ul>
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**Combinations defined by the Morning (M) and Evening (E) Scales:**



**Capsule Descriptions by M and E Quadrant:**

***Energetic Type***

This individual typically feels energized and alert both during the early morning and late at night. These individuals appear particularly well suited to shiftwork, and other jobs requiring flexible work schedules.

***Morning Type***

The active part of this person's day is the morning; they are not active or energized in the evening, or late at night. People in this quadrant are profitably given work assignments during the morning. Although there is no evidence that this type of individual's performance will reduce dramatically in the afternoon, peak efficiency is generally from 6am to 1pm.

***Evening Type***

The active part of this person's day is the afternoon and early evening; they are not as active or energized in the morning. People in this quadrant are profitably given work assignments during the afternoon and can be valuable to organisations since they may be prepared to work back late to meet deadlines. Although there is no evidence that this type of individual's performance is reduced dramatically in the morning, peak efficiency is generally after 1pm.

***Lethargic Type***

This type tends *not* to be energized or alert either in the early morning or late at night. These individuals may still perform at efficient levels of work during the middle of the day, though they appear particularly ill suited to shiftwork, and other jobs requiring flexible work schedules. Extreme scores in this quadrant may be indicative of possible clinical problems, such as depression and seasonal affective disorder (though further screening, using appropriate clinical instruments, is required before any judgments along these lines are made).

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