Relationship among Type A Behavior Pattern, Hostility, and Uncontrollable Event in a College-Aged Population

Marna Elyea Burns
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by

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In closing I send thanks to my parents, Jim and Peg Elyea, for all their love and support through tough times and to my husband, Tom, for his support, but most of all for helping me believe I could do it.
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. List of Tables</td>
<td>iv</td>
</tr>
<tr>
<td>2. List of Figures</td>
<td>v</td>
</tr>
<tr>
<td>3. Abstract</td>
<td>vii</td>
</tr>
<tr>
<td>4. Introduction</td>
<td>1</td>
</tr>
<tr>
<td>5. Method</td>
<td>12</td>
</tr>
<tr>
<td>6. Results</td>
<td>19</td>
</tr>
<tr>
<td>7. Discussion</td>
<td>28</td>
</tr>
<tr>
<td>8. References</td>
<td>52</td>
</tr>
<tr>
<td>9. Appendices</td>
<td>59</td>
</tr>
</tbody>
</table>
List of Tables

<table>
<thead>
<tr>
<th>1. Time Estimation (in s) for Rest 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>TABP x Ho x Experimental Condition. 21</td>
</tr>
<tr>
<td>2. Time Estimation (in s) for Rest 2</td>
</tr>
<tr>
<td>TABP x Ho x Experimental Condition. 22</td>
</tr>
<tr>
<td>3. Time Estimation (in s) TABP x</td>
</tr>
<tr>
<td>Experimental Condition. 24</td>
</tr>
<tr>
<td>4. Time Estimation (in s) TABP x</td>
</tr>
<tr>
<td>Experimental Condition. 25</td>
</tr>
<tr>
<td>5. Time Estimation (in s) TABP x Ho. 26</td>
</tr>
<tr>
<td>6. Time Estimation Averages (in s)</td>
</tr>
<tr>
<td>for TABP x Ho. 50</td>
</tr>
</tbody>
</table>
List of Figures

1. TABP x Ho x Experimental Condition
   Baseline I Time Estimation ........... 32
2. TABP x Ho x Experimental Condition
   Rest 1 Time Estimation ............... 33
3. TABP x Ho x Experimental Condition
   Rest 2 Time Estimation ............... 34
4. TABP x Ho x Experimental Condition
   Rest 3 Time Estimation ............... 35
5. TABP x Ho x Experimental Condition
   Baseline II Time Estimation .......... 36
6. TABP x Experimental Condition
   Baseline I Time Estimation .......... 37
7. TABP x Experimental Condition
   Rest 1 Time Estimation ............... 38
8. TABP x Experimental Condition
   Rest 2 Time Estimation ............... 39
9. TABP x Experimental Condition
   Rest 3 Time Estimation ............... 40
10. TABP x Experimental Condition
    Baseline II Time Estimation ......... 41
### List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>TABP x Ho</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Baseline I Time Estimation</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>TABP x Ho</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Rest 1 Time Estimation</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>TABP x Ho</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Rest 2 Time Estimation</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>TABP x Ho</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Rest 3 Time Estimation</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>TABP x Ho</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>Baseline II Time Estimation</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Average Time Estimations</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>TABP x Ho</td>
<td></td>
</tr>
</tbody>
</table>
Abstract

Seventy-two male college students classified as Type A or Type B on the basis of scores on the Jenkins Activity Survey – Form T (JAS-T) were given the Cook and Medley Hostility Scale and divided into four groups on the basis of test scores: A/High Hostile; A/Low Hostile; B/High Hostile; and, B/Low Hostile. Subjects were then randomly assigned to either Group I: Controllable Event or Group II: Uncontrollable Event. Pre- and post-experimental one-minute time estimates and pre- and post-experimental one-minute key tapping sessions were recorded for all subjects. During the experimental condition, subjects in Group I: Controllable Event estimated a sequence of one-minute task and rest conditions. During the task condition, subjects tapped the "t" key on a computer keyboard to accrue points displayed on the computer monitor. Subjects in Group II: Uncontrollable Event received inaccurate feedback from their tapping of the computer "t" key during their second and third task conditions. In other words, during some of their task trials, subjects in Group II tapped the "t" key, but the computer did not display all the taps made on the
screen counter. In these trials, the onscreen feedback was only partially contingent on the behavior of the subject, i.e., the subject was not in full "control." Two separate dependent variables, time estimation in seconds and number of taps, were analyzed in this design. No significant interactions or main effects were found for tapping behavior. Results showed a population difference for time estimation for subjects in one presentation order of Group II: Uncontrollable Event. However, a significant two-way interaction between Type A/Type B and High Hostile/Low Hostile subjects was present for all five measures of time estimation. This interaction does not support the hypothesis that high hostile Type A subjects exposed to an uncontrollable event will significantly underestimate time compared to other subjects. The results do suggest that High Hostility may affect a Type B individual's ability to estimate one minute and that Low Hostility may affect a Type A individual's ability to estimate one minute. Further research is needed to explore this possible relationship.
Relationship Among Type A Behavior Pattern, Hostility, and Uncontrollable Event in a College-aged Population

Type A Behavior Pattern

It has been over 20 years since the type A behavior pattern (TABP) was first implicated as a risk factor in the occurrence of coronary heart disease (CHD) (Friedman & Rosenman, 1959). This behavior pattern is characterized by excessive displays of competitiveness, aggressiveness, hostility, impatience, time urgency, and vigorous voice and psychomotor mannerisms, which occur in response to a variety of environmental stimuli (Glass, 1977; Rosenman et al., 1964). In this sense, TABP is a global construct. Type A prone individuals possess many, though not necessarily all, of the defining characteristics while type B prone individuals (noncoronary-prone) are defined by the relative absence of Type A characteristics. Findings from both retrospective and prospective studies have linked the global TABP with clinical manifestations of CHD (Haynes, Feinleib, & Kannel, 1980; Rosenman et al., 1975). Follow-up over an eight-and-a-half year period
in the Western Collaborative Group Study (Rosenman et al., 1975) showed Type A men to have about twice the rate of new CHD events as compared to their Type B counterparts. In addition, the association between TABP and CHD was found to be unrelated to traditional factors such as age, height, or weight and statistically independent of smoking, family history of CHD, and blood pressure.

However, several other studies have failed to find an association between TABP and coronary artery disease using either of the two most common measures of TABP, the Jenkins Activity Survey (JAS) (Jenkins, Zyzanski, & Rosenman, 1971) or the Structured Interview (SI). The Multiple Risk Factor Intervention Study (Shekelle, Hulley, et al., 1985) failed to show a significant association between either SI- or JAS-defined TABP and incidence of CHD at a 7.1-year follow-up of over 3,000 subjects.

In addition, some studies have found a significant association between SI-defined TABP and CHD but not JAS-defined TABP using the same sample population (Williams et al., 1980). Blumenthal, Williams, Kong, Schanberg, and Thompson (1978) found a
relationship between TABP as determined by the SI and CHD events but did not find a relationship between TABP as determined by the JAS questionnaire and arteriographically documented coronary arteriosclerosis. The sample population in this study consisted of a large proportion of individuals from rural settings. Blumenthal et al. (1978) suggest that since the JAS was originally standardized on a male, urban population it does not generalize well to heterogeneous populations with a significant number of female and/or rural subjects. However, such discrepancies in SI- and JAS-determined TABP could also indicate that some components of the TABP are more important than others in relating Type A behavior to CHD. In particular, hostility has been explored as a salient feature of TABP as it relates to CHD.

**Hostility and Type A Behavior Pattern**

In 1977, Matthews, Glass, Rosenman, and Bortner reanalyzed the tape-recorded structured interviews from the Western Collaborative Group Study (WCGS) and found two factors to be the only significant predictors of CHD: "Competitive Drive" and
"Impatience." One component of the Competitive Drive factor was "Potential for Hostility," defined as a relatively stable tendency (a) to experience varying degrees and combinations of anger, irritability, resentment, and related negative effects in response to common, everyday events that are likely to arouse them in individuals who are prone to react in such ways, and/or (b) to react with expressions of antagonism, disagreeableness, rudeness, surliness, criticalness, and uncooperativeness (Dembroski, 1978; Dembroski, MacDougall, Williams, Haney, & Blumenthal, 1985).

Dembroski, MacDougall, Herd, and Shields (1979) examined the relationship between TABP and cardiovascular response induced by varying levels of environmental challenge and found that high hostile/competitive Type As respond to even mild challenge with enhanced physiologic response (systolic blood pressure and heart rate) while globally defined As show physiologic elevations only when specifically challenged and Type Bs show much smaller physiologic elevations when challenged.
Findings from several recent studies (Barefoot, Dahlstrom, & Williams, 1983; Dembroski et al., 1985; Shekelle, Gale, Ostfeld, & Paul, 1983) suggest that anger and hostility may be the components of TABP which are more highly correlated with CHD.

Williams et al. (1980) found that scores on the Cook and Medley (1954) Hostility Scale (Ho) were retrospectively associated with the severity of arteriosclerosis independent of the SI-defined global TABP. The Ho Scale is a subscale of the Minnesota Multiphasic Personality Inventory (MMPI).

McCranie, Watkins, Brandsma, and Sisson (1986) found that high scores on the Cook and Medley (1954) Hostility Scale were not significant predictors of CHD, even though they used sample characteristics and a follow-up period similar to those of former studies (Barefoot et al., 1983; Shekelle et al., 1983). However, in the McCranie et al. study (1986), the Ho Scale was administered as part of an application for medical school entry while medical students in the other studies took the scale as part of their curriculum. The lower Ho scores in the McCranie et al. (1986) sample may have been due to social desirability factors.
Dembroski et al. (1985) reanalyzed SI audiotapes from a random sample of angiography patients at Duke University Medical Center and found two dimensions of interest: "Potential for Hostility" and "Anger-In," defined as a tendency to withhold expression of anger or irritation against others even when such expression would be appropriate. Potential for Hostility and Anger-In were found to be interactive in their association so that a positive relationship between Potential for Hostility ratings and CHD indices was observed only in those subjects who were rated high on the Anger-In dimension. Level of Ho was unrelated to CHD in those subjects who reported a willingness to express anger openly against the source of irritation. A significant relationship between severity of CHD and Anger-In scores agrees with the findings of the Framingham study (Haynes et al., 1980), which showed that Anger-In scores were predictive of clinical CHD in both men and women.

**Time Urgency and Type A Behavior Pattern**

The TABP is characterized by a hard-driving competitiveness, time urgency, hyperalertness, and
preoccupation with vocational and related deadlines. In addition, certain environmental situations, such as uncontrollable stress, seem to evoke an A reaction in specific types of TABP-prone individuals. Krantz, Glass, and Snyder showed in 1974 that exposing subjects to an uncontrollable noise stressor interfered with escape learning in a subsequent experimental stress situation. Under high levels of noise, Type As gave up in the face of high stress relative to the escape behavior of Type Bs. For the moderate level of noise, however, Type As showed significantly more escape attempts than Type Bs in the experimental stress situation.

Krantz et al. (1974) computed two factor scores from the JAS, Hard-Driving (HD) and Speed-and-Impatience (SI), and found that it was the measure of time urgency that was more important in determining the relationship between the TABP and reactions to uncontrollable noise. A sense of time urgency appeared to be the dominant feature in the Type As response to uncontrollable stressful events.

Bortner and Rosenman (1967) found that time-conscious Type As work near maximum speed, have
difficulty slowing down, and overreact when required to slow down. Glass, Snyder, and Hollis (1974) found that time-urgent Type A individuals had more difficulty solving a task requiring a slow rate of response than less urgent Type Bs.

Uncontrollable Events and Type A Behavior Pattern

Early work by Glass (1977) and other researchers (Brunson & Matthews, 1981; Krantz, Glass, & Snyder, 1974; Matthews, 1979) provides evidence that the Type A individual is motivated by a strong need to maintain personal control over life events. Strube and Werner (1983) found that Type A subjects relinquished fewer trials to their partners than did Type B subjects for a task in which only one person could work during any one trial, especially when the partner had exhibited a superior initial performance.

Dembroski, MacDougall, and Musante (1984) suggested that autonomic nervous system arousal may create psychological discomfort which increases need for control in the Type A individual. These authors hypothesize that voice stylistics typical of Type A individuals (such as explosive, accelerated speech
and frequent interruptions) may be a means of attempting control of the social environment. Research by Brunson and Matthews (1981) also suggests that the Type A coping style is aimed at maintaining control over stressful aspects of their environment.

Furnham, Hillard, and Brewin (1985) found that As and Bs differed in reactions to uncontrollable situations, with the As perceiving more causal and moral responsibility and reporting more anger with self. In addition, Type As are also more easily threatened by loss of control and react to this loss with attempts to re-establish control (Carver, 1980; Rhodewalt and Comer, 1982).

Glass (1977) found that Type A individuals exert greater effort than Type B individuals to master events which they perceive as threatening to their sense of environmental control. In particular, Type As suppress subjective states (like fatigue) that might interfere with performance, exhibit rapid pacing of their activities, show little tolerance for interruption, and may express hostility if task interruption does occur.
The concept of uncontrollability may be defined as the perception of noncontingency between responding and reinforcement (Seligman, Maier, & Solomon, 1971). When a response will not determine what an individual gets, the outcome is considered uncontrollable. Glass (1977) labeled the initial reaction of Type A individuals to an uncontrollable event "hyperresponsiveness." In effect, Type As try harder to assert control over the stimulus. When, despite these extra efforts, the Type A individual learns that he or she cannot escape and/or avoid the unpleasant situation, then the Type A will exhibit what Glass termed "hyporesponsiveness" compared to a Type B counterpart. In other words, after extended exposure to uncontrollability, the Type A individual stops trying harder (hyperresponsiveness) and gives up (hyporesponsiveness), in effect showing a learned helplessness response (Seligman et al., 1971).

Matthews (1982) points out, however, that even though findings seem to indicate that Type As do respond to threats to their control by actively trying to resist those threats and attempting to reassert control, the evidence to date is based solely on a
Jenkins Activity Survey definition of Type As and Type Bs. It is not known whether similar effects would be obtained if the classification of TABP were based on another measure.

The present study examines the hypothesis that those Type A individuals scoring high on hostility will also demonstrate a higher operant rate of responding to a button pressing experimental task following exposure to an uncontrollable event as compared to the responding of Type B subjects and to Type A subjects who do not score as high on the Ho scale. In addition, this study will also examine whether high hostile Type A subjects exposed to an uncontrollable event will significantly underestimate time compared to other subjects.
Method

Subjects

Subjects were 72 college-aged males enrolled in Psychology Department classes. Each received extra credit for their participation in this research. Additionally, an honorarium of $5.00 was provided to all participants who completed the study. All participants were treated in accordance with the "Ethical Principles of Psychologists" (American Psychological Association, 1981).

Apparatus

A Zenith Z-180 PC Series portable computer was programmed to record time estimates made by subjects and to record the number of times the "t" key was depressed during challenge conditions.

Test Measures

The Jenkins Activity Survey, T-Form. The Jenkins Activity Survey, T-Form (Glass, 1977) is a 44-item, self-report measure which has been used frequently in work with university samples.
(Glass, 1977; Jenkins et al., 1971). The Jenkins Activity Survey, T-Form (JAS-T) provides an overall Type A score in addition to separate measures.

For the present study, scoring of the JAS-T was done following procedures described by Glass (1977). For each of the 21 items on the A-B scale, the A responses were scored 1 and the B responses 0. The median A-B score for college-age males in Glass' research typically falls between 7 and 8, where 0 is the maximal Pattern B score and 21 is the maximal Pattern A score. The median for subjects used in the present study was 8.

The Cook and Medley Hostility Scale. The Cook and Medley Hostility Scale (Cook & Medley, 1954), is a 50-question, forced-choice test derived from the Minnesota Multiphasic Personality Inventory. Items on this scale can be answered in either a hostile or nonhostile direction. The Ho score is the number of items out of 50 answered in the hostile direction. Williams (1984) found that Ho scores increase as a function of increasing TABP as measured by the structured interview. The Cook and Medley Hostility Scale was used to measure Ho in the present study.
Design and Procedure

Session One. Subjects were asked to fill out informed consent forms prior to initial testing. The experimenter then gave instructions for completing both paper and pencil instruments: the JAS-T and the Cook and Medley Hostility Scale. Half the subjects completed the JAS-T first, followed by the Cook and Medley Hostility Scale and half the subjects completed the Cook and Medley Hostility Scale first, followed by the JAS-T. After subjects completed these scales, they were advised of a Session Two date and time and were dismissed. The experimenter scored the two instruments and assigned subjects to one of four groups based on the results using a median split for both measures. The four groups consisted of 1) subjects scoring above the median splits in both measures (A/HH, $N = 23$), 2) subjects scoring above the median split for TABP and below the median split for Ho (A/LH, $N = 13$), 3) subjects scoring below the median split for TABP and above the median split for Ho (B/HH, $N = 15$), and 4) subjects scoring below the median split in both measures (B/LH, $N = 20$). The
median split scores were 8 for the JAS-T and 23 for the Cook and Medley Hostility Scale.

Subjects were assigned randomly to one of two experimental groups: Group I: Controllable Event and Group II: Uncontrollable Event. Subjects assigned to Group II: Uncontrollable Event were then assigned randomly to one of two orders of presentation, 25%/50% or 50%/25% where the percentage indicates the number of taps actually made which were not recorded by the onscreen counter.

Session Two. All subjects were read the following instructions before the experiment began: "During this experiment you will be asked to estimate 1 minute. Please do not use a watch—we want this to be your estimate. You will also be asked to tap keys on the computer keyboard. A tap consists of pressing a key down and letting it up. Do not hold a key down continuously."

All subjects were then asked to estimate a 1-minute interval by pressing the "t" key on the computer keyboard to begin their estimate and pressing the "q" key on the keyboard to end their estimate.
The program recorded the actual length of each subject's time estimate.

All subjects were asked to tap the "t" key at "a comfortable rate" for 1 minute. No feedback on number of taps made was given to the subject. The computer program recorded the number of taps made and signaled the subject at the end of the 1-minute period, presenting onscreen directions for the next phase of the experiment.

Each subject in Group I: Controllable Event was asked to tap the "t" key at a comfortable rate for an estimated 1-minute period to accrue points on the screen counter. The subject was then asked to estimate a 1-minute rest period during which he did not tap the "t" key. Subjects in Group I were asked to repeat these instructions for the following sequence:

TASK REST TASK REST TASK REST

The total time for the task and rest condition of the experiment was approximately 6 minutes.

Subjects in Group II: Uncontrollable Event were given the same instructions as those subjects in Group I. The difference in experimental condition
between the two groups was that subjects in Group II received accurate and inaccurate feedback from their tapping of the computer "t" key. In other words, during some of their task trials, subjects in Group II tapped the "t" key, but the computer did not display all the taps made on the screen counter.

Subjects in Group II: Uncontrollable Event received accurate onscreen feedback of the number of taps made during the first task condition. During their remaining two task conditions, 25% and 50% of the number of taps actually made by the subject were not recorded on the onscreen counter. These two experimental conditions with inaccurate feedback were counterbalanced across subjects in Group II. Thus, in the first task condition onscreen feedback was directly contingent on the actual behavior of the subject, i.e., he was in "control." In the latter two conditions, the onscreen feedback was only partially contingent on the behavior of the subject, i.e., the subject was not in full "control."

Although subjects in Group II did not always receive accurate onscreen information about the number of taps made, the computer was programmed to record
the actual number of taps made during each task condition.

Following the task and rest sequence, all subjects were asked to tap the "t" key again at a "comfortable rate" for 1 minute. The number of taps made was recorded by the computer.

All subjects were then asked to once again estimate a 1-minute time interval by pressing the "t" key to begin their estimate and pressing the "q" key to end their estimate. The actual time was recorded by the computer program.
Results

The effects of three independent variables were analyzed in this design: TABP rating, Ho rating, and experimental condition. Type A Behavior Pattern rating was represented by two levels: Type A and Type B. Hostility rating was also represented by two levels: High Hostility and Low Hostility. Experimental condition was represented by three levels: Group I: Controllable Event (subjects in this group received accurate feedback on the number of taps made during all three Tasks); Group II: Uncontrollable Event--25%/50% (subjects in this group received feedback for 75% of taps made in Task 2 and for 50% of taps made in Task 3); and Group II: Uncontrollable Event--50%/25% (subjects in this group received feedback for 50% of taps made in Task 2 and 75% of taps made in Task 3).

Two separate dependent variables were analyzed in this design: time estimate in seconds and number of taps. There were five measures for each variable. For tapping, the five measures were: Tapping Baseline I, Tapping Task 1, Tapping Task 2, Tapping Task 3, and
Tapping Baseline II. For time estimate the five measures were: Time estimation Baseline I, Time estimation Rest 1, Time estimation Rest 2, Time estimation Rest 3, and Time estimation Baseline II.

One subject was deleted from the experiment for holding the "t" key down continuously during the tapping tasks, in spite of instructions not to do so. Total subject number was therefore reduced to 71.

There were no significant interactions or main effects for tapping behavior.

Significant triple interaction effects were found for TABP by High Ho/Low Ho subjects by experimental condition for Time estimation Rest 1 and Time estimation Rest 2. For Time estimation Rest 1, $F(2,59) = 3.27, p \leq .05$. See Table 1 for means and standard deviations. For Time estimation Rest 2, $F(2,59) = 4.44, p \leq .05$. See Table 2 for means and standard deviations.

Significant two-way interaction effects were found for TABP by experimental condition for Time estimation Rest 1, Time estimation Rest 2, and Time estimation Rest 3. For Rest 1, $F(2,59) = 5.13, p \leq .01$. For Rest 2, $F(2,59) = 4.20, p \leq .05$. 
Table 1

Time Estimation (in s) for Rest 1 TABP x Ho x Experimental Condition.

<table>
<thead>
<tr>
<th>Experimental Condition</th>
<th>Mean</th>
<th>Standard Deviation</th>
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<td></td>
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<tr>
<td><strong>Type A</strong></td>
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<tr>
<td><strong>High Ho</strong></td>
<td></td>
<td></td>
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<tr>
<td>Controllable Event</td>
<td>55.40</td>
<td>17.63</td>
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<tr>
<td>Uncontrollable Event, 25%/50%</td>
<td>75.83</td>
<td>30.64</td>
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<tr>
<td>Uncontrollable Event, 50%/25%</td>
<td>46.00</td>
<td>12.65</td>
</tr>
<tr>
<td><strong>Low Ho</strong></td>
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<td></td>
</tr>
<tr>
<td>Controllable Event</td>
<td>39.57</td>
<td>20.28</td>
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<tr>
<td>Uncontrollable Event, 25%/50%</td>
<td>51.00</td>
<td>10.82</td>
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<tr>
<td>Uncontrollable Event, 50%/25%</td>
<td>56.33</td>
<td>16.26</td>
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<tr>
<td><strong>Type B</strong></td>
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<tr>
<td><strong>High Ho</strong></td>
<td></td>
<td></td>
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<tr>
<td>Controllable Event</td>
<td>57.29</td>
<td>13.24</td>
</tr>
<tr>
<td>Uncontrollable Event, 25%/50%</td>
<td>37.25</td>
<td>28.23</td>
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<tr>
<td>Uncontrollable Event, 50%/25%</td>
<td>61.75</td>
<td>4.57</td>
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<td><strong>Low Ho</strong></td>
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<tr>
<td>Controllable Event</td>
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<td>15.01</td>
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<td>Uncontrollable Event, 25%/50%</td>
<td>60.40</td>
<td>12.42</td>
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<tr>
<td>Uncontrollable Event, 50%/25%</td>
<td>59.60</td>
<td>14.84</td>
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Table 2

Time Estimation (in s) for Rest 2 TABP x Ho x Experimental Condition.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
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<tr>
<td><strong>Type A</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>High Ho</strong></td>
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<tr>
<td>Controllable Event</td>
<td>57.90</td>
<td>15.31</td>
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<td>Uncontrollable Event, 25%/50%</td>
<td>79.67</td>
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<td>Uncontrollable Event, 50%/25%</td>
<td>46.43</td>
<td>9.29</td>
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<tr>
<td><strong>Low Ho</strong></td>
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<tr>
<td>Controllable Event</td>
<td>32.86</td>
<td>22.95</td>
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<tr>
<td>Uncontrollable Event, 25%/50%</td>
<td>50.67</td>
<td>5.51</td>
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<tr>
<td>Uncontrollable Event, 50%/25%</td>
<td>59.33</td>
<td>9.61</td>
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<tr>
<td><strong>Type B</strong></td>
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<tr>
<td><strong>High Ho</strong></td>
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<tr>
<td>Controllable Event</td>
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<td><strong>Low Ho</strong></td>
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<tr>
<td>Controllable Event</td>
<td>70.30</td>
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</tr>
<tr>
<td>Uncontrollable Event, 50%/25%</td>
<td>63.00</td>
<td>12.65</td>
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</table>
For Rest 3, $F(2,59) = 3.94, p \leq .05$. See Tables 3 and 4 for means and standard deviations.

Significant two-way interaction effects were found for TABP by $H_0$ for all five Time estimate periods. For Baseline I, $F(1,59) = 5.29, p \leq .05$.
For Time estimation Rest 1, $F(1,59) = 7.48, p \leq .01$.
For Time estimation Rest 2, $F(1,59) = 10.71, p \leq .01$.
For Time estimation Rest 3, $F(1,59) = 4.77, p \leq .05$.
For Baseline II, $F(1,59) = 4.61, p \leq .05$. See Tables 5 and 6 for means and standard deviations.

There were no significant main effects.
Table 3

Time Estimation (in s) TABP x Experimental Condition.

<table>
<thead>
<tr>
<th></th>
<th>Rest 1</th>
<th>Rest 2</th>
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<tbody>
<tr>
<td></td>
<td>Standard Mean Deviation</td>
<td>Standard Mean Deviation</td>
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<tr>
<td></td>
<td>Controllable Event</td>
<td>Controllable Event</td>
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<tr>
<td>Type A</td>
<td>48.88 19.84</td>
<td>47.59 22.16</td>
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<td></td>
<td>Uncontrollable Event, 25%/50%</td>
<td>70.00 40.46</td>
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<tr>
<td></td>
<td>Uncontrollable Event, 50%/25%</td>
<td>50.30 10.81</td>
</tr>
<tr>
<td>Type B</td>
<td>64.71 15.28</td>
<td>64.24 13.93</td>
</tr>
<tr>
<td></td>
<td>Uncontrollable Event, 25%/50%</td>
<td>54.44 20.27</td>
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<tr>
<td></td>
<td>Uncontrollable Event, 50%/25%</td>
<td>64.44 9.18</td>
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Table 4

Time Estimation (in s) TABP x Experimental Condition.

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<td>Uncontrollable Event, 25%/50%</td>
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<tr>
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<td>66.35</td>
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<td>Uncontrollable Event, 25%/50%</td>
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<tr>
<td>Uncontrollable Event, 50%/25%</td>
<td>64.89</td>
<td>13.46</td>
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Table 5

Time Estimation (in s) TABP x Ho.

<table>
<thead>
<tr>
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<th>Standard Deviation</th>
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<tr>
<td><strong>Baseline I</strong></td>
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<td><strong>Type A</strong></td>
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<td></td>
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<tr>
<td>High Ho</td>
<td>56.13</td>
<td>28.99</td>
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<tr>
<td>Low Ho</td>
<td>40.54</td>
<td>23.49</td>
</tr>
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<td><strong>Type B</strong></td>
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<td>58.50</td>
<td>21.00</td>
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<tr>
<td><strong>Rest 1</strong></td>
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<td></td>
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<tr>
<td><strong>Type A</strong></td>
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<td>14.54</td>
</tr>
<tr>
<td><strong>Rest 2</strong></td>
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<td></td>
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<tr>
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<td></td>
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<td>Low Ho</td>
<td>67.65</td>
<td>13.74</td>
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*(table continues)*
Table 5

Time Estimation (in s) TABP x Ho.

<table>
<thead>
<tr>
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<th>Rest 3</th>
<th>Baseline II</th>
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<tr>
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<td>Mean</td>
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<tr>
<td></td>
<td>Low Ho</td>
<td>49.15</td>
</tr>
<tr>
<td>Type B High Ho</td>
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</tr>
<tr>
<td></td>
<td>Low Ho</td>
<td>67.60</td>
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<tr>
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<td></td>
<td>Low Ho</td>
<td>46.54</td>
</tr>
<tr>
<td></td>
<td>Type B High Ho</td>
<td>44.67</td>
</tr>
<tr>
<td></td>
<td>Low Ho</td>
<td>61.20</td>
</tr>
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</table>
Discussion

Key Tapping

The nonsignificant interaction for TABP by Ho by experimental condition for key tapping behavior on the five tapping measures fails to support the hypothesis that Type A individuals scoring high on the Cook and Medley Hostility Scale demonstrate any difference in operant rate of responding to key tapping following an uncontrollable event.

One possible explanation for a lack of a TABP effect or interaction could be attributed to the experimental approach. It has been shown that Type B individuals respond as compulsively as Type A individuals in a situation that encourages competitive striving, yet respond at a slower pace when competitive cues are absent (Burnam, Pennebaker, & Glass, 1975). The lack of any main effects on operant rate of responding to the key tapping task suggests that the onscreen counter may have been sufficient encouragement for competitive striving in both Type A and Type B subjects.
The lack of an interaction or main effect for hostility could be a result of the same competition confound. However, further research is needed on the hostility component of TABP to determine its salience and ecology.

**Time Estimation**

The significant triple interaction between TABP, Ho, and experimental condition for Time estimation Rest 1 suggests the presence of a population difference between Type A/High Hostile and Type B/High Hostile subjects assigned to the Group II: Uncontrollable Event—25%/50% condition. Rest 1 followed Tapping Task 1 during which all subjects received accurate feedback on the number of taps made. In other words, there was no treatment difference by group membership until after the Rest 1 measure was taken. Treatment difference by group did not occur until Tapping Task 2. Graphs of all five time estimation measures, including the measures that were not significant, show a recurrent pattern of responding for Type A/High Hostile subjects and Type B/High Hostile subjects in Group II: Uncontrollable
Event--25%/50% that differs from subjects in the other two groups (see Figures 1 through 5). Standard deviations for Type A/High Hostile subjects and Type B/High Hostile subjects in Group II:

Uncontrollable Event--25%/50% for Rest 1 reflect a wider variation of time estimates for this group than for the other two groups (see Table 1).

This population difference for Group II:

Uncontrollable Event--25%/50% subjects shows up again in the two-way interaction between Type A/Type B subjects and experimental condition. The interaction is again significant for Time estimation Rest 1 even though there had not yet been a difference in treatment by group. Graphing all five measures of time estimation for this two-way interaction also shows a pattern of responding for Type A and Type B subjects in Group II: Uncontrollable Event--25%/50% that is different from the response pattern for Group I: Controllable Event subjects and for Group II: Uncontrollable Event--50%/25% subjects (see Figures 6 through 10). There is also a difference in standard deviations (see Table 3).
## Legend for Figures 1 through 16.

<table>
<thead>
<tr>
<th>Abbreviation In Figure</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/HH</td>
<td>Type A, High Hostile</td>
</tr>
<tr>
<td>A/LH</td>
<td>Type A, Low Hostile</td>
</tr>
<tr>
<td>B/HH</td>
<td>Type B, High Hostile</td>
</tr>
<tr>
<td>B/LH</td>
<td>Type B, Low Hostile</td>
</tr>
<tr>
<td>Control</td>
<td>Group I: Controllable Event</td>
</tr>
<tr>
<td>25/50</td>
<td>Group II: Uncontrollable Event, 25%/50% presentation</td>
</tr>
<tr>
<td>50/25</td>
<td>Group II: Uncontrollable Event, 50%/25% presentation</td>
</tr>
</tbody>
</table>
Figure 1. Baseline I Time Estimates (in s) for TABP x Ho x Experimental Condition. Note: These results are not statistically significant.
Figure 2. Rest I Time Estimates (in s) for TABP x Ho x Experimental Condition.
Figure 3. Rest 2 Time Estimates (in s) for TABP x Ho x Experimental Condition.
Figure 4. Rest 3 Time Estimates (in s) for TABP x Ho x Experimental Condition. Note: These results are not statistically significant.
Figure 5. Baseline II Time Estimates (in s) for TABP x Ho x Experimental Condition. Note: These results are not statistically significant.
Figure 6. Baseline I Time Estimates (in s) for TABP x Ho x Experimental Condition. Note: These results are not statistically significant.
Figure 7. Rest 1 Time Estimates (in s) TABP x Experimental Condition.
Figure 8. Rest 2 Time Estimates (in s) for TABP x Experimental Condition.
Figure 9. Rest 3 Time Estimates (in s) TABP x Experimental Condition.
Figure 10. Baseline II Time Estimates (in s) for TABP x Experimental Condition. Note: These results are not statistically significant.
In order to assume a treatment effect, significant interactions would be expected for Time estimation Rest 2, Time estimation Rest 3, and possibly Baseline II. The presence of significant interactions for Time estimation Rest 1 suggests that in spite of random assignment and standardized procedures, subjects in Group II: Uncontrollable Event—25%/50 responded differently than other groups in the experiment.

The significant two-way interaction between TABP and Ho is present for all five measures of time estimation (see Figures 11 through 15.) The response patterns in each of these five graphs is similar, suggesting that a robust population difference in time estimation based on Type A/Type B, High Hostile/Low Hostile classification existed for this subject group and that the difference in time estimation was not affected by treatment conditions. In other words, the population difference in time estimation based on Type A/Type B, High Hostile/Low Hostile classification was not affected by uncontrollable event manipulations.

Type A/High Hostile and Type B/Low Hostile subjects were most accurate in their estimation of 1
Figure 11. Baseline I Time Estimates (in s) for TABP x Ho.
Figure 12. Rest 1 Time Estimates (in s) for TABP x Ho.
Figure 13. Rest 2 Time Estimates (in s) for TABP x Ho.
Figure 14. Rest 3 Time Estimates (in s) for TABP x Ho.
Figure 15. Baseline II Time Estimates (in s) for TABP x Ho.
minute (see Table 6). Type A/Low Hostile and Type B/High Hostile subjects both underestimated 1 minute. Averages for the five time estimation measures by TABP and Ho are graphed in Figure 16.

These results suggest that High Hostility may affect a Type B subject's ability to estimate 1 minute and that Low Hostility may affect a Type A subject's ability to estimate 1 minute. Further research is necessary to determine whether significant differences in time estimation by TABP and Ho exist for other populations. The Ho dimension is not measured effectively by the JAS-T. Yarnold, Bryant, and Grimm (1985) reported that the aggression/hostility dimension of TABP is represented by only one item on the JAS-T and by only two items on the JAS. Because of this lack of representation of the Ho dimension, time estimation differences in populations measured solely for TABP may not have been significant.

Though the significant interaction between Type A/B and High/Low Hostility for time estimations does support the hypothesis that hostility is an important behavioral dimension of the global TABP, this interaction does not support the hypothesis that high
Figure 16. Averages (in s) for all Time Estimation trials comparing TABP x Ho.
Table 6

Time Estimation Averages (in s) for TABP x Ho.

<table>
<thead>
<tr>
<th></th>
<th>Baseline I</th>
<th>Rest 1</th>
<th>Rest 2</th>
<th>Rest 3</th>
<th>Baseline II</th>
<th>All Trials</th>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>High Ho</td>
<td>56.13</td>
<td>57.87</td>
<td>60.09</td>
<td>62.52</td>
<td>56.30</td>
<td>58.58</td>
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<td>Low Ho</td>
<td>40.54</td>
<td>46.08</td>
<td>43.08</td>
<td>49.15</td>
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<td>45.08</td>
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<td>67.65</td>
<td>67.60</td>
<td>61.20</td>
<td>63.98</td>
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</table>
hostile Type A individuals exposed to an uncontrollable event will significantly underestimate time compared to other individuals.

In conclusion, additional research is needed to explore the possibility of a robust population difference in time estimation based on an individual's TABP and Ho classification. Implications for tasks in industry requiring accurate time estimation would be significant if personality measures such as the JAS and Cook and Medley Hostility Scale proved predictive of time estimation ability.
References


Appendix A

Scale 1: The Cook and Medley Hostility Scale

Please circle the answer, T (true) or F (false) which most closely describes you.

1. When I take a new job, I like to be tipped off on who should be gotten next to. T  F

2. When someone does me a wrong, I feel I should pay him back if I can, just for the principle of the thing. T  F

3. I prefer to pass by school friends or people I know but have not seen for a long time, unless they speak to me first. T  F

4. I have often had to take orders from someone who did not know as much as I did. T  F

5. I think a great many people exaggerate their misfortunes in order to gain the sympathy and help of others. T  F

6. It takes a lot of argument to convince most people of the truth. T  F

7. I think most people would lie to get ahead. T  F

8. Someone has it in for me. T  F
9. Most people are honest chiefly through fear of being caught.  
10. Most people will use somewhat unfair means to gain profit or an advantage rather than to lose it.  
11. I commonly wonder what hidden reason another person may have for doing something nice for me.  
12. It makes me impatient to have people ask my advice or otherwise interrupt me when I am working on something important.  
13. I feel that I have often been punished without cause.  
14. I am against giving money to beggars.  
15. Some of my family have habits that bother and annoy me very much.  
16. My relatives are nearly all in sympathy with me.  
17. My way of doing things is apt to be misunderstood by others.  
18. I don't blame anyone for trying to grab everything he can get in this world.
19. No one cares much what happens to you.
   T   F

20. I can be friendly with people who do things which I consider wrong.
    T   F

21. It is safer to trust nobody.       T   F

22. I do not blame a person for taking advantage of someone who lays himself open to it. T   F

23. I have often felt that strangers were looking at me critically. T   F

24. Most people make friends because friends are likely to be useful to them. T   F

25. I am sure I am being talked about. T   F

26. I am likely not to speak to people until they speak to me. T   F

27. Most people inwardly dislike putting themselves out to help other people. T   F

28. I tend to be on my guard with people who are somewhat more friendly than I had expected. T   F

29. I have sometimes stayed away from another person because I feared doing or saying something that I might regret afterwards. T   F
30. People often disappoint me. T F
31. I like to keep people guessing what I'm going to do next. T F
32. I frequently ask people for advice. T F
33. I am not easily angered. T F
34. I have often met people who were supposed to be experts who were no better than I. T F
35. I would certainly enjoy beating a crook at his own game. T F
36. It makes me feel like a failure when I hear of the success of someone I know well. T F
37. I have at times had to be rough with people who were rude or annoying. T F
38. People generally demand more respect for their own rights than they are willing to allow for others. T F
39. There are certain people whom I dislike so much that I am inwardly pleased when they are catching it for something they have done. T F
40. I am often inclined to go out of my way to win a point with someone who has opposed me. T F
41. I am quite often not in on the gossip and talk of the group I belong to. T F

42. The man who had most to do with me when I was a child (such as my father, stepfather, etc.) was very strict with me. T F

43. I have often found people jealous of my good ideas, just because they had not thought of them first. T F

44. When a man is with a woman, he is usually thinking about things related to her sex. T F

45. I do not try to cover up my poor opinion or pity of a person so that he won't know how I feel. T F

46. I have frequently worked under people who seem to have things arranged so that they get credit for good work but are able to pass off mistakes onto those under them. T F

47. I strongly defend my opinions as a rule. T F

48. People can pretty easily change me even though I thought that my mind was already made up on a subject. T F
49. Sometimes I am sure that other people can tell what I am thinking.  T  F

50. A large number of people are guilty of bad sexual conduct.  T  F
Appendix B

Scale 2: The Jenkins Activity Survey, T-Form

Please answer the questions on the following pages by marking the answers that are true for you. Each person is different, so there are no "right" or "wrong" answers. Of course, all you tell us is strictly confidential—to be seen only by the research team. Do not ask anyone else about how to reply to the items. It is your personal opinion that we want.

Your assistance will be greatly appreciated.

For each of the following items, please blacken the letter of the ONE best answer on the Scantron Form.

1. Do you ever have trouble finding time to get your hair cut or styled?
   A. Never    B. Occasionally    C. Almost always

2. Does college "stir you into action"?
   A. Less often than most college students
   B. About average
   C. More often than most college students
3. Is your everyday life filled mostly by
   A. Problems needing solution
   B. Challenges needing to be met
   C. A rather predictable routine of events
   D. Not enough things to keep me interested or busy

4. Some people live a calm, predictable life. Others find themselves often facing unexpected changes, frequent interruptions, inconveniences or "things going wrong". How often are you faced with these minor (or major) annoyances or frustrations?
   A. Several times a day   B. About once a month
   C. A few times a week   D. Once a week
   E. Once a month or less

5. When you are under pressure or stress, do you usually:
   A. Do something about it immediately
   B. Plan carefully before taking any action

6. Ordinarily, how rapidly do you eat?
   A. I'm usually the first one finished.
   B. I eat a little faster than average.
   C. I eat at about the same speed as most people.
   D. I eat more slowly than most people.
7. Has your spouse or some friend ever told you that you eat too fast?
   A. Yes often   B. Yes, once or twice.
   C. No, no one has told me this

8. How often do you find yourself doing more than one thing at a time, such as working while eating, reading while dressing, figuring out problems while driving?
   A. I do two things at once whenever practical.
   B. I do this only when I'm short of time.
   C. I rarely or never do more than one thing at a time.

9. When you listen to someone talking, and this person takes too long to come to the point, do you feel like hurrying him along?
   A. Frequently   B. Occasionally   C. Almost never

10. How often do you actually "put words in his mouth" in order to speed things up?
    A. Frequently   B. Occasionally   C. Almost never

11. If you tell your spouse or a friend that you will meet them somewhere at a definite time, how often do you arrive late?
    A. Once in a while   B. Rarely   C. I am never late
12. Do you find yourself hurrying to get places even when there is plenty of time?
   A. Often   B. Occasionally   C. Rarely or never

13. Suppose you are to meet someone at a public place (street corner, building lobby, restaurant) and the other person is already 10 minutes late. Will you
   A. Sit and wait?
   B. Walk about while waiting?
   C. Usually carry some reading matter or writing paper so you can get something done while waiting?

14. When you have to "wait in line", such as at a restaurant, a store or the post office, do you
   A. Accept it calmly?
   B. Feel impatient but do not show it?
   C. Feel so impatient that someone watching could tell you were restless?
   D. Refuse to wait in line, and find ways to avoid such delays?

15. When you play games with young children about 10 years old, how often do you purposely let them win?
   A. Most of the time   B. Half the time
   C. Only occasionally   D. Never
16. Do most people consider you to be
   A. Definitely hard-driving and competitive?
   B. Probably hard-driving and competitive?
   C. Probably more relaxed and easy going?
   D. Definitely more relaxed and easy going?

17. Nowadays, do you consider yourself to be
   A. Definitely hard-driving and competitive?
   B. Probably hard-driving and competitive?
   C. Probably more relaxed and easy going?
   D. Definitely more relaxed and easy going?

18. How would your spouse (or closest friend) rate you?
   A. Definitely hard-driving and competitive?
   B. Probably hard-driving and competitive?
   C. Probably relaxed and easy going?
   D. Definitely relaxed and easy going?

19. How would your spouse (or best friend) rate your general level of activity?
   A. Too slow. Should be more active.
   B. About average. Is busy much of the time.
   C. Too active. Needs to slow down.
20. Would people who know you well agree that you take your work too seriously?
   A. Definitely Yes    B. Probably Yes
   C. Probably No       D. Definitely No

21. Would people who know you well agree that you have less energy than most people?
   A. Definitely Yes    B. Probably Yes
   C. Probably No       D. Definitely No

22. Would people who know you well agree that you tend to get irritated easily?
   A. Definitely Yes    B. Probably Yes
   C. Probably No       D. Definitely No

23. Would people who know you well agree that you tend to do most things in a hurry?
   A. Definitely Yes    B. Probably Yes
   C. Probably No       D. Definitely No

24. Would people who know you well agree that you enjoy "a contest" (competition) and try hard to win?
   A. Definitely Yes    B. Probably Yes
   C. Probably No       D. Definitely No

25. Would people who know you well agree that you get a lot of fun out of your life?
   A. Definitely Yes    B. Probably Yes
   C. Probably No       D. Definitely No
26. How was your "temper" when you were younger?
   A. Fiery and hard to control
   B. Strong, but controllable
   C. No problem
   D. I almost never got angry

27. How is your "temper" nowadays?
   A. Fiery and hard to control
   B. Strong, but controllable
   C. No problem
   D. I almost never get angry

(Remember, the answers on these Questionnaires are confidential information and will not be revealed to officials of your college.)

28. When you are in the midst of studying and someone interrupts you, how do you usually feel inside?
   A. I feel OK. because I work better after an occasional break.
   B. I feel only mildly annoyed.
   C. I really feel irritated because most such interruptions are unnecessary.
29. How often are there deadlines in your courses?
(If deadlines occur irregularly, please mark the letter on the Scantron Form of the closest answer listed below)
   A. Daily or more often   B. Weekly
   C. Monthly            D. Never

30. Do these deadlines usually
   A. Carry minor pressure because of their routine nature?
   B. Carry considerable pressure, since delay would upset things a great deal?

31. Do you ever set deadlines or quotas for yourself in courses or other things?
   A. No
   B. Yes, but only occasionally
   C. Yes, once per week or more often

32. When you have to work against a deadline, is the quality of your work
   A. Better?
   B. Worse?
   C. The same? (Pressure makes no difference.)
33. In school do you ever keep two projects moving forward at the same time by shifting back and forth rapidly from one to the other?
   A. No, never.
   B. Yes, but only in emergencies.
   C. Yes, regularly.

34. Do you maintain a regular study schedule during vacations such as Thanksgiving, Christmas, and Easter?
   A. Yes
   B. No
   C. Sometimes

35. How often do you bring your work home with you at night or study materials related to your courses?
   A. Rarely or never.
   B. Once a week or less often.
   C. More than once a week.

36. How often do you go to the college when it is officially closed (such as nights or weekends)? If this is not possible, circle letter E on the Scantron.
   A. Rarely or never.
   B. Occasionally (less than once a week).
   C. Once or more a week.
37. When you find yourself getting tired while studying, do you usually
   A. Slow down for a while until your strength comes back.
   B. Keep pushing yourself at the same pace in spite of the tiredness.
38. When you are in a group, do other people tend to look to you to provide leadership?
   A. Rarely.
   B. About as often as they look to others.
   C. More often than they look to others.
39. Do you make yourself written lists of "things to do" to help you remember what needs to be done:
   A. Never   B. Occasionally   C. Frequently
40. In the amount of effort put forth, I give
   A. Much more effort
   B. A little more effort
   C. A little less effort
   D. Much less effort
41. In sense of responsibility, I am
   A. Much more responsible
   B. A little more responsible
   C. A little less responsible
   D. Much less responsible

42. I find it necessary to hurry
   A. Much more of the time
   B. A little more of the time
   C. A little less of the time
   D. Much less of the time

43. In being precise (careful about detail), I am
   A. Much more precise
   B. A little more precise
   C. A little less precise
   D. Much less precise

44. I approach life in general
   A. Much more seriously
   B. A little more seriously
   C. A little less seriously
   D. Much less seriously
Appendix C

Computer Program for Key Tapping and Time Estimation

Programming Language: Microsoft QuickBasic
Programmer: Marna Elyea Burns

CLS
r = 0
PRINT " 0 - nonrandom  1 - random 25/50 "
PRINT " 2 - random 50/25"
INPUT r
INPUT "Press enter to continue", enter$
FOR i% = 1 to 25
PRINT " "
NEXT i%

' GREETING MODULE
PRINT " Thank you for taking part in this "
PRINT " experiment."
PRINT " 
PRINT " Please type your name ", name$
PRINT " 
PRINT "There are 5 sections to this experiment."
PRINT "Instructions will be given on the screen for"
PRINT "each section. Read the instructions"
PRINT "carefully. The experimenter is unable to"
PRINT "answer any questions once the experiment has"
PRINT "started. If you have difficulty with any"
PRINT "section, please continue as best you can."
PRINT "Wait for the words, BEGIN NOW, to start each"
PRINT " new section."
PRINT ""
INPUT "Press enter to continue", enter$
'
END GREETING MODULE

FOR i% = 1 to 20

PRINT ""

NEXT i%
'

BASELINE 1 MINUTE ESTIMATE

Secnds% = 0
Secndsl% = 0
PRINT ""
PRINT "In a moment you will be asked to estimate"
PRINT " 1 minute."
PRINT ""
PRINT "You will press the T key to being your"
PRINT "estimate and you will press the Q key to end"
PRINT " your estimate."
PRINT " "
PRINT " "
PRINT "BEGIN NOW"
PRINT " ".

' Define key 15 - t
KEY 15, CHR$(0) + CHR$(20)
ON KEY(15) GOSUB BegEst
KEY(15) ON

DO
LOOP UNTIL INKEY$ = "q"
Secnds1% = Secnds%
KEY(15) OFF
TIMER OFF
'

BASELINE KEY TAPPING
z = 0
basap1% = 0
tap% = 0
FOR i% = 1 to 20
 PRINT " "
NEXT i%

PRINT "In a moment you will be asked to tap the T key"
PRINT "at a comfortable rate for about 1 minute."
PRINT "Please continue until the screen gives"
PRINT " instructions to stop."
PRINT " "
PRINT " BEGIN NOW"
PRINT " "
DO
LOOP UNTIL INKEY$ = "t"
ON KEY(15) GOSUB TapCount
KEY(15) ON
ON TIMER(60) GOSUB EndTap
TIMER ON
,
DO
LOOP UNTIL z = 1
,
bastapl% = tap%
TIMER OFF
,
FOR i% = 1 to 10
   PRINT " "
NEXT i%
,
INPUT "Press enter to continue "; enter$
KEY(15) OFF
,
TASK & REST CONDITIONS
tap% = 0
bogct% = 0
tsktpl% = 0

FOR i% = 1 TO 20
  PRINT " "
NEXT i%

PRINT "In a moment you will be asked to tap the T key"
PRINT "at a comfortable rate for an estimated 1"
PRINT "minute. The total number of your taps will be"
PRINT " shown on the screen."
PRINT " ",
PRINT "You will begin the 1 minute estimate by"
PRINT "pressing the T key. You will end your"
PRINT " estimate by pressing the Q key."
PRINT " ",
PRINT " ",
PRINT " BEGIN NOW"
PRINT " ",
ON KEY(15) GOSUB TaskEst
KEY(15) ON
DO
LOOP UNTIL INKEY$ = "q"
tsktpl% = tap%
KEY(15) OFF
INPUT "Press enter to continue", enter$
'
RES 1
Secnds% = 0
rsecndsl% = 0
FOR i% = 1 to 20
    PRINT " "
NEXT i%
'
PRINT "In a moment you will be asked to estimate a"
PRINT "1 minute rest period with no tapping. You"
PRINT "will press the T key to begin your estimate"
PRINT "and you will press the Q key to end your"
PRINT "estimate."
PRINT " "
PRINT " "
PRINT "BEGIN NOW"
PRINT " "
ON KEY(15) GOSUB BegEst
KEY(15) ON
DO
LOOP UNTIL INKEY$ = "q"
'
  rsecndsl% = Secnds%
KEY(15) OFF
TIMER OFF

INPUT "Press enter to continue", enter$

TASK 2

tap% = 0
bogct% = 0
tsktp2% = 0
FOR i% = 1 TO 20
    PRINT "  
NEXT i%

PRINT "In a moment you will be asked again to tap the"
PRINT "T key at a comfortable rate for an estimated 1"
PRINT "minute. The total number of your taps will be"
PRINT "  shown on the screen."
PRINT "  
PRINT "You will begin the 1 minute estimate by"
PRINT "pressing the T key. You will end your"
PRINT "  estimate by pressing the Q key."
PRINT "  
PRINT "  BEGIN NOW"
PRINT "  

IF \( r = 0 \) THEN

ON KEY(15) GOSUB TaskEst

KEY(15) ON

ELSE

ON KEY(15) GOSUB BogEst1

KEY(15) ON

ENDIF

DO

LOOP UNTIL INKEY$ = "q"

itsktp2% = tap%

KEY(15) OFF

INPUT "Press enter to continue", enter$

REST 2

Secnds% = 0

rsecnds2% = 0

FOR i% = 1 to 20

PRINT " "

NEXT i%

PRINT "In a moment you will be asked again to estimate"

PRINT "a 1 minute rest period with no tapping. You"

PRINT "will press the T key to begin your estimate"

PRINT "and you will press the Q key to end your"
PRINT "estimate."
PRINT ""
PRINT "BEGIN NOW"
PRINT ""
ON KEY(15) GOSUB BegEst
KEY(15) ON

DO
LOOP UNTIL INKEY$ = "q"

rsecds2% = Secnds%
KEY(15) OFF
TIMER OFF
INPUT "Press enter to continue", enter$

TASK 3

tap% = 0
bogct% = 0
tsktp3% = 0
FOR i% = 1 TO 20
    PRINT " "
NEXT i%

PRINT "In a moment you will be asked again to tap the"
PRINT "T key at a comfortable rate for an estimated 1" minute. The total number of your taps will be" shown on the screen."
PRINT "You will begin your 1 minute estimate with"
PRINT "the first tap of T and you will end your"
PRINT "estimate by tapping the letter Q."
PRINT ""
PRINT "BEGIN NOW"
PRINT ""
IF r = 0 THEN
  ON KEY(15) GOSUB TaskEst
  KEY(15) ON
ELSE
  ON KEY(15) GOSUB BogEst2
  KEY(15) ON
END IF
DO
LOOP UNTIL INKEY$ = "q"
TSKTP3% = TAP%
KEY(15) OFF
INPUT "Press enter to continue", enter$

REST 3

Secnds% = 0
rsecnds3% = 0
FOR i% = 1 TO 20
    PRINT " "
NEXT i%

PRINT "In a moment you will be asked to estimate"
PRINT "another 1 minute rest period without tapping."
PRINT "You will press the T key to begin your"
PRINT "estimate and you will press the Q key to end"
PRINT "your estimate."
PRINT ""
PRINT ""
PRINT " BEGIN NOW"
PRINT " "
ON KEY(15) GOSUB BegEst
KEY(15) ON

DO
LOOP UNTIL INKEY$ = "q"
rsecnds3% = Secnds%
KEY(15) OFF
TIMER OFF

INPUT "Press enter to continue", enter$

ENDING KEY TAPPING

z = 0
bastap2% = 0
tap% = 0
FOR i% = 1 to 20
    PRINT " "
NEXT i%
PRINT "In a moment you will be asked to tap the T key"
PRINT "at a comfortable rate for about 1 minute."
PRINT "Please continue until the screen gives"
PRINT " instructions to stop."
PRINT " "
PRINT " "
PRINT " "
PRINT " BEGIN NOW"
PRINT " "
DO
LOOP UNTIL INKEY$ = "t"
ON KEY(15) GOSUB TapCount
KEY(15) ON
,' 
ON TIMER(60) GOSUB EndTap
TIMER ON
DO
LOOP UNTIL z = 1
,' 
 bastap2% = tap%
KEY(15) OFF
TIMER OFF
FOR i% = 1 TO 10
   PRINT " " 
NEXT i%
,' 
INPUT "Press enter to continue"," , enter$
' 
   ENDING MINUTE ESTIMATE 
,' 
Secnds2% = 0
Secnds2% = 0
FOR i% = 1 TO 20
   PRINT " " 
NEXT i%
PRINT "In a moment you will be asked to estimate 1"
PRINT "minute."
PRINT "You will press the T key to begin your"
PRINT "estimate and you will press the Q key to end"
PRINT "your estimate."
PRINT ""
PRINT "BEGIN NOW"
PRINT ""
ON KEY(15) GOSUB BegEst
KEY(15) ON
DO
LOOP UNTIL INKEY$ = "q"
Secnds2% = Secnds%
KEY(15) OFF
TIMER OFF
PRINT ""
INPUT "Press enter to continue", enter$
FOR i% = 1 TO 20
    PRINT ""
NEXT i%
PRINT "This ends the experiment. You may exit the"
PRINT "lab and tell the experimenter that you have"
PRINT "finished."

DATA OUTPUT
PRINT ""
PRINT "Thank you for your participation.", enter$
PRINT " 
PRINT "SUBJECT NAME:", name$
PRINT " 
PRINT "DATE OF EXPERIMENT:", date$
PRINT "TIME OF EXPERIMENT:", time$
IF r = 0 THEN
    PRINT "Nonrandom Group"
ELSEIF r = 1 THEN
    PRINT "Random Group - 25/50"
ELSEIF r = 2 THEN
    PRINT "Random Group - 50/25"
END IF

INPUT "Press enter to continue", enter$

"
PRINT "SUBJECT", name$

PRINT "Baseline 1 Minute Estimate, seconds:"; Secnds1%
PRINT "Baseline Key Tapping, number of taps:";
PRINT bastapl%
PRINT " "
PRINT "Task 1 - number of taps:"; tsktp1%
PRINT " "
PRINT "Rest 1 - time estimate - seconds:"; rsecnds1%
PRINT " "
PRINT "Task 2 - number of taps:"; tsktp2%
PRINT " "
PRINT "Rest 2 - time estimate - seconds:"; rsecnds2%
PRINT " "
PRINT "Task 3 - number of taps:"; tsktp3%
PRINT " "
PRINT "Rest 3 - time estimate - seconds:"; rsecnds3%
PRINT " "
PRINT "Ending Key Tapping, number of taps:"; bastap2%
PRINT "Ending 1 Minute Estimate, seconds:"; Secnds2%
END

' GOSUBS
' Once every second branch to CounTime
BegEst:

    ON TIMER(1) GOSUB CounTime

RETURN

CounTime:

    Secnds% = Secnds% + 1

RETURN

TapCount:

    tap% = tap% + 1

RETURN

Endtap:

    PRINT "STOP TAPPING NOW"
    z = 1

RETURN
TaskEst:
    tap% = tap% + 1
    PRINT tap%
RETURN
,

BogEst:
    tap% = tap% + 1
    IF r = 1 THEN
        GOSUB Randm25
    ELSEIF r = 2 THEN
        GOSUB Randm50
    ENDIF
RETURN
,

BogEst2:
    tap% = tap% + 1
    IF r = 1 THEN
        GOSUB Randm50
    ELSEIF r = 2 THEN
        GOSUB Randm25
    ENDIF
RETURN
,
Randm25:

   x = RND

   IF x <= .75 THEN
       bogct% = bogct% + 1
       PRINT bogct%
   END IF

RETURN

Randm50:

   x = RND

   IF x <= .5 THEN
       IF x <= .75 THEN
           bogct% = bogct% + 1
           PRINT bogct%
       END IF
   END IF

RETURN