

REACTION TIME OF A SELECTED GROUP OF COLLEGE
MEN IN RELATION TO MENTAL ABILITY AND
CERTAIN PERSONALITY TRAITS

by

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A THESIS

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REACTION TIME OF A SELECTED GROUP OF COLLEGE
MEN IN RELATION TO MENTAL ABILITY AND
CERTAIN PERSONALITY TRAITS

A Thesis

Presented to

The Faculty of the Department of Physical Education

Sam Houston State College

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

by

Richard B. Couey

May, 1968

ACKNOWLEDGMENT

The writer expresses sincere gratitude to those whose assistance made this thesis possible, especially to Dr. Matthew H. McLemore of the Physical Education Department at Sam Houston State College for his wise guidance and consideration during his supervision of the writing of this thesis. Appreciation is expressed to Dr. Paul E. Pierce of the Physical Education Department and Dr. Milford F. Allen of the History Department who served as committee members. The writer is also grateful for the patience and understanding of his wife Elray, and daughter Suzanne.

ABSTRACT

Couey, Richard B., Reaction Time of a Selected Group of College Men in Relation to Mental Ability and Certain Personality Traits. Master of Arts (Physical Education), May, 1968. Sam Houston State College, Huntsville, Texas. 58 pp.

Purposes

The basic purposes of this study were (1) to investigate the reaction times, mental abilities, and personality traits of a selected group of college men; (2) to determine the relationship between reaction time and mental ability for a selected group of college men; (3) to determine the relationship between reaction time and each of the following personality traits for a selected group of college men:

- a. Active
- b. Vigorous
- c. Impulsive
- d. Dominant
- e. Stable
- f. Social
- g. Reflective

(4) to determine the mean score differences in mental ability between the fast reacting group of students and the slow reacting group of students; and (5) to determine the mean score differences in personality between the fast reacting group of students and the slow reacting group of students on each of the

following personality traits:

- a. Active
- b. Vigorous
- c. Impulsive
- d. Dominant
- e. Stable
- f. Social
- g. Reflective

Methods

One hundred twenty male physical education majors and minors at Sam Houston State College were given a reaction time test, a mental ability test, and a personality test.

Each subject received nine scores from the three tests that were administered - a reaction time score, a mental ability score, and seven personality trait scores. The results of the reaction time test were correlated with the results of mental ability test and each of the seven personality traits from the personality test.

The 120 male college students were then divided into three groups. The first group (Group I) was comprised of students whose reaction time scores ranked at the top one-third of the total number of students who took the reaction time test. The second group (Group II) was comprised of students whose reaction time

scores ranked at the bottom one-third of the total number of students who took the reaction time test. The third group (Group III) was comprised of students whose reaction time scores were average and were ranked between Groups I and II. Groups I and II were utilized for further study.

Fisher's t test for independent small samples was used to test the significance of difference between Groups I and II on mental ability mean scores and mean scores on each trait from the personality test.

Findings

From the evidence presented in this study the following suggestions appear to be in order:

1. There was no significant relationship between reaction time and mental ability.
2. There was no significant relationship between reaction time and the following personality traits.
 - a. Active
 - b. Impulsive
 - c. Dominant
 - d. Stable
 - e. Social
 - f. Reflective

3. The Vigorous personality trait showed a low correlation with reaction time. A correlation of .19 was found between reaction time and the Vigorous personality trait which was significant at better than the .05 level.

4. There was no significance of difference shown between Groups I and II on mental ability scores.

5. There was no significance of difference shown between Groups I and II on each of the personality variables studied.

6. It appears that reaction time cannot be a successful predictor in placing physical education students according to their mental and social needs.

Approved: _____

Supervising Professor ✓

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CHAPTER I

ORIENTATION TO THE STUDY

Introduction

Throughout past years coaches have often referred to the importance of psychology in the molding of superior athletic performance. Similarly teachers of physical education have also begun to look more and more to the findings of the behavioral scientists for guidelines in governing their methodologies and in guiding and counseling with their students. This trend has been manifested within physical education curricula with the introduction of new courses dealing with various psychological parameters of motor performance and motor learning (1, p. 1).

Many physical education teachers and coaches have recognized a need for a psychological approach in physical education and athletics for evaluating students according to their physical, mental, and social needs. This study was designed to aid in developing a better understanding of the relationships between the physical, mental, and social abilities of physical education students and serve as a guideline for guidance and placement of students according to their physical, mental, and social abilities.

Statement of the Problem

This study was concerned with the reaction time of a se-

lected group of college men in relation to mental ability and certain personality traits.

Purposes

The following purposes were formulated for the study:

1. To determine the reaction times of a selected group of college men.
2. To determine the mental ability scores of a selected group of college men.
3. To determine personality trait scores of a selected group of college men on the following traits:
 - a. Active
 - b. Vigorous
 - c. Impulsive
 - d. Dominant
 - e. Stable
 - f. Social
 - g. Reflective
4. To determine the relationship between reaction time and mental ability for a selected group of college men.
5. To determine the relationship between reaction time and each of the following personality traits for a selected group of college men.
 - a. Active

- b. Vigorous
- c. Impulsive
- d. Dominant
- e. Stable
- f. Social
- g. Reflective

6. To investigate the mean score differences in mental ability between the fast reacting group of students and the slow reacting group of students.

7. To investigate the mean score differences in personality between the fast reacting group of students and the slow reacting group of students on each of the following personality traits:

- a. Active
- b. Vigorous
- c. Impulsive
- d. Dominant
- e. Stable
- f. Social
- g. Reflective

Hypotheses

The following hypotheses were formulated:

1. There will be a significant relationship between reaction time and mental ability.

2. There will be a significant relationship between reaction time and the following personality traits:

- a. Active
- b. Vigorous
- c. Social

3. There will be no significant relationship between reaction time and the following personality traits:

- a. Impulsive
- b. Dominant
- c. Stable
- d. Reflective

4. There will be a significance of difference in mental ability mean scores between the fast reacting group of students and the slow reacting group of students.

5. There will be a significance of difference in personality trait mean scores between the fast reacting group of students and the slow reacting group of students on the following personality traits:

- a. Active
- b. Vigorous
- c. Social

6. There will be no significance of difference in personality trait mean scores between the fast reacting group of students and the slow reacting group of students on the following personality traits:

- a. Impulsive
- b. Dominant
- c. Stable
- d. Reflective

Definitions of Terms

For the purpose of this study, the following definitions were established:

1. Reaction time -- The time between a visual stimulus (light) and the initiation of a hand or foot response. Six hand and six foot responses were tabulated. The average score obtained from these combined hand and foot responses was operationally defined as a subject's reaction time in this study.

2. Fast reactors -- The upper one-third group of students on a ranked scale of scores from the reaction test. The reaction test scores were ranked from the top of the scale to the bottom with the lower scores being at the top.

3. Slow reactors -- The lower one-third group of students on a ranked scale of scores from the reaction test.

4. Mental ability -- The Intelligent Quotient of a subject determined by the Otis Quick-Scoring Mental Ability Test (Form E M).

5. Automatic Performance Analyzer -- An electrical timing machine that can accurately measure reaction time to the $\pm .05$ of a second (2, p. 117).

Basic Assumptions

The following basic assumptions were established for this study:

1. It was assumed in this study that adequate and persistent data could be secured through the Automatic Performance Analyzer, Otis Quick-Scoring Mental Ability Test, and the Thurstone Temperament Schedule.

2. It was assumed in this study that the conclusions drawn could be applied to the population from which the samples came.

Limitations of the Study

This study was conducted within the following limitations:

1. The students participating in this study were one hundred twenty male college physical education majors or minors who were enrolled in five theory physical education classes at Sam Houston State College, Huntsville, Texas.

2. Interpretation of the results of the study were limited to interpretations that could be made from treatments by the Pearson product-moment correlation coefficients and the Fisher's t test for independent small samples.

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CHAPTER II

REVIEW OF RELATED LITERATURE

Many of today's teachers and coaches are constantly in search of better screening techniques that will serve as aids in identifying potential physical ability in the available students of their schools. For years selection of athletes for football, basketball, baseball, and various other sports has been based on one or all of such factors as strength, size, speed, endurance, previous experience, and skill level. There is, apparently, a more basic factor that should be given special consideration as a screening aid, the nervous system (3, p. 79).

The response capabilities of the individual are dependent upon his innate neuromotor makeup, his physical structure, and his typical level of activation, as well as his inclination to move at a given moment in a given task. An overriding principle is that an individual cannot perform at a level higher than permitted by the response capacities of his nervous system (20, p. 1).

Genasci (11) verifies this in his study. He found that practice, training, or conditioning does not affect the measurable results on reaction time. According to Genasci, your reaction time cannot be improved, you are born with it.

In recent years a number of research studies have been conducted to investigate reaction time, intelligence, and person-

ality. The present study is related to each of these topics; therefore, the review of literature will be presented under these three topics.

Reaction Time

Slater Hammel (25) conducted an experiment to determine the reaction time to a visual stimulus and to arm movement for selected groups of subjects. The selected groups included varsity athletes, physical education majors, music majors, and liberal arts majors. The conclusions of the experiment were as follows:

1. Reaction time to arm movement was significantly shorter than reaction time to a visual stimulus for all subjects and all groups of subjects.

2. Varsity athletes had a significantly shorter overall reaction time than physical education majors, music majors, and liberal arts majors. Other groups differences were not significant.

3. Varsity athletes, physical education and music majors had a significantly shorter reaction time to arm movement than liberal arts majors. Other group differences were not significant.

4. Varsity athletes had a significantly shorter reaction to a light stimulus than physical education, music, and liberal arts majors.

5. Only a modest relationship existed between the two reaction time measures.

Poffenberger (24) has done further study with reaction time to light stimuli in the peripheral visual situation in which the response stimulus fell on the fovea and at three, ten, thirty, and forty-five degrees to each side of the fovea. From the results of his investigations, he concluded that, for each eye, a subject's reaction time generally increased as the distance of the stimulus from the fovea increased. He also concluded that the nasal side of the retina gave a faster reaction time than the temporal side.

In another study, Wilson (29) reported the results of a study with the quickness of reaction and movement, related to rhythmicity or nonrhythmicity of signal presentation. Wilson states that when a series of rhythmic signals was presented, with equal probability that any one of them might be accompanied by a stimulus to react, the average reaction time (.20 second) was six percent faster than when the signals were nonrhythmic. However, the time (also .20 second) required for the standardized arm movement which was initiated by the reaction, as well as the "unison" or variability between subjects, showed no rhythmicity effect. Theoretical explanations involved readiness-foreperiod relationships.

Wilson concluded that:

1. Reaction time is faster when potential stimuli are presented in a rhythmic rather than nonrhythmic series.
2. The speed of the movement initiated by such reaction is not influenced by the rhythmicity or nonrhythmicity.

In his research, Smith (26) has developed a paper on the effect of muscular stretch, tension, and relaxation upon the reaction time and speed of movement of a supported limb. Currently, as in the past, there has been a difference of opinion among physical educators and coaches regarding the problem of whether it is more advantageous for an athlete to initiate and complete a fast movement when his muscles are in a relaxed or a tensed condition. Smith tested forty college men under each of the three experimental conditions.

He concluded that under the condition of stretch, the maximal velocity of an arm movement was not significantly faster than when the arm was tensed or relaxed. He found that during the state of tension, the subjects produced a four percent faster movement time and a seven percent faster reaction time than compared to when the arm was in a more relaxed position. According to his study, the correlation between reaction time and movement time was insignificant during the conditions of relaxation, tension, and stretch.

Fairclough (9) has done some research on the transfer of motivated improvement in speed of reaction and movement. He tested forty male students from college physical education classes as to speed on a hand-coordination movement and foot-coordination movement, for the purpose of determining whether motivated improvement in movement of one part of the body transfers to cause improvement of some other part of the body.

The results showed that motivated improvement in speed of movement in one part of the body (hand) can transfer to cause a significant improvement in speed of a different type of movement in some other part of the body (foot), under conditions where there is no transfer of training. Fairclough found that reaction time showed a larger and more significant transfer than movement time. His results concluded that transfer of training failed to occur whereas transfer of motivated improvement did occur.

Norrie (22) has done an experiment with the timing of two simultaneous movements of arms and legs. Norrie studied the ability of people to perform simultaneous movements involving speed and accuracy and the relationships among the several time measures for these movements. The conclusions of her experiment were as follows:

1. Reaction time for simultaneous movements involving an arm and leg is slower than for simultaneous movements of two arms.

2. For simultaneous movement of two arms, increasing the complexity of the task does not produce a significant change in reaction.

3. When the simultaneous movements of the arms are different, the starting time difference and contact time difference are greater than when the simultaneous movements of the arms are the same.

4. No significant differences in timing measures were found between the task involving the preferred hand and left foot.

5. For the right hand-left hand same task, no consistent movement pattern was observed.

6. For all other tasks there was a consistent pattern of movements in which the right hand started first and finished last.

Colgate (6) did a study on reaction and response times for individuals reacting to visual, auditory, and electro-shock stimuli. He found that for both speed of reaction and speed of response the group means were lower when the subject responded to the sound stimulus than when the subject responded to the visual or the electro-shock stimulus. Speed of reaction and speed of response were faster when the subjects responded to the visual stimulus than when they responded to the electro-shock stimulus.

Extensive research on reaction time in older adults was conducted by Goldfarb (12). His results were as follows:

1. Men tend to be reliably faster than women in both simple and discriminative reaction.

2. Among the men, there is a tendency to decline from the younger to the older age groups in speed of simple and discriminative reactions. The women show a consistent but unreliable tendency to decline with age in reaction speed.

3. There is a marked tendency for the individual who shows a high degree of variance from his average rate of speed in simple reaction to show an equivalently high degree of variance in the more complex discrimination reactions.

4. Variability in reaction time tends to become greater as a function of age among the men. The women do not show relationship between individual variance and age that is significantly better than chance.

5. There is a distinct tendency for the slower individuals also to be more variable in their reaction times.

A similar study was conducted by Hodgkins (17) on the influence of age on the speed of reaction and movement in females. It was found that reaction time and movement time are uncorrelated in all age level groups studied. Reaction time improved

with age up to age nineteen, remained constant to age twenty-six, and then decelerated with age. Movement time improved with age up to age fifteen, remained constant to age nineteen, and decelerated thereafter.

In Gosselin's study (14), it was concluded that reaction time was significantly affected by cold and hot temperatures.

Sorge (27) found in his study on the effects of levels of intense activity on the total body reaction time that the more intense the activity the slower the reaction time will be.

In a study of reaction time using both light and sound stimulus, Teichner (28) found an inverse correlation between the two measures. Those subjects having relatively slow reaction time to light stimulus, had relatively fast reaction time to avoid stimulus and vice versa.

Woodworth's (3) review of the literature indicates that quickness of a reaction depends upon the adequacy to the preparation.

Henry (16) observed under controlled laboratory conditions that reaction time and speed of arm movement, both measured during the same response to a stimulus by using two chronoscopes, are independent and uncontrolled to any significant amount. Because of this fact, it becomes very important to measure separately and distinguish between reaction time to a stimulus and the speed of movement which is initiated by the reaction.

John Bunn, a successful basketball coach states, "without question the most outstanding characteristic or quality, which is not only desired in a basketball player but necessary for all successful athletes, is reaction time" (3, p. 339).

To verify Bunn's statement, Olsen (23) conducted a study, the purpose of which was to determine the relationship of reaction time between athletes, intermediate athletes and non-athletes. He concluded that athletes had faster reaction time than intermediate and nonathletes and that intermediate athletes were faster in reaction time than nonathletes.

In his study, Keller (18) has shown that there is a significant relation between the ability to move the body fast (quickness) and success in athletics.

Harsch (15) did a comparative study of the reaction times and response times of Negro and white athletes and found that Negro athletes do not react or respond more quickly than white athletes. Athletes (Negro and white) react and respond more quickly than do white nonathletes.

Reaction Time and Intelligence

Several hypotheses have been formulated by researchers as to whether or not reaction time is related to intelligence.

Many earlier researchers are harmonious in their belief that reaction time relates with intelligence, while others believe that reaction time does not relate to intelligence. These earlier investigators used many different methods and experiments to test their hypotheses and always with the same results: reaction time was either related or wasn't related to intelligence.

Aiken (1) was one of the earlier researchers who conducted a study on reaction time and intelligence. His results advocate that reaction time was significantly correlated with intelligence. Persons with superior intelligence will have faster reaction time, while persons with subnormal intelligence will have slower reaction time.

To counteract this principle, Lichtenstein (19) concluded in his study that reaction time had no significant correlation with intelligence.

Most present day researchers agree with Goodenough and Tyler (13) that on the average, persons of superior intelligence react to a stimulus more quickly than do those of less ability, but the difference is so small and there are so many individual exceptions to the general rule that it is unsafe to judge the intelligence of any person on the basis of his speed of reaction.

Dingman and Silverstein (8) agree with Goodenough and Tyler in their study of intelligence, motor disabilities, and reaction time in the mentally retarded. Their results showed that reaction

time was not significantly related to intelligence in the mentally retarded.

Reaction Time and Personality

Reaction time is an important factor in selecting or predicting performance in physical education and athletics. Personality has also been found to select or predict success in physical activities. Flanagan (10) found personality to be a factor in selecting physical activities. His results indicated that fencers seemed to be more dominant, more feminine, and more extroverted than those engaged in badminton, basketball, volleyball, boxing, and swimming.

Nelson (21) studied the personality and attitude differences of those who chose military science in preference to the physical education program. The military students were less in favor of physical activity and competition, and displayed a withdrawing disposition in social situations. They preferred organized uniformed groups and had a more favorable attitude toward authority and position.

Cabot (5), in studying the relationship between characteristics of personality and physique in adolescents, found that a good physique disposes boys to develop traits of self-expression, social acceptability, and physical vitality.

Burnstein and Zajonc (4) did a study that dealt with the relationship between changes in status and task performance involving simple reaction time responses. For their study, these researchers assumed that status was manipulated by assigning to group members different degrees of control over the group product and by subsequently creating conditions which required that control be reallocated. The degree of control members had over the group product defined their status rank in the group. Two experiments were presented in which performance effects deriving from status changes were examined. In the first, the highest ranked member was demoted and the lowest ranked member was promoted. In the second experiment, members of intermediate ranks were shifted both up and down. From these experiments the researchers concluded that a member's performance improves when his status is increased and his performance suffers when his status is decreased.

Bluhm's study (2) was concerned with evaluating the effects of incentive-related, transient anxiety on discrimination reaction time in terms of task difficulty. Bluhm concluded that although the level of difficulty of the discrimination task is significantly related to speed of performance, there is no simple relationship between anxiety and task difficulty for either white or Negro.

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CHAPTER III

METHODS AND PROCEDURES OF THE STUDY

Description of the Population

The subjects who participated in this study were physical education majors and minors enrolled in five theory physical education classes at Sam Houston State College, Huntsville, Texas. These 120 male college students were administered a reaction time test, a mental ability test, and a personality test.

The 120 male college students were divided into three groups. The first group was comprised of students whose reaction time scores ranked at the top one-third of the total number of students who took the reaction time test. The reaction time scores were ranked with the fastest times being at the top of the scale. The second group was comprised of students whose reaction time scores ranked at the bottom one-third of the total number of students who took the reaction time test. The third group was comprised of students whose reaction time scores ranked at the middle one-third of the total number of students who took the reaction time test. The data from Table I show how the three groups were divided according to their reaction time scores.

TABLE I
GROUP DIVISIONS AND REACTION TIME SCORES
IN THE STUDY

Group	Reaction Times
I Fast Reactors	.154 to .208
II Slow Reactors	.222 to .299
III Average Reactors	.209 to .221

Instruments Used

The measuring instruments used in this study were the Automatic Performance Analyzer, Otis Quick-Scoring Mental Ability Test (Form EM), and the Thurstone Temperament Schedule.

For the purpose of this study, the Automatic Performance Analyzer was accepted as a measure of reaction time. There was a need to examine the dependability and precision of this instrument and to consider some of the technical problems that occurred in its use. Henry (1) gives the following explanation concerning the instrument:

The instrument operates on a simple principle. A synchronous A. C. motor drives a notched control disc through a friction clutch. The control disc is connected to a sweep second pointer that rotates over a dial divided into hundredths of a second. Each

division is one-tenth of an inch wide. There is also a smaller pointer that reads cumulated seconds.

The accuracy of measurement with this timer is, of course, ultimately determined by the alternating current supply system. This error is less than .001 of a second.

A second limiting factor is the number of notches in the control disc. There are 370 notches in the control disc. Since each notch represents 2.7 thousandths of a second, the limiting mechanical accuracy of a single reading is 1.35 seconds⁻³.

A third limiting factor is the error in reading the dial. If the pointer reading is interpolated to tenth divisions, using care to avoid parallax error, an experienced operator can usually keep within .1 second⁻³ (1, p. 117).

The hundredth second electric precision timer used with the usual A. C. clutch circuit has an accuracy within \pm .05 hundredths of a second (1, p. 122).

The Otis Quick-Scoring Mental Ability Test (Form EM) was selected as a valid and reliable instrument to measure the mental ability of a subject. The reliability of this instrument, as corrected by Spearman-Brown Formula, was found to be .92. The validity of each item of the test was investigated by finding the biserial coefficient of correlation between the item and the total score in the test. The validity coefficient was found to be .61.

The researcher administered each subject the Otis Quick-Scoring Mental Ability Test (Form EM) and received an intelligence quotient for each subject. For the purpose of this test the intelligence quotient was the subject's measure of intelligence (3).

The Thurstone Temperament Schedule was selected as a valid and reliable instrument to measure the following personality traits:

Active, Vigorous, Impulsive, Dominant, Stable, Social, and Reflective. Seven areas of temperament are appraised in a relatively short questionnaire. Reliability coefficients for the seven traits of this schedule ranged from .40 up to .90. Studies as quoted in the manual indicated that the temperament schedule can be a valuable instrument in predicting successful performance in several areas of work (4). The Thurstone Temperament Schedule was administered to each of the subjects, and the raw score for each of the seven traits was recorded as one of the factors to be studied.

Procedures for Collecting Data

One hundred twenty male college students were given a reaction time test, an intelligence test, and a personality test. The students were selected from five physical education theory classes at Sam Houston State College, Huntsville, Texas.

For the purpose of this study, the Automatic Performance Analyzer was used to measure the reaction time of each student.

Each test administered with the Automatic Performance Analyzer consisted of a hand reaction time test and a foot reaction time test. Each student was given six separate timings on the hand and foot reaction time tests. The twelve timings were then averaged together to establish a mean score average for each subject. For the purpose of this study each subject's mean score average constituted the subject's reaction time score.

In giving the Automatic Performance Analyzer's hand reaction test, the student was instructed to sit at a desk and place his arm on the desk and grasp the electric circuit breaker button with his dominant hand, having his thumb on the button. The subject was instructed to sit erect and focus his concentration on an electric light bulb which was six feet from him at eye level. As soon as the light flashed on, the student was instructed to press the electric circuit breaker button as quickly as possible. The electric clock on the Automatic Performance Analyzer started when the bulb flashed and stopped when the button was pressed. The instructor read the subject's reaction time from the Automatic Performance Analyzer's electric clock, which was calibrated in hundredths of a second. The times were recorded on a five by seven card until the subject had been given six hand reaction timings. The Automatic Performance Analyzer has a delayed start button which varies the time of the light flash. This eliminated most of the anticipation on the part of the student. The student was given one practice trial to make certain that he understood the correct procedure involved in taking the test. The preparatory command of "ready" was given to the student prior to the flash of the bulb on each trial. After six timings, the subject's hand reaction was determined.

The foot reaction test was given immediately after the subject's hand reaction test. The subject was given six timings to

determine his foot reaction time. The student was instructed to sit erect in the same desk as his hand reaction test was given. The subject placed the ball of his foot on the electric circuit breaker pad and concentrated on a light bulb which was placed six feet in front of him at eye level. The subject was given one practice timing, and then the command of "ready" was given to the subject so he could start his concentration. The instructor used the delayed start button in the same manner as he did in the hand reaction time test. As soon as the light flashed, the student stopped the electric clock by pressing the electric circuit breaker pad. After six timings, the student's foot reaction time was determined.

The subject's total reaction time score was determined by arriving at a mean average of the twelve timings. The subject's score was calibrated into thousandths of a second.

The Otis Quick-Scoring Mental Ability Test (Form EM) (3) was selected as a valid and reliable instrument to measure the mental ability of each subject. This test was given to each subject one week after the reaction time test was administered. The Otis Quick-Scoring Mental Ability Test (Form EM) was administered with adherence to the instructions given on the first page of the test booklet. The tests were then handscored and the subjects' intelligence quotients were derived.

The Thurstone Temperament Schedule (4) was selected to measure the personality traits that were desired for this study. The results were handscored, and the raw score on each of the seven traits was determined for each of the subjects. The seven traits included:

1. Active -- A person with a high score in this area usually works and moves rapidly.
2. Vigorous -- A person with a high score in this area participates in physical sports and work requiring the use of the hands.
3. Impulsive -- A high score in this category indicates a happy-go-lucky, daredevil type of individual.
4. Dominant -- A person scoring high in this area thinks of himself as a leader.
5. Stable -- A high score in this area indicates a cheerful and even disposition.
6. Sociable -- A person who scores high in this area is agreeable and cooperative in relations with others.
7. Reflective -- A high score in this area indicates that a person likes meditative and reflective thinking.

The raw scores in each of the seven areas were recorded as independent variables to be used in the study.

From the results of the three measuring instruments used in this study, the following scores were obtained for each subject tested:

1. A score assessing reaction time
2. A score assessing intelligence
3. A score assessing the Active personality trait
4. A score assessing the Vigorous personality trait
5. A score assessing the Impulsive personality trait
6. A score assessing the Dominant personality trait
7. A score assessing the Stable personality trait
8. A score assessing the Sociable personality trait
9. A score assessing the Reflective personality trait

Procedures for Treating Data

In order to test the hypotheses of this study, the data were examined and treated statistically in the following manner.

1. Hypothesis One stated that there will be a significant relationship between reaction time and mental ability. Hypothesis One was tested by obtaining a reaction time score and an intelligence quotient score for each individual tested. The Pearson product-moment correlation was used to determine if there was a significant relationship between reaction time and mental ability.

2. Hypothesis Two stated that there will be a significant relationship between reaction time and the following personality traits:

- a. Active
- b. Vigorous
- c. Social

Hypothesis Two was tested by obtaining a reaction time score and a score on the Active, Vigorous, and Social personality traits. The Pearson product-moment correlation was used to determine if there was a significant relationship between reaction time and the Active, Vigorous, and Social personality traits.

3. Hypothesis Three stated that there will be no significant relationship between reaction time and the following personality traits:

- a. Impulsive
- b. Dominant
- c. Stable
- d. Reflective

Hypothesis Three was tested by obtaining a reaction time score and a score on the Impulsive, Dominant, Stable, and Reflective personality trait. The Pearson product-moment correlation was used to determine if there was a significant relationship between reaction time and the Impulsive, Dominant, Stable, and Reflective personality traits.

4. Hypothesis Four stated that there will be a significance of difference in mental ability mean scores between the fast reacting group of students and the slow reaction group of students. Hypothesis Four was tested by obtaining a reaction time score and a mental ability score for each subject. The subjects were divided into three groups according to their score on the reaction time

test. Group I consisted of the upper one-third or the fast reacting students. Group II consisted of the bottom one-third or the slow reacting students. Each group's mean score was obtained by averaging the mental ability scores of the members in each group. Group III or the average group of reactors was not used in the statistical treatment involved in Hypotheses Four, Five, and Six.

Fisher's t test for independent small samples was utilized to test the significance of the difference between the two groups on mental ability mean scores. The formula (2, p. 109) is as follows:

$$t = \frac{M_1 - M_2}{\sqrt{\left(\frac{N_1 \sigma_{S_1}^2 + N_2 \sigma_{S_2}^2}{N_1 + N_2 - 2} \right) \left(\frac{1}{N_1} + \frac{1}{N_2} \right)}}$$

M_1 = Mean of Group I

M_2 = Mean of Group II

N_1 = Number of Subjects in Group I

N_2 = Number of Subjects in Group II

σ_{S_1} = Standard Deviation of Group I

σ_{S_2} = Standard Deviation of Group II

5. Hypothesis Five stated that there will be a significance of difference in personality trait mean scores between the fast reacting group of students and the slow reacting group of students on the following personality traits:

- a. Active
- b. Vigorous
- c. Social

Hypothesis Five was tested by obtaining a mean score for each group on the Active, Vigorous, and Social personality traits, Hypothesis Five was tested by repeating the same procedures for each personality trait as used in testing Hypothesis Four.

6. Hypothesis Six stated that there will be no significance of difference in personality trait mean scores between the fast reacting group of students and the slow reacting group of students on the following personality traits:

- a. Impulsive
- b. Dominant
- c. Stable
- d. Reflective

Hypothesis Six was tested by obtaining a mean score for each group on the Impulsive, Dominant, Stable, and Reflective personality traits. Hypothesis Six was tested by repeating the same procedures for each personality trait as used in testing Hypotheses Four and Five.

The null hypothesis was tested in reference to Hypotheses Four, Five and Six. The .05 level of significance was arbitrarily selected as the point for rejecting the null hypotheses.

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CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

The basic purposes of this study were (1) to investigate the reaction times, mental abilities, and personality traits of a selected group of college men; (2) to determine the relationship between reaction time and mental ability for a selected group of college men; (3) to determine the relationship between reaction time and each of the following personality traits for a selected group of college men:

- a. Active
- b. Vigorous
- c. Impulsive
- d. Dominant
- e. Stable
- f. Social
- g. Reflective

(4) to determine the mean score differences in mental ability between the fast reacting group of students and the slow reacting group of students; and (5) to determine the mean score differences in personality between the fast reacting group of students and the slow reacting group of students on each of the following personality traits:

- a. Active
- b. Vigorous
- c. Impulsive
- d. Dominant
- e. Stable
- f. Social
- g. Reflective

One hundred twenty male college students at Sam Houston State College were given a reaction time test, a mental ability test, and a personality test.

Each subject received nine scores from the three tests that were administered - a reaction time score, a mental ability score, and seven personality trait scores.

Means and standard deviations of 120 college men on reaction time, mental ability, and seven personality variables are shown in Table II.

The mean Intelligence Quotient of 109.64 was of significant interest since other studies by the college have shown the norm Intelligence Quotient for college students enrolled at Sam Houston State College to be 110 (2, p. 74).

TABLE II

MEANS AND STANDARD DEVIATIONS OF 120 COLLEGE
MEN ON REACTION TIME, MENTAL ABILITY,
AND SEVEN PERSONALITY VARIABLES

Variables	Mean	Standard Deviation
Reaction Time	.214	.023
Intelligence Quotient	109.64	9.59
Active	12.21	5.00
Vigorous	13.86	2.77
Impulsive	12.37	3.08
Dominant	8.36	4.11
Stable	7.94	3.08
Social	11.55	3.21
Reflective	7.55	2.38

This indicates a possible average sampling of the population.

The small standard deviation for the reaction time test indicates homogeneity in the sample.

The coefficients of correlation between reaction time and variables of mental ability and personality are presented in Table III.

TABLE III

COEFFICIENTS OF CORRELATION BETWEEN REACTION
TIME AND VARIABLES OF MENTAL
ABILITY AND PERSONALITY

Variables	Correlation	Level of Significance
Intelligence Quotient	-.04	NSC
Active	.01	NSC
Vigorous	.19	.05
Impulsive	.14	NSC
Dominant	-.03	NSC
Stable	-.02	NSC
Social	.03	NSC
Reflective	.01	NSC

The data in Table III show very low correlations between reaction time and variables of mental ability and personality. Most of the correlations are not significantly different from zero. The Vigorous personality variable shows a low correlation of .19, which is significant at better than the .05 level.

These findings were presented in relationship to Hypotheses One, Two, and Three.

Hypothesis One, which stated that there will be a significant relationship between reaction time and mental ability, was rejected.

Hypothesis Two, which stated that there will be a significant relationship between reaction time and the Active, Vigorous, and Social personality traits, was rejected for the Active and Social personality traits. Hypothesis Two was accepted for the Vigorous personality trait. A correlation of .19 was found between reaction time and the Vigorous personality trait.

Hypothesis Three, which stated that there will be no significant relationship between reaction time and the Impulsive, Dominant, Stable and Reflective personality traits, was accepted.

The 120 college students were divided into three groups according to their reaction time scores. Group I was designated as the fast reactors, Group II the slow reactors, and Group III the average reactors. Groups I and II were used to further study reaction time and its relationship to mental ability and personality.

Means, standard deviations, Fisher's t and levels of significance for Groups I and II on mental ability, and personality are shown in Table IV.

A study of the data in Table IV indicates that there is no significance of difference between the fast reacting group of students (Group I) and the slow reacting group of students (Group II) on mental ability or personality.

TABLE IV

MEANS, STANDARD DEVIATIONS, FISHER'S t AND
LEVELS OF SIGNIFICANCE FOR GROUPS I AND
II ON MENTAL ABILITY AND PERSONALITY

Variables	Group I N=40		Group II N=40		Fisher's t	LS
	Mean	S.D.	Mean	S.D.		
Intelligence Quotient	107.87	8.56	109.61	8.64	-.90	NSD
Active	12.51	3.03	11.87	2.56	.98	NSD
Vigorous	14.32	2.51	13.81	2.83	.90	NSD
Impulsive	12.72	2.69	12.22	2.71	.82	NSD
Dominant	8.12	4.21	7.92	3.47	.24	NSD
Stable	7.52	3.03	8.32	3.03	-1.17	NSD
Social	11.35	3.37	11.41	2.91	-.07	NSD
Reflective	7.40	2.81	7.52	2.65	-.20	NSD

The above data were presented in relationship to Hypotheses Four, Five, and Six.

Hypothesis Four, which stated that there will be a significance of difference in mental ability mean scores between the fast reacting group of students and the slow reacting group of students, was rejected since Fisher's t was found to be $-.90$, which is not significant at better than the $.05$ level.

Hypothesis Five, which stated that there will be a significance of difference in personality trait mean scores between the fast reacting group of students and the slow reacting group of students on the Active, Vigorous, and Social personality traits, was also rejected.

Hypothesis Six, which stated that there will be no significance of difference in personality trait mean scores between the fast reacting group of students and the slow reacting group of students on the Impulsive, Dominant, Stable, and Reflective personality traits, was accepted.

The findings from the data which have been presented on the 120 selected college students and the two Groups (I and II) within this larger population can be summarized as follows:

1. There was no significant relationship between reaction time and mental ability.
2. There was no significant relationship between reaction time and each of the following personality traits:
 - a. Active
 - b. Impulsive
 - c. Dominant
 - d. Stable
 - e. Social
 - f. Reflective

3. The Vigorous personality trait showed a low correlation with reaction time. A correlation of .19 was found between reaction time and the Vigorous personality trait which was significant at better than the .05 level.
4. There was no significance of difference shown between Groups I and II on mean mental ability scores.
5. There was no significance of difference shown between Groups I and II on mean scores from each of the seven personality variables.

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CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study concerns the reaction time of a selected group of college students in relation to mental ability and personality.

The purposes of the study were as follows: (1) to determine the reaction times of a selected group of college men; (2) to determine the mental ability scores of a selected group of college men; (3) to determine the personality trait scores of a selected group of college men; (4) to determine the relationship between reaction time and mental ability for a selected group of college men; (5) to determine the relationship between reaction time and each of the following personality traits for a selected group of college men:

- a. Active
- b. Vigorous
- c. Impulsive
- d. Dominant
- e. Stable
- f. Social
- g. Reflective

(6) to determine the mean score differences in mental ability between the fast reacting group of students and the slow reacting group of students; (7) to determine the mean score differences in personality between the fast reacting group of students and the slow reacting group of students on each of the following personality traits:

- a. Active
- b. Vigorous
- c. Impulsive
- d. Dominant
- e. Stable
- f. Social
- g. Reflective

One hundred twenty male physical education majors and minors were administered a reaction time test, a mental ability test, and a personality test.

The 120 male college students were further divided into three groups. The first group was comprised of students whose reaction time scores ranked at the top one-third of the total number of students who took the reaction time test. The reaction time scores were ranked with the fastest times being at the top of the scale. The second group was comprised of students whose reaction time scores ranked at the bottom one-third of the total number of students who took the reaction time test. The third

group was comprised of students whose reaction time scores ranked at the middle one-third of the total number of students who took the reaction time test.

For the purpose of this study, the Automatic Performance Analyzer was used to measure the reaction times of each student. The Otis Quick-Scoring Mental Ability Test (Form EM) was administered to each subject to assess certain personality traits.

Each subject received nine scores from the three tests that were administered -- a reaction time score, a mental ability score, and seven personality trait scores. The results of the reaction time test were correlated with the results of the mental ability test. The results of the reaction time test were also correlated with each of the seven personality traits from the personality test.

Fisher's t test for independent small samples was used to test the significance of difference between the two groups (I and II) on mental ability mean scores and the mean scores on each trait from the personality test.

The results of these correlations and comparisons are listed below with the hypothesis which was stated for each.

1. The first hypothesis was stated as follows: there will be a significant relationship between reaction time and mental ability. The Pearson product-moment correlation was used to determine if there was a significant relationship between re-

action time and mental ability. Hypothesis One was rejected since the results of the test found the correlation to be $-.04$ which was not significantly different from zero.

2. The second hypothesis was stated as follows: there will be a significant relationship between reaction time and the following personality traits:

- a. Active
- b. Vigorous
- c. Social

Hypothesis Two was tested by obtaining a reaction time score and a score on the Active, Vigorous, and Social personality traits. The Pearson product-moment correlation was used to determine if there was a significant relationship between reaction time and the Active, Vigorous, and Social personality traits. Hypothesis Two was rejected for the Active and Social personality traits. Hypothesis Two was accepted for the Vigorous personality trait. The Vigorous personality variable showed a low correlation of $.19$ which is significant at better than the $.05$ level.

3. The third hypothesis was stated as follows: there will be no significant relationship between reaction time and the following personality traits:

- a. Impulsive
- b. Dominant
- c. Stable
- d. Reflective

Hypothesis Three was tested by obtaining a reaction time score and a score on the Impulsive, Dominant, and Reflective personality traits. The Pearson product-moment correlation was used to determine if there was a significant relationship between reaction time and the Impulsive, Dominant, Stable, and Reflective personality traits. Hypothesis Three was accepted since the results of the correlations showed no significant correlations.

4. The fourth hypothesis was stated as follows: there will be a significance of difference in mental ability mean scores between the fast reacting group of students and the slow reacting group of students. Hypothesis Four was tested by obtaining a reaction time score and a mental ability score for each subject. The subjects were divided into three groups according to their scores on the reaction test. Group I consisted of the upper one-third or the fast reacting students. Group II consisted of the bottom one-third or the slow reacting students. Each group's mean score was obtained by averaging the mental ability scores of the members in each group. Group III or the average group of reactors was not used in the statistical treatment involved in Hypotheses Four, Five, and Six. Fisher's t test for independent small samples was utilized to test the significance of the difference between the two groups on mental ability mean scores.

Hypothesis Four was rejected since Fisher's t yielded results which indicated that there was no significance of difference

in the mental ability mean scores between the fast reacting group of students and the slow reacting group of students.

5. The fifth hypothesis was stated as follows: there will be a significance of difference in personality trait mean scores between the fast reacting group of students and the slow reacting group of students on the following personality traits:

- a. Active
- b. Vigorous
- c. Social

Hypothesis Five was tested by obtaining a reaction time score and scores on the Active, Vigorous, and Social personality traits.

Hypothesis Five was tested by repeating the same procedures as used in testing Hypothesis Four. Fisher's t yielded results which indicated that there was no significance of difference in the Active, Vigorous, and Social personality traits mean scores between Groups I and II. Hypothesis Five was rejected.

6. The sixth hypothesis was stated as follows: there will be no significance of difference in personality trait mean scores between the fast reacting group of students and the slow reacting group of students on the following personality traits:

- a. Impulsive
- b. Dominant
- c. Stable
- d. Reflective

Hypothesis Six was tested by obtaining a mean score for each group on the Impulsive, Dominant, Stable, and Reflective personality traits. Hypothesis Six was tested by repeating the same procedures for each personality trait as used in testing Hypotheses Four and Five. Hypothesis Six was accepted for Fisher's t yielded results that indicated no significance of difference on the Impulsive, Dominant, Stable, and Reflective personality traits mean scores between Group I and II.

Summary of the Findings

The findings which have been presented can be summarized as follows:

1. There was no significant relationship between reaction time and mental ability.
2. There was no significant relationship between reaction time and each of the following personality traits:
 - a. Active
 - b. Impulsive
 - c. Dominant
 - d. Stable
 - e. Social
 - f. Reflective
3. The Vigorous personality trait showed a low correlation with reaction time. A correlation of .19 was found between re-

action time and the Vigorous personality trait which was significant at better than the .05 level.

4. There was no significance of difference shown between Groups I and II on mean mental ability scores.

5. There was no significance of difference shown between Groups I and II on mean scores from each of the seven personality variables.

Conclusions

An analysis of the results of this study leads to the following conclusions.

1. Reaction time cannot be used as a successful predictor of intelligence.

2. Reaction time cannot be used as a successful predictor of the following personality traits:

- a. Active
- b. Impulsive
- c. Dominant
- d. Stable
- e. Social
- f. Reflective

3. A person who thinks of himself as having a Vigorous personality tends to have a faster reaction time than a person who doesn't think of himself as having a vigorous personality.

4. The faster reacting person doesn't have a higher Intelligence Quotient than a slower reacting person.

5. The faster reacting person doesn't perceive of himself as being more Active, Vigorous, Impulsive, Dominant, Stable, Social, and Reflective than a slower reacting person.

6. It appears that reaction cannot be a successful predictor in placing physical education students according to their mental and social needs.

Recommendations

On the basis of the findings and the conclusions of the study, the following are recommended:

1. That similar studies be made in guiding and placing students according to their physical, mental, and social abilities.

2. That studies be made on the possibility of establishing criteria for the purpose of grouping physical education students according to their physical, mental, and social abilities.

3. That studies be made of the relationships of other physical, mental, and social factors and their influence on the physical education program.

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