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# Personality traits of male intercollegiate swimmers

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## ABSTRACT

The purposes of this study were to compare the personality traits of outstanding and less outstanding male intercollegiate swimmers and male members of similar age in the normal population.

The subjects selected were male members of intercollegiate swimming teams at Indiana University, Bloomington, Indiana and Ithaca College, Ithaca, New York during the 1970-71 season. The population consisted of 27 swimmers (16 outstanding and 11 less outstanding).

Cattell's Sixteen Personality Factor Questionnaire (16 PF) was utilized as the personality measuring instrument. From an analysis of the data, the investigator accepted hypothesis one, that the total sample of swimmers were not significantly different ( $\alpha=.05$ ) from males of similar age in the normal population. However, the swimmers differed from the normal population on four of the sixteen primary personality factors. The swimmers differed significantly from the national norm on Factor A (more reserved, detached, critical, aloof), Factor B (more intelligent, abstract-thinking, bright), Factor E (more assertive, independent, aggressive, stubborn, competitive), and Factor N (more forthright, natural, artless, unpretentious).

From an analysis of the data, the investigator

accepted hypothesis two. The outstanding male intercollegiate swimmers did not differ significantly from the less outstanding male intercollegiate on any of the 16 primary personality factors.

Although the investigator found four out of sixteen factors significantly different ( $\alpha=.05$ ) when comparing outstanding male intercollegiate swimmers to males of similar age in the normal population, he accepted hypothesis three. The outstanding male intercollegiate swimmers differed significantly from the national norm on Factor A (more reserved, detached, critical, aloof), Factor B (more intelligent, abstract-thinking, bright), Factor N (more forthright, natural, artless, unpretentious) and Factor  $Q_3$  (more undisciplined self-conflict, follows own urges, careless of protocol).

From an analysis of the data, the investigator accepted hypothesis four. The less outstanding male intercollegiate swimmers did not differ significantly ( $\alpha=.05$ ) from males of similar age in the normal population except on Factor E. The less outstanding swimmers were more assertive, independent, aggressive, stubborn and competitive than males of similar age in the normal population.

The following conclusions were made. Personality did not distinguish male intercollegiate swimmers from males of similar age in the normal population, personality does not distinguish levels of swimming proficiency and personality did not distinguish outstanding male

intercollegiate swimmers and less outstanding male intercollegiate swimmers from males of similar age in the normal population.

PERSONALITY TRAITS OF MALE INTERCOLLEGIATE SWIMMERS

by

James Robert Matheney

A thesis submitted in partial fulfillment of the  
requirements for the degree of Master of  
Science in the School of Health, Physical  
Education and Recreation  
at Ithaca College

May, 1973

Thesis Advisor: Dr. A. Craig Fisher

School of Health, Physical Education and Recreation  
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CERTIFICATE OF APPROVAL

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MASTER OF SCIENCE THESIS

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This is to certify that the Master of Science thesis of

James Robert Matheney

with a major in Physical Education has been approved by the Examining Committee as satisfactory for the thesis requirement for the Master of Science degree at the convocation of May, 1973

Thesis Committee:

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## Chapter 1

### INTRODUCTION

It is believed that traditionalists in society today would generally agree that sport participation makes a noteworthy contribution not only to the academic and physical phases of life, but also to society and mankind as a whole. This same attitude is reinforced by those persons actively involved in teaching and conducting research in physical education as well as by those individuals who are practitioners--the coach and the athlete. However, in our interest and enthusiasm we are apt to overlook or deny that there exist in the realm of athletics some very serious contradictions between what is said and what is done. There is a common belief that athletic participation has as its major aim the development of the individual athlete. It has been said that participation builds a sound body as well as a sound mind. It builds character and strength; it helps the individual mature. It helps him grow to face the more serious aspects of life. Athletics, in other words, represents a testing and developing ground in life whereby one can develop personally.

Within the last two decades, there has been an increase in the amount, quality and scope of research

being conducted in the area of physical education and athletics. Certainly, questions have been asked and solutions have been found to some of the profession's most pressing problems.

Certainly, one of the most difficult problems to solve has been that no comprehensive model for personality factors in athletics has been forwarded. This study was not intended to develop the much sought-after model, but an attempt was made to answer some of the questions relative to personality factors and athletics.

A basic premise for personality research in athletics has been that definable traits exist that are capable of differentiating athletes in one sport from those in another, or from non-athletes. Implicit in such work has been the idea that certain athletic activities develop or at least encourage the development of some personality traits. Contentions that athletics develop character, courage, or aggressiveness are examples of such a position.

Major emphasis in much of the work on athletic personality has been on the identification of differences among various groups of athletes, and between athletes and non-athletes. Results from such studies as reviewed in Chapter 2 would seem to suggest numerous differences. It appears, that when personality differences among athletes are demonstrated, the inference is drawn that such traits are related to success in a particular sport. Sometimes,

the further inference is made that the presence of such traits in potential sport aspirants is desirable and that the cultivation of such traits would be beneficial to successful performance.

Factors demonstrated to be differentiators are suggestive of traits somehow linked to athletics. Demonstrating that such traits are linked causally to success in a particular sport, however, is quite a different matter. It might be found, for example, that athletes in a particular sport differ on a trait from other athletes and from norms. It also may be found that these traits differed between known levels of ability in the same sport, or that continuing participation in the sport augmented the magnitude of the trait.

For example, in respect to personality and athletics, Johnsgard and Ogilvie (56) found that there was a personality profile characteristic of racing car drivers. They studied groups of sports racing car drivers from novice to national champions and Grand Prix stars. The similarity of a racing car driver's profile strongly attested to a "competitive driver personality." The drivers were found to be introverted, reserved, emotionally stable, bright, reasonably self-assertive, venturesome, tough-minded, and to have well developed super-egos. They were average trusting types and slightly above average with regard to being imaginative, worldly wise, self-assured, free thinking and self-sufficient. They possessed

extremely high self-control and functioned at an extraordinarily low level of tension, a trait that suggests a high capacity to perform under stress.

Another example of research with respect to personality and athletics was Kroll's study (60). He studied 94 amateur and collegiate wrestlers utilizing the Cattell Sixteen Personality Factor Questionnaire (16 PF). They were studied across different levels of demonstrated achievement in wrestling. Discriminant function analyses failed to establish any profile differences between criterion groups. Groups assessed were (1) a superior group comprised of 28 wrestlers from the 1964 United States Olympic team, National Collegiate Athletic Association (N.C.A.A.) or National Association of Intercollegiate Athletics (N.A.I.A.) champions or place winners, (2) an excellent group comprised of 33 collegiate wrestlers who were varsity representatives, rated excellent by their coach, and who had won at least 60 percent of their matches during the season, and (3) an average or below average group of the 33 wrestlers remaining on four college teams secured for the study. When compared to the norms, wrestlers demonstrated a significant departure from average on Factor I indicating tough-mindedness, self-reliance, and masculinity. Support was not found for the suggestion that wrestlers may possess a neurotic profile.

Compatible findings were reported by Parsons (72) who studied 35 Canadian swimmers of national championship

calibre with the 16 PF. He found significant differences between this entire group and the average population on 15 of the primary profile factors. When contrasts were made between the 11 athletes chosen to represent Canada at the British Empire and Commonwealth Games and the remaining non-selected athletes (but still of championship calibre), no significant differences were found. Similarly, Carlile (44) found no significant differences between 28 Australian Olympic swimmers and the average population utilizing the 16 PF.

There has been discussion among coaches and research investigators about the relationship between personality traits of athletes and athletic performance. Considerable emphasis has been placed on the identification of the personality traits that were thought to relate significantly to athletic achievement. The selection of athletes such as those of national or international status, permitted statements to be made about the personality of the outstanding athlete.

Some personality researchers, e.g., those affiliated with sport, have focused their attention on identifying the specific traits of athletes who participated in such sports as football, competitive race car driving, wrestling and karate. The results of these studies leads one to believe that personality is sport-specific. However, personality measurement does not always allow the investigator to determine which athletes will be out-



standing in a particular sport.

When the investigator, through personality measurement, differentiated between outstanding and less outstanding athletes, it was sometimes difficult to ascertain why one athlete was a winner and another was a loser. It was hypothesized that when athletes reach national or international levels of competition, their physical abilities are very similar. If the above statement is true the basic underlying question is: are there certain personality traits that continually place one individual above all the others and if there are, what are they?

Personalogists, psychologists associated with the study of personality, do not agree on the answers to the following questions: (1) How does personality develop? (2) What are the effects of early experiences on personality? (3) Is there a critical period in personality development? (4) How does heredity and environment affect personality? and (5) What is the influence of sensory deprivation? If agreement can be reached on the aforementioned questions, personality and theories surrounding it will not be clouded by so many intangibles (91).

#### Statement of the Problem

The purposes of this study were to compare the personality traits of outstanding and less outstanding male intercollegiate swimmers and male members of similar age in the normal population.

### Significance of the Problem

Presently, there is a great deal of emphasis on the study of personality traits of athletes. However, as the investigator will reveal in Chapter 2, there are conflicting inferences regarding the studies done previously. It was the major objective of this study to compare the personality traits of outstanding and less outstanding male intercollegiate swimmers and males of similar age in the normal population.

Physical education is placing considerable emphasis on sociology and psychology of sport. New courses have been blossoming in the college curriculum and many studies have focused on the social and psychological behavior of participants in sports.

It has been noted by Cratty (9), Oxendine (26), and Singer (33), that many athletes have high needs for social approval and for affiliation. With the great emphasis on sport and athletes in adolescent culture and with sport's deemed importance by adult society, many adolescents are motivated to fulfill their needs for approval by participation in sport.

The study of the personality traits of athletes has become popular among sport psychologists and physical educators around the world. More specifically, some investigators who have conducted studies in the area of personality and swimming are Arthur (40), Behrman (41), Cofer (7), Hendry (52,53,54), Heusner (90), Johnson (7),

Kane (17,18,37), Newman (68), Ogilvie (23,25,69,71),  
Rushall (73,74,92), Stembridge (87), Tutko (25),  
Warburton (37), Whiting (54,87), and Young (25).

### Scope of the Problem

This study was conducted to assess the personality traits of male intercollegiate swimmers from Indiana University, Bloomington, Indiana, and Ithaca College, Ithaca, New York. Furthermore, the investigator desired to determine if the swimmers who were participating at different levels of competition possessed different personality traits and also to compare the personality of those swimmers to males of similar age in the normal population.

The following sub-problems were included in this study:

1. To assess the personality traits of outstanding male intercollegiate swimmers.
2. To assess the personality traits of less outstanding male intercollegiate swimmers.
3. To compare the personality traits of the entire sample of swimmers to males of similar age in the normal population.
4. To compare the personality traits of outstanding male intercollegiate swimmers to less outstanding male intercollegiate swimmers.
5. To compare the personality traits of outstanding male intercollegiate swimmers and males of similar

age in the normal population.

6. To compare the personality traits of less outstanding male intercollegiate swimmers and males of similar age in the normal population.

### Definition of Terms

Cattell Sixteen Personality Factor Questionnaire (16 PF). A test was devised by Raymond B. Cattell in 1957 to give the most complete coverage of personality possible in a brief time. The 16 primary factors measured by the 16 PF are:

Factor A: Reserved, detached, critical, aloof (A-) versus outgoing, warmhearted, easy-going, participating (A+).

Factor B: Less intelligent, concrete-thinking (B-) versus more intelligent, abstract-thinking, bright (B+).

Factor C: Affected by feelings, emotionally less stable, easily upset (C-) versus emotionally stable, faces reality, calm, mature (C+).

Factor E: Humble, mild, accommodating, conforming, milquetoast (E-) versus assertive, independent, aggressive, stubborn, competitive (E+).

Factor F: Sober, prudent, serious, taciturn (F-) versus happy-go-lucky, impulsively lively, gay, enthusiastic (F+).

Factor G: Expedient, evades rules, feels few obligations (G-) versus conscientious, persevering, staid,

rule-bound (G+).

Factor H: Shy, restrained, timid (H-) versus venturesome, socially bold, uninhibited, spontaneous (H+).

Factor I: Tough-minded, self-reliant, realistic, no-nonsense (I-) versus tender-minded, dependent, over-protected, sensitive (I+).

Factor L: Trusting, adaptable, free of jealousy, easy to get along with (L-) versus suspicious, self-opinionated, hard to fool (L+).

Factor M: Practical, careful, conventional, proper (M-) versus imaginative, wrapped up in inner urgencies, careless of practical matters, bohemian (M+).

Factor N: Forthright, natural, artless, unpretentious (N-) versus shrewd, calculating, worldly, penetrating (N+).

Factor O: Placid, self-assured, confident, serene (O-) versus apprehensive, worrying, depressive, troubled (O+).

Factor Q<sub>1</sub>: Conservative, respecting established ideas (Q<sub>1</sub>-) versus experimenting, critical, analytical, free-thinking (Q<sub>1</sub>+).

Factor Q<sub>2</sub>: Group dependent, a joiner and a sound follower (Q<sub>2</sub>-) versus self-sufficient, prefers own decisions (Q<sub>2</sub>+).

Factor Q<sub>3</sub>: Undisciplined self-conflict, follows own urges, careless of protocol (Q<sub>3</sub>-) versus controlled, socially-precise, following self-image (Q<sub>3</sub>+).

Factor Q<sub>4</sub>: Relaxed, unfrustrated (Q<sub>4</sub>-) versus tense, frustrated, driven (Q<sub>4</sub>+).

Collegian. Any member of the varsity swimming team who is officially enrolled in a four-year accredited school leading towards a bachelor's degree.

Factor. A factor is a combination of two or more personality traits.

Long Course. In swimming, a pool which is 50 meters in length.

Short Course. In swimming, a pool which is 75 feet in length by at least 45 feet in width with a minimum water depth of 4 feet.

National Time Standards. Time standards established each year by the National Collegiate Athletic Association (N.C.A.A.) Swimming Rules Committee.

Outstanding. Those swimmers who have equalled or bettered 1971 N.C.A.A. time standards established for university or college division schools.

Less Outstanding. Those swimmers who have not achieved the 1971 N.C.A.A. time standards established for university and college division schools.

Personality. "The dynamic organization within the individual of those psychological systems that determine his unique adjustments to his environment" (1:48).

Personality Learning. "Multi-dimensional change in response to experience of a multi-dimensional situation" (38:434).

Profile. A graphic illustration of the 16 factors measured by the 16 PF. They were used for visual comparison.

Trait. "The learned tendency of an individual to react as he has reacted more or less successfully in the past in similar situations when similarly motivated" (28:216).

World Record. Records which may be set by any amateur swimmer in the world for a specific event which has been established in a certified long-course pool and recognized by an international review board.

#### Hypotheses--Stated in Null

1. There were no significant differences in personality traits of male intercollegiate swimmers and males of similar age in the normal population.

2. There were no significant differences in personality traits between outstanding male intercollegiate swimmers and less outstanding male intercollegiate swimmers.

3. There were no significant differences in the personality traits of outstanding male intercollegiate swimmers and males of similar age in the normal population.

4. There were no significant differences in the personality traits of less outstanding male intercollegiate swimmers and males of similar age in the normal population.

### Assumptions

The following were assumptions of this study:

1. The individuals who administered the test did so in the prescribed manner.
2. All questions on the 16 PF were answered truthfully.
3. An individual's personality is basically fixed by the time he is fourteen years of age (91) but may exhibit slight changes after that age.
4. An individual's personality can be factored into specific segments making it reasonable, therefore, to speak about specific traits.

### Limitations of the Study

The following were limitations of this study:

1. Personality tests, including the 16 PF, measure a number of complex traits. It is difficult to select a test that is truly valid and reliable.
2. The test was not administered to the samples at the same time and place.
3. The test was administered by two individuals.
4. Reliability or validity coefficients of the 16 PF were not calculated.

### Delimitations of the Study

The following were delimitations of this study:

1. Only male intercollegiate swimmers from Indiana University, Bloomington, Indiana and Ithaca



College, Ithaca, New York were included in this study.

2. The findings may be applied only to the swimmers sampled.

## Chapter 2

### REVIEW OF RELATED LITERATURE

#### Introduction

The following is a review of available literature relative to the present study. This chapter is subdivided into the following areas: (1) learning theory of personality; (2) personality and physical ability; (3) personality and selected sports; (4) personality and swimmers; and (5) summary.

#### Learning Theory and Personality

The main reason for including personality theory in the body of this chapter was to possibly focus light on the question: (1) does the individual participate in a specific activity because of his personality; or (2) does the activity influence the development of his personality?

Although the application of learning theory to personality research is still relatively new in its development, it is possibly more applicable to this study than some others. It should not be overlooked by researchers in physical education interested in such facets of personality as anxiety, aggression, and achievement motivation. The learning theory is built on the premise that all

behavior is learned or that man is a product of his environment.

Learning, like personality, is not directly observable. And again as in personality study, there are many theories which have been developed to explain the nature and functioning of the inferred learning process. Generally speaking, these theories can be classified as either associative or cognitive. The primary concern of learning theorists and researchers is to discover how behavior is changed as a result of experience or practice. Since an individual's personality is determined to a very great degree by his interactions with his environment, it is inevitable that the interests of the learning theorist and those of the personality theorist would come to overlap.

Modern learning theory has been developed on the foundation laid by Pavlov in his famous studies of classical conditioning. Traceable to this work are such basic concepts as the unconditioned response, the unconditioned stimulus, the conditioned response, the conditioned stimulus, extinction, stimulus generalization, and stimulus discrimination. The reinforcement theory of Dollard and Miller, with an emphasis on the significance of drive reduction, has been especially influential with personality theorists, in part because Dollard and Miller accepted the importance of many of Freud's ideas about personality. In attempting to bring more rigor to the study of Freudian concepts, Dollard and Miller developed

theory and research using learning principles. Their conception of the learning process insists upon the necessity of specifying the likely nature and strength of the within-organism processes which intervene between stimulus and response. This is one of the key differences between the Dollard-Miller approach to learning and the operant theory advanced by Skinner. The latter, of course, believes that it is not only futile but also possibly self-defeating for psychologists to "guess" about the nature of within-organism processes. Also, Skinner emphasizes the basic difference between emitted or operant behavior and respondent behavior (2).

Cognitive theories of learning have been receiving increased attention among psychologists in recent years, although the early work of Kohler on insight learning and of Tolman on latent learning and cognitive maps is also quite important in this regard. The social learning theories of Rotter and of Bandura and Walters have been of particular interest to personality theorists since this type of theory emphasizes the importance of social interaction or context in giving direction to learning. Such theories usually incorporate concepts which refer to complex mental events which are hypothesized to intervene between stimulation and response; Rotter, for example, emphasizes the significance of expectancy while Bandura and Walters pay particular attention to observational learning. Also, cognitive theorists ordinarily point out

the necessity to distinguish carefully between performance and learning. Finally, though, one must not overlook the fact that cognitive theorists do not reject all of the principles or concepts which were developed originally by the associative theorists. The significance of reinforcement, for example, is accepted by almost all learning theorists no matter how much they may disagree on other matters (2).

Hall and Lindzey (11) defined several aspects of personality theory. They concluded that an individual's personality is assessed by the effectiveness with which he is able to elicit positive reactions from a variety of persons under different circumstances.

Hall and Lindzey (11) cited several theories that argued the opposite point of view that environments have specific effects on the total individual. To assess the total individual is almost meaningless unless situational circumstances are known.

Since the primary concern of this sub-area was personality and not learning per se, the investigator has attempted to show how learning relates to some of the major problems studied by personality psychologists. The investigator examined how learning has contributed to the following problems in the personality domain: the structural, the dynamic, the assessment, the developmental, and the biological-environmental.

In summary of the area of learning theory and

personality, Wiggins and others (39:80) stated that

the role of learning occupies a prominent place in the understanding of human personality. The key to personality lies in the mechanisms and processes whereby learning takes place. Learning is the foundation, because it is through the mechanisms and processes of learning that the specific content of human personality is acquired. It is through the processes and mechanism of classical conditioning that specific actions are acquired and through incentive learning that values develop.

### Personality and Physical Ability

The term personality has many meanings, but in general, its usage is based upon the assumption that there are consistencies in behavior which are evidenced by an individual in a variety of situations. Personality denotes the total behavioral pattern of a person and is usually experimentally divided into traits denoting values, intellect, emotional makeup, and at times, perceptual-motor attributes.

Despite the fact that individual differences in neuro-motor makeup influence performance in basic ways, the kind of environment in which the athlete practices, the dynamics of interactions between teammates, and the personal attributes of the performer himself all influence the quality and quantity of effort he will put forth.

Athletes usually have an acute awareness of the social implications of their successes and/or failures. Good athletes are often extremely perceptive; they know their own physical and emotional limitations and

attributes. They are also aware of the psychological make-up of those with whom they come in contact. Investigators have used a wide variety of personality scales with differing terminologies on subjects of varying ability in both individual and group sports. Useful detailed reviews (9,18,43,46,67,81,90) of the current state of knowledge are available which tend, in general, to support the notion that athletic ability correlates highly with such personality dimensions as aggression, dominance, drive, tough-mindedness, and others associated with the outgoing sociable behavior of the extravert. Confidence, lack of anxiety and emotional stability are another set of traits which have often been found among high-level athletes.

Both Kane (18) and Cratty (9) expressed an interest in the relationship between higher athletic ability and extraversive tendencies. They reported that care must be taken with respect to generalizations about this trait because there was a tendency for team versus individual sport differences to appear. While extraversion correlated highly with competitive athletic success among British schoolboys, it was not apparent that extreme extraverts would proceed to the highest levels. From observation of the "individual" athlete's overt behavior, the explanation seems to lie in the development of intense subjectivity and self-analysis that result from constant competitive crises.

Dominance is normally related positively with

ability in individual sports, but apparently, professional game players must be reasonably able to conform and submit to the interests of the team. The relationship between introversion and extraversion has been shown to change with the sport, age of competitors, and level of competition. However, what does seem certain is that all champion athletes must be high in surgency (Factor F).

Cratty (9) perhaps best represents those writers who hold the conviction that a specific combination of personality traits differentiates the superior performer from others in the same activity. He voiced the assumption that eliciting superior athletic performance is solely a problem of psychologically preparing the athlete. Overlooked is the indication that superior athletes probably possess innate perceptual motor attributes somewhat different from those of the mediocre performer. If a group of athletes are exposed to the same practice conditions, influenced by the personality of the same coach, and encouraged to persist in their efforts by the same kinds of motivating conditions, their final performances will differ widely.

Cratty (9) believed that for an athlete to be superior, he must be able to cope with certain psychological fears. These fears are: (1) the removal of various fears in training and in competition, i.e., the fear of pain during extensive, quality training; and (2) the ability to overcome the fear of failure. Also, he con-



cluded that certain groups of personality traits are found in superior athletes. Certain clusters of traits are found to be specific to various sports and will be explained later in this chapter.

Cofer and Johnson (7) concluded in 1960, in their extensive review of literature, that less than twenty studies had made a contribution to the understanding of the personality structure of high-level competitors. They concluded that there was perhaps some evidence to support the generalization that "the exceptional athlete could be described as a special breed." The conclusions focused attention on the statement that perhaps sport is personality-specific and that possibly the individual's personality profile guides him towards that sport. It must be said, however, that conflicting results and conclusions are to be found in the literature since 1960, though many of these are perhaps due to conceptual and methodological inaccuracies.

Cooper (46) concluded that one general problem pervading work in the area of athletics and personality is the lack of attempts to differentiate athletic participation from physical activity. The kind of personality factors compelling an individual to join and work with a team, with its regular practices, leadership and peer involvements, and continuity over time, might well separate from the individual's physical abilities and his psychological needs for such activity.

Cooper (46) in reviewing the related literature, summarized his findings so that the reader has a "painted picture" of athletes when correlating their personality traits with athletic participation and motor ability. He concluded that athletes were: (1) more outgoing and socially confident; (2) more outgoing and socially aggressive; (3) higher in social adjustment as rated by both teachers and peers; (4) higher in prestige and social status; (5) higher in self-confidence; (6) stronger competitors; (7) less anxious; (8) more emotionally stable; (9) less compulsive; (10) more tolerant of physical pain; (11) lower in feminine interests and (12) higher in masculine ones.

Much of the research in the area as a whole seems to attempt to justify participation in athletics and physical education as both important and helpful aspects of growth and maturity, in a physical and psychological sense. It is not clear to what extent the various aspects of personality are related and how do they relate to greater or lesser degrees of physical ability, athletic participation, and athletic success.

Nelson and Langer (67) investigated the relationship between athletic performance and some psychological variables using both the 16 PF (short form) and the Taylor Manifest Anxiety Scale (TMAS). Resting level of state anxiety, pre-game anxiety, and coaches game-by-game rating of individual performance were found to be significantly

related to success. They concluded that their data supported the general statement that the successful athlete has internal mechanisms for preparing for competition.

In conclusion of this area--personality and physical ability--it can be noted that psychology provides direction in teaching methodology and understanding the learning process, in becoming more knowledgeable about growth and development factors, and in general, in interpreting and predicting human behavior. However, different test instruments measure different traits and it is generally a very difficult job to analyze and compare research results. Also, even if identical testing devices were used, the results may very well be dissimilar. For example, Kane (18) found, using the 16 PF, that Factor F (urgency) and Factor E (dominance) were important in distinguishing champion athletes. He concluded that it is introversion rather than extraversion which is suggested by a significantly high score in Factor M (autia). High scoring in this trait was characteristic of those who are self-absorbed individuals with inner urgencies. There was no suggestion of emotional instability and in terms of the major dimension of anxiety, they were significantly low.

On the contrary Heusner (90), in a similar study with Olympic athletes, found them to be significantly more extraverted. Heusner also agrees with Cofer and Johnson (7) that the exceptional athlete could be described as a "special breed."

### Personality and Selected Sports

Kroll (60), as previously mentioned, studied 94 collegiate wrestlers across different levels of demonstrated achievement. Utilizing the 16 PF, discriminant function analyses failed to establish any profile differences between criterion groups. When compared to norms, however, wrestlers demonstrated a significant departure from average on Factor I indicating tough-mindedness, self-reliance, and masculinity.

Also mentioned in Chapter 1 was Johnsgard and Ogilvie's investigation (23) of the race car drivers. From this study, they were able to conclude that racing car drivers are of a certain, specific personality type. If one were to accept the premise of this study, it might be postulated that testing a group of unknown men, would allow selection of those individuals whose profiles are most clearly similar to the known racing car drivers. Prediction could thereby be made as to success as a racing car driver.

Kroll and Peterson (62) studied five college football teams (N=139). Personality profiles of the five teams on the 16 PF were scrutinized through a multiple discriminant analysis and a maximum likelihood classification method. Significant discrimination between teams was demonstrated with the highest contributors to the derived-discriminant function being Factor B (intelligence), Factor H (shy versus bold), Factor O (confident versus worrying)

and Factor  $Q_3$  (casual versus controlled). Based upon actual versus predicted group membership, the percentage of correct classification was 55. When based upon prediction into winning or losing categories, the percentage of correct classification was 82. Also, they assumed that all football environments were similar.

Straub and Davis (81) studied four varsity collegiate football teams. Their criterion groups were football players attending a small private college ( $N=50$ ), an Ivy League University ( $N=69$ ), a small New York State school ( $N=44$ ) and a Big Ten Conference School ( $N=83$ ). They used the 16 PF as their test instrument. Subjecting the data to multiple discriminant function analyses, they found that there was no significant differences in team personality profile comparisons between the Ivy League, State College, or Private College. The Big Ten University team's profile was found to be significantly different from each of the other three teams. The teams were found to be significantly different ( $\alpha=.01$ ) on Factor I (tough-minded versus tender-minded); Factor N (forthright versus shrewd), and Factor  $Q_1$  (conservative versus experimenting). The teams were significantly different ( $\alpha=.05$ ) on Factor M (practical versus imaginative); Factor O (self-assured versus apprehensive) and  $Q_2$  (group dependent versus self-sufficient).

Berger and Littlefield (42) studied 30 outstanding college football athletes, 30 non-outstanding college

football athletes and 30 college non-athletes, after controlling for scholastic aptitude. Using the California Psychological Inventory (CPI), they found no significant differences ( $\alpha=.01$ ) between the groups or on any of the 18 items of the CPI, nor a composite score. The insignificant differences in CPI scores found between outstanding athletes, non-outstanding athletes, and non-athletes when groups were equated on Scholastic Aptitude Test scores, indicated that participation in varsity football may not develop more favorable characteristics of social interaction and social living than nonparticipation.

Merriman (66) used the CPI and the Phillips JCR Test to determine the relationship between motor ability and personality traits. The tests were administered to 808 high school boys. For purposes of comparison, the subjects were classified into the following groups: upper and lower motor ability groups; athletes and non-athletes matched according to motor ability scores; and participants in team sports, participants in team-individual sports. The upper motor ability group scored significantly higher ( $\alpha=.05$ ) than the lower motor ability group on the measures of poise, ascendancy, and self-assurance and on the measures of intellectual and interest modes. Few significant differences were found between mean CPI scores when the athletes and non-athletes were matched according to motor ability. Few significant differences ( $\alpha=.05$ ) were found between mean CPI scores for participants in

team sports, participants in individual sports and participants in team-individual sports. The results of this study perhaps indicate that motor ability is related to personality traits.

Keogh (59) attempted to differentiate more adequately between the terms motor ability and athletic participation in their relationship to some measurable aspects of personality. A group of 167 college junior and senior male students were classified both as to motor ability and participation in athletics and were administered the CPI. Utilizing a total test response derived from the sum of ranks of median scores, low and middle motor ability groups ranked higher in the main effects and within the nonathletic and intramural participation groups, but athletic participation did not appear to have any effect upon the measures studied. The pattern of results suggested an expectation hypothesis wherein higher ratings in the personality inventory might be achieved by groups of subjects who participated at a level which would be "expected" in relation to motor ability.

Schendel (75) also used the CPI when comparing the psychological characteristics of athletes and nonparticipants in athletics at three educational levels, i.e. junior high school (ninth grade), senior high school (twelfth grade) and college males (juniors and seniors). He found there were specific differences ( $\alpha=.05$ ) between the measures of the personal-social psychological

characteristics of athletes and nonparticipants at the ninth, twelfth and college levels. At the college level, athletes rated as substitutes generally possess psychological characteristics which are more like the characteristics of college nonparticipants in athletics than those of the athletes rated as regular players or outstanding athletes.

Slusher (79) compared selected high school athletes (junior and senior lettermen in baseball, basketball, football, swimming and wrestling) with non-athletes from the same population for differences in selected profile scales, as indicated by the Minnesota Multiphasic Personality Inventory (MMPI), and intelligence, as measured by the Lorge-Thorndike Intelligence Test (Level 10-12). A random sample of 100 non-athletes and 400 athletes (100 baseball players, 100 basketball players, 100 football players, 50 swimmers and 50 wrestlers) selected by stratified chance selection were administered the MMPI.

The baseball group was characterized by a relatively low neurotic profile. When compared with the nonathletic group, it was significantly higher on the Hs (hypochondriasis) and D (depression) scales. They attained the highest score for all the groups on the MA (hypomania). They were significantly lower than the non-athletic group on the Mf (femininity) scale and intelligence.

The basketball group was significantly higher than



the nonathletic group relative to the HS (hypochondriasis) and D (depression) scales. They were significantly lower than the nonathletic group on the Pd (psychopathic deviation), MF (femininity) and MA (hypomania) profiles, and were also significantly lower than the nonathletic group in intelligence. This group was the most deviate from both the nonathletic group and all other athletic groups.

The football group displayed a heightened profile relative to Hs (hypochondriasis), Hy (hysteria), Pd (psychopathic deviation) and Ma (hypomania). Compared with the normal group, they were significantly higher on the Hs (hypochondriasis) and Hy (hysteria) scales, although lower on Mf (femininity). They were also significantly lower than the nonathletic group in intelligence; however, they indicated a higher level of intelligence than any other athletic group.

According to Slusher (79) the swimming group had the lowest profile of all athletic groups. They were almost identical to the nonathletic group, except they were significantly lower on the Pd (psychopathic deviation) and Mf (femininity) profiles and were significantly lower in intelligence. They were the only athletic group not displaying a significant difference from the nonathletic group relative to Hs (hypochondriasis).

The wrestling group was characterized by great elevations in D (depression), Pd (psychopathic deviation) and Pt (psychasthenia). They were significantly higher

than the nonathletic groups relative to Hs (hypochondriasis) and Pt (psychasthenia). They were significantly lower than the nonathletic group in Mf (femininity) and intelligence.

It should be noted that the football and wrestling groups demonstrated the most similar profiles. They tended to display the most neurotic profile of all groups studied. Also, wrestlers had the lowest intelligence scores of all athletic groups studied while football players had the highest intelligence scores.

Thune (82) studied the personality of weightlifters. An inventory was administered to 100 Oakland YMCA male weightlifters and to 100 other YMCA male athletes (non-weightlifters) in an effort to determine group differences in attitudes and dispositions of personality. Thune's suggestive conclusions were that the weightlifting group felt more strongly than the controls that their health had improved, that basically they were shy, that they lacked self-confidence and that they did not obtain satisfaction through participating at a loss, in the more traditional physical activities. They want to be strong and dominant, emulating other strong men.

Bosco (88) used the 16 PF when he studied 84 champion male gymnasts. He found ( $\alpha=.05$ ) that they have a strong tendency toward brightness and intelligence, calmness and maturity, criticism and experimentation, and control and exactness.

Kroll and Carlson (61) studied 71 amateur karate participants with the 16 PF. Multiple discriminant analysis revealed no significant profile differences between the advanced (N=17), intermediate (N=25) or novice classifications (N=29).

Since original criterion groups were formed on a basis of belt classification and length of participation, a hierarchial grouping analysis of the 71 personality profiles were performed as a means of eliciting alternate classification criteria. None were suggested. It was concluded that on the basis of the 16 PF and the sample studied, no profile components or patterns were found which differentiated between (1) levels of karate participation and proficiency or (2) karate participants and the normal population.

Chipman (89) using the Gordon Personal Profile (GPP), found that with a sample of college males, the team sports participants were more sociable and ascendant than the individual sports participants. He also found that nonparticipants were more original in thinking than the team members and that the individual sport members were more original in thinking than team sports members.

Hunt's (55) study was designed to investigate the differences in four personality traits between Negro and Caucasian athletes and non-athletes utilizing the GPP. A total of 111 subjects was divided into four groups based upon their ethnic background and athletic ability. The

results produced seven significant differences at the .05 level: three between Caucasian athletes and Caucasian non-athletes; one between Negro varsity athletes and Negro non-athletes; and three between Caucasian varsity athletes and Negro non-athletes. These results suggested that Caucasian varsity athletes were significantly different and ranked higher in ascendancy, responsibility and emotional stability traits when compared to Negro and Caucasian non-athletes. Negro varsity athletes were significantly different and ranked higher in responsibility when compared to Negro non-athletes. No significant differences occurred when Caucasian varsity athletes and Negro varsity athletes were compared or when Negro non-athletes and Caucasian non-athletes were compared. Hunt concluded that athletes, regardless of ethnic background, tend to have different select personality traits when compared to non-athletes. When the investigator controlled the ethnic background variable, there were significant differences in selected personality traits between Caucasian varsity athletes and Negro and Caucasian non-athletes; and between Negro varsity athletes and Negro non-athletes. Caucasian varsity athletes and Negro varsity athletes tended to have similar selected personality traits as did Negro and Caucasian non-athletes.

The purpose of LaPlace's study (64) was to determine whether specific personality traits are associated with success in professional baseball. To determine this,

a "success" group of 49 major league players was compared to a "non-success" group of 64 minor league players. The MMPI and a biographical data sheet were employed. He concluded that major league players were better able than minor league players to: (1) apply their strong "drive" towards a definite objective by exercising self-discipline; (2) adjust to occupations, as professional baseball, requiring social contact, or the ability to get along well with other people; and (3) exercise initiative.

Singer (78) used the Edwards Personal Preference Schedule (EPPS) to test baseball and tennis players at the collegiate level before the season began. Using multiple discriminant function analysis, no significant differences in personality profiles were observed between the tennis and baseball groups, or between the highest 20 and lowest 20 ranked baseball players. When making between and within group comparisons with normative data on each of 15 personality traits, a few traits, such as achievement, intra-ception and dominance, emerged as significant.

Booth (43) used the MMPI to compare the personality ratings of the following college students: (1) freshman and upper-class athletes and non-athletes; (2) freshman and varsity athletes who participated in only team, individual, or team and individual sports; and (3) athletes who were rated as poor or good competitors. He found that varsity athletes and upperclass non-athletes significantly differed ( $\alpha=.05$ ) from the freshman athletes and

non-athletes on the dominance variable. Freshman athletes, freshmen non-athletes and upperclass non-athletes scored significantly higher than the varsity athletes on the anxiety variable. On the social responsibility variable, the upperclass non-athletes and upperclass non-athletes scored significantly higher than the freshmen athletes and non-athletes and the varsity athletes.

Varsity athletes who participated in only individual sports scored significantly higher on the depression variable than those who participated only in team sports. On the psychasthenia variable, the participants in varsity individual sports scored significantly higher than the athletes who participated in both team and individual varsity sports.

Lakie (63) combined selected scales from the Omnibus Personality Inventory and the Attitude Inventory to compare the personality traits of 230 athletes from a state university, a private university and two state colleges. Utilizing ANOVA, he found no significant difference ( $\alpha=.05$ ) on any of the five scales for total sports groups. For total school groups he found a significant difference on the social maturity scale, with the athletes at the private university scoring higher than athletes at each of the other three schools. For sports groups within their own schools the following results were found: (a) at the private university, the football players had a lower mean score on the social introversion

scale than did the track men, (b) at the state university, the tennis-golf group had a higher mean social maturity score than any other group and (c) at the state colleges, both the basketball players and wrestlers had a higher mean liberalism score than the tennis-golf group. Differences between similar groups at different schools were as follows: (a) the football players at the private university had a lower mean score on the social introversion scale than football players at the state colleges, and (b) the tennis-golf group at the state university had a higher mean social maturity score than the tennis-golf group in the state colleges. One may conclude that the differentiating characteristics of specific groups may be the result of the manner in which the program is conducted, the emphasis placed upon the program, or the individuals in charge of the program.

Utilizing West Point athletes, Werner and Gottheil (86) assessed the changes in personality using the 16 PF. A comparison of change was made between 116 cadets with no high school athletic experience and 340 cadets with experience. They concluded that the pattern of personality structure changed little over the four-year period. The differences which originally existed generally remained after the fourth year. The assertion that college athletics produces changes in personality was not supported. Further research is warranted with different tests, different groups and at lower age levels.

Their conclusions were in direct conflict with conclusions made by other investigators. For example, Warburton and Kane (37:70) stated "that there is a relationship in change in personality through participation in athletics."

To conclude this area of personality and other sports, it was quite clear to this investigator that conflicting reports, investigations and studies have been conducted by researchers around the world. Some of the more recent studies have been more meaningful because of the improvement in research techniques, testing instruments and the greater sophistication of those conducting these investigations. However, glaring errors have been noted in studies done by some of the leading sports psychologists. It also should be noted that this review was not intended to be critical of those studies that have been made previously but only to enlighten the reader to what has been done previously.

#### Personality and Swimmers

Arthur (40:185) stated that

competitive swimming has become one of the giants of amateur athletics. The increase in the number of swimming pools, the expanding age group program, and the fantastic achievements of the Olympic swimmers have transformed competitive swimming from a relatively parochial sport concentrated in a few centers to a worldwide favorite.

Behrman (41) in 1962 studied 204 entering male freshmen (102 swimmers and 102 non-swimmers) at the City



College of New York. The investigation was made to determine whether there were personality differences between those who could not swim and those who could and to determine the relationship between personality traits and swimming progress among non-swimmers experiencing a common course of instruction. The subjects were compared on the basis of swimming performance, personality tests, biographical data forms and interviews with subjects who failed to learn how to swim. Comparisons revealed significant differences between swimmers and non-swimmers and learners and non-learners.

Behrman used the Guilford-Zimmerman Temperament Survey (GZTS) as his personality instrument. He found that on the restraint scale (R), non-swimmers by reason of their restrained temperament, might have been overcautious and lacked the necessary impulsiveness generally demanded in learning to swim. On the ascendant scale (A), the greater the degree of swimming competence, the more ascendant and socially bold the individual. On the sociability scale (S), non-swimmers were more shy and seclusive than swimmers who were more sociable and outgoing. On the emotional stability scale (E), no significant differences existed between swimmers and non-swimmers. However, significant differences did not exist between learners and non-learners. On the objectivity scale (O), significant differences were revealed in learners and non-learners. Non-learners seem to be hypersensitive and self-centered. On the friendliness

scale (F), it is important to note that there were two aspects to a low score of the scale. Such a score indicates that (1) energy and aggressiveness is represented by a fighting spirit, and (2) hostility is represented by anti-social reactions.

The low raw scores of higher athletic groups may be (1) in conformity with considerable research in the area of personality and athletic ability which revealed, for example, in the athlete a greater incidence of aggressiveness, dominance, and fighting spirit or (2) may indicate hostility, resentment or contempt for others. It must be noted that Behrman used stratified groups and a convenient sample of volunteers.

Whiting and Stenbridge (87) studied the personality of persistent non-swimmers. Non-swimmers attending any course of instruction can be divided into categories: those who, after having received previous instruction, were still unable to swim (category 1) and those who have never received previous instruction (category 2). Analysis of the scores on Maudsley Personality Inventories (M.P.I.) given to university male non-swimmers indicated that students in category 1 had a lower extroversion mean than those in category 2 but results were only significant at the 10 percent level. No significant differences were found in neuroticism scores.

Junior M.P.I.'s were given to all 11- and 12-year old boys in a variety of secondary schools in order to

obtain norms for those particular schools. A comparison of the extraversion means for swimmers and persistent non-swimmers at each of these age levels in the combined results of all the schools indicated highly significant differences ( $\alpha=.01$ ), the non-swimmers being more introverted. Highly significant differences in neuroticism means were found at the age 11 level, and significant differences were found at the age 12 level, the non-swimmers being more neurotic.

Hendry (53) studied the personality traits of 126 swimmers and 56 coaches using the 16 PF. Objective measures and subjective ratings of the personality of coaches and their own swimmers by cross-assessment was carried out and coaches additionally gave a self-rating. The mean scores of objective and subjective ratings were compared. A series of projection pictures of the father-figure was shown and coaches and swimmers answered questions on these. Responses were compared with adult and school-children control groups. Results indicated some similarity between subjective and objective ratings.

Hendry and Whiting (54) studied social and psychological trends in national championship calibre junior swimmers. While supporting Kane's conclusions regarding factors of competitive aggression, introversion and anxiety, they reported the wide range of personality profiles which exist in top-notch swimmers. Rushall (74) agreed with the wide variety of personalities but

accepted Heusner's (90) findings on the "great champions" profile evidencing cultural differences.

Using the 16 PF, Ogilvie (69,70,71) compared female college swimmers to male Olympic swimmers and found no significant differences between the two groups. He concluded that the competitive swimmer has a specific personality, irrespective of sex. Further, he tested Santa Clara Swim Club members of both sexes with an average age of 14 years with the Junior-Senior High School Personality Questionnaire (HSPQ), and concluded that the sex of the swimmers was differentiated by only a few personality factors and that generally the swimmers were similar in their personality profiles.

The 1964 United States male swimmers, studied by Ogilvie, Tutko and Young (25), were divided into gold medalists and non-medalists in order to establish the highest possible criterion for excellence in swimming. The study indicated that the medalists tended to separate themselves by the personality traits, emotional stability, and self-control. Based upon second-order factors, the medalists tended to be lower in anxiety, lower in neuroticism, more independent, and slightly better able to handle emotional stress.

Ogilvie, Tutko and Young (25) found that the most significant shift with age occurred for the personality trait, sober-serious (F-) versus happy-go-lucky surgency (F+) as indicated by the 16 PF. In that this trait

correlates most significantly with the personality trait extraversion (A+) versus introversion (A-) one is forced to respect the possible contribution of this personality trait to continued competition. The individuals studied moved toward increased emotional stability with increased age. These data, as cited by Ogilvie, Tutko and Young (25), support the generalization that increased control of anxiety, self-assertiveness, tough-mindedness, and extraversion all increase with age. Rushall (73) studied Indiana age group swimmers and found that these aforementioned characteristics did exist to some degree.

Newman (68) in his study of faster and slower high school swimmers, concluded that three significant rank-difference correlations were found, indicating a tendency for rank of swimming performance to correspond with rank of personality variable. The dominance trait was positively correlated with 100 yard freestyle ranking. Negative correlations were found with the sociable trait and 100 yard breaststroke and with the reflective trait and 200 yard freestyle.

In conclusion, it would seem that the personality profile of swimmers would be that they are more extraverted, more intelligent, more emotionally stable, more dominant, more happy-go-lucky, lower in anxiety and slightly better able to handle emotional stress.

### Summary

The literature was reviewed with respect to the relationship between personality and athletic ability, personality and other sports, and personality and swimmers. Those studies were included in which different personality measurement instruments were used. Therefore, it was sometimes difficult to make comparisons because of the many and varied studies.

It can be stated however, with some degree of certitude, that the athletes who retain their motivation for competition will have most of the following personality traits: ambition, organization, deference, dominance, endurance and aggression. Except in distance runners, weight-lifters, and possibly golfers, there will be fewer introverted types by adult level competition. Emotional maturity ranged from average to high-average and was complemented by self-control, self-confidence, tough-mindedness, trustfulness, intelligence, high-conscience development, and low levels of tension (69).

Support was available for varying relationships between personality, physical performance and athletic participation. Personality variables are said to differentiate between levels of physical performance, between individuals with varying histories of participation and to depict superior performers. Since swimming is an athletic activity, these postulated relationships should be observable in its participants.

## Chapter 3

### METHODS AND PROCEDURES

#### Introduction

This chapter is divided into the following areas: (1) selection of subjects; (2) source of data; (3) characteristics of the test instrument; (4) method of collecting and organizing data for treatment; (5) level of significance selected; (6) organization of sample; (7) scoring of data; (8) statistical procedures employed; and (9) summary.

#### Selection of Subjects

The subjects (N=27) were selected from male intercollegiate swimmers enrolled at Indiana University, Bloomington, Indiana and Ithaca College, Ithaca, New York. Fifteen swimmers from Indiana University and twelve from Ithaca College, ranging in age from 18 to 21, were tested using the 1962 edition of the Cattell Sixteen Personality Factor Questionnaire (16 PF).

Indiana University swimmers were selected for this study for one important reason. There was general agreement among college coaches around the country that the 1971 Indiana University swimming team, winners of the National Collegiate Athletic Association (N.C.A.A.) University

Division Championship, was outstanding. Four swimmers, at one time in their careers, either held or shared six world records and seventeen American records.

Ithaca College swimmers were selected for this study for the following reasons: (1) general agreement among area coaches that Ithaca College swimmers would offer a suitable difference in swimming ability from those swimmers at Indiana University and (2) the investigator's knowledge that only one member of the 1970-71 Ithaca College swimming team had bettered the national time standards previously established.

#### Source of Data

The investigator utilized the Cattell Sixteen Personality Factor Questionnaire (16 PF) because it had been used extensively in the investigation of personality traits of athletes. A particularly valuable development of the 16 PF has been its translation and standardization in several countries (5).

#### Characteristics of the Test Instrument

The 16 PF was a questionnaire devised in 1957 by Raymond B. Cattell yielding 16 first-order and 8 second-order factors. The factors result from numerous factor analyses of the items, and the test offers a comprehensive description of personality. It was developed for the primary purpose of studying personality traits of "normal" individuals (5).



The factor analytic work of Cattell approximates closely the inductive procedure. He attempted to obtain comprehensive behavioral information so that his results would reflect upon the question of the concrete peripheral characteristics it is most fruitful to postulate. Cattell began by assembling all personality variable names occurring in the dictionary or in the psychological literature. This list was first reduced to 171 variable names by combining obvious synonyms. Then a sample of 100 adults from many walks of life was selected. Associates of these people, who knew them well, were asked to rate them on these 171 variables. Intercorrelations and factor analyses of these ratings were followed by further ratings of 208 men on a shortened list of variables. Factor analyses of these latter ratings led to the identification of what Cattell described as "the primary source traits of personality." Cattell and his associates then set out to build a personality test that would give evidence of these source traits. The end result was the 16 PF, which is made up of many items concerning life activities that the respondent must indicate that he likes or dislikes (21).

The 16 PF (Form A) consists of 187 items, with from 10 to 13 items comprising each scale, that Cattell states "insure the coverage of personality by the 16 functionally independent and psychologically meaningful dimensions" (5). It was planned for the ages of 17 through the mature adult. The test purports to give the most informa-

tion in the shortest amount of time about most personality traits identifiable at this time. The questionnaire is applicable to any individual who can read the questions and respond without pondering or hesitation. There are two forms (A and B). The investigator chose form A because of its availability.

The validity of the 16 PF includes construct (or concept) validity, i.e., the extent to which the test measures the traits it is supposed to measure. The concept validities of the sixteen factor scales can be calculated from the known factor loadings and/or from the split-half reliability of the factor, assuming that the items have no "specifics" in common but only the common-factor (5). Individuals familiar with recent trends in personality and ability measurement realize that the final validity of the total battery is more important than the particular reliability coefficients of the parts.

The items in these final forms are the survivors from several thousands of items originally tried, and constitute only those which continue to have significant validity against the factors after three successive factor analyses on different samples. These analyses have both verified the existence and natural structure of the sixteen factors, and cross-validated the test items in their correlation with the factors and different adult population samples. Cattell reported the following reliability and validity coefficients: mean dependability coefficient

(test-retest after 6 days) was  $+0.76$ ; mean trait stability coefficient (test-retest after two months) was  $+0.78$ ; and mean direct validity coefficient was  $+0.68$ . The mean correlation of all single items with the factors they represent was  $+0.37$  and, a mean intercorrelation of the items of  $+0.10$ , the mean correlation of each group of items with the factor it represents, i.e., the concept validity was  $+0.85$ , which is an acceptable performance for so brief a test (5).

#### Method of Collecting and Organizing Data for Treatment

The 16 PF (Form A) was administered to the Indiana University swimmers ( $N=15$ ) by Dr. James E. Counsilman and returned to the investigator. The investigator administered the 16 PF (Form A) to the Ithaca College swimmers ( $N=12$ ).

#### Level of Significance

The  $.05$  level of significance was selected for this study as the area of rejection for all hypotheses. In reporting the findings of the study, it would have been more serious to commit a Type I error (rejecting a hypothesis of no change when in fact there was no real change, but a change due to chance) than it would be to commit a Type II error (accepting a hypothesis of no change when in fact there has been a change). If the data were significant at the  $.05$  level, it can be assumed by the investigator that the results would be predictable 95 times

out of 100.

### Organization of Sample

The sample was selected because of the dichotomy that was present in their known swimming performances. Utilizing 1971 National Collegiate Athletic Association (N.C.A.A.) time standards, the investigator made comparisons and then divided the sample into two categories for further comparisons: (1) swimmers that were classified outstanding, and (2) swimmers that were classified less outstanding.

### Scoring of Data

The 16 PF was administered to each of the 27 subjects (16 outstanding swimmers and 11 less outstanding swimmers). The answer sheets were scored manually and the raw scores converted to standardized scores (sten scores) for each of the sixteen personality factors.

A sten score is a score utilized to indicate the degree and direction of relationship of a score to other scores. A sten score of either five or six was considered normal. A sten score of one to four indicated that a person tended to exhibit the personality characteristics described as the low score description. A sten score of seven to ten indicated that a person tended to exhibit the personality characteristics described as the high score description.

The raw scores obtained from the 16 PF were used

to compute all of the statistical analyses except when plotting the different personality profiles. When plotting the profiles it was necessary to convert the raw scores to sten scores as established by Cattell (6). Raw scores are preferred when computing statistical significance because if sten scores are used, the individual identity of the scores are lost.

### Statistical Procedures

The tally statistics program results in the computation of the mean, median, standard deviation and the range. No assumptions had to be met for this program. The mean raw scores for the total sample of swimmers for the 16 primary personality factors were recorded. The mean raw scores for the males of similar age in the normal population for the 16 primary personality factors were derived by Cattell (6:13).

To test hypothesis one, that male intercollegiate swimmers were not significantly different in personality traits from males of similar age in the normal population, a computer t-test program for differences between sample means and population means was utilized. The mean raw scores for the total sample of swimmers were compared to the mean raw scores for males of similar age in the normal population. The RCA Spectra 70/35 Computer was utilized. All results were tabled for visual comparison (Table I).

To test hypothesis two, that outstanding male

intercollegiate swimmers were not significantly different from less outstanding male intercollegiate swimmers, the subjects were divided into two groups--outstanding swimmers (N=16) and less outstanding swimmers (N=11). A tally statistics program, computed independently for each criterion group, revealed the mean raw scores. The raw scores of the 16 personality factors were subjected to a computer program for a t-test for two independent samples. The RCA Spectra 70/35 Computer was utilized. All results were tabled for visual comparison (Table II).

To test hypotheses three and four, that outstanding male intercollegiate swimmers were not significantly different from males of similar age in the normal population, and that less outstanding male intercollegiate swimmers were not significantly different from males of similar age in the normal population, a computer t-test program for differences between sample means and population means was utilized. The mean raw scores for outstanding male intercollegiate swimmers were compared to the mean raw scores for males of similar age in the normal population. The mean raw scores for less outstanding male intercollegiate swimmers were compared to the mean raw scores for males of similar age in the normal population. The RCA Spectra 70/35 Computer was utilized. All results were tabled for visual comparison (Tables III and IV).

Summary

In this chapter, the investigator explained the selection of subjects utilized, the source of data, characteristics of the test instrument, method of collecting and organizing data for treatment, level of significance selected, organization of sample, scoring of data and the statistical procedures used to analyze the data.

## Chapter 4

### ANALYSIS OF DATA

#### Introduction

This chapter is divided into the following sections: (1) analysis of data: total sample of swimmers versus the normal population; (2) outstanding swimmers versus less outstanding swimmers; (3) outstanding swimmers versus normal population; (4) less outstanding swimmers versus the normal population on the primary factors; and (5) summary.

#### Analysis of Data: Swimmers Versus Norm (Table I, Figure I)

The personality traits of male intercollegiate swimmers were compared to the national norm established for Cattell's Sixteen Personality Factor Questionnaire (16 PF). The swimmers differed from the national norm on four of the sixteen primary personality factors (Table I). The investigator found that the swimmers tended to be more reserved, detached, critical and aloof (Factor A-); more intelligent, abstract-thinking and bright (Factor B+); more assertive, independent, aggressive, stubborn, and competitive (Factor E+); and more forthright, natural, artless and unpretentious (Factor N-) than the national norm (Table I, Figure 1).



Table I

Mean Raw Scores, Standard Deviations, t-Test  
Values of Swimmers Versus the  
Norm for the Primary Factor

Factor	Swimmers		Norm		t
	Mean	S.D.	Mean	S.D.	
A	8.52	2.79	9.80	3.43	2.38 <sup>a</sup>
B	8.93	2.15	7.72	1.80	2.92 <sup>b</sup>
C	16.56	3.60	15.50	3.69	1.52
E	15.63	3.98	13.94	3.92	2.20 <sup>a</sup>
F	16.00	4.45	15.73	4.40	.31
G	12.19	4.42	12.73	3.60	.64
H	12.74	5.22	13.01	5.24	.27
I	8.81	3.45	8.79	3.49	.04
L	8.41	3.68	9.47	3.13	1.50
M	11.78	3.82	11.68	3.41	.13
N	9.78	3.15	11.07	2.63	2.13 <sup>a</sup>
O	9.22	3.63	10.65	3.90	2.04

Table I (Continued)

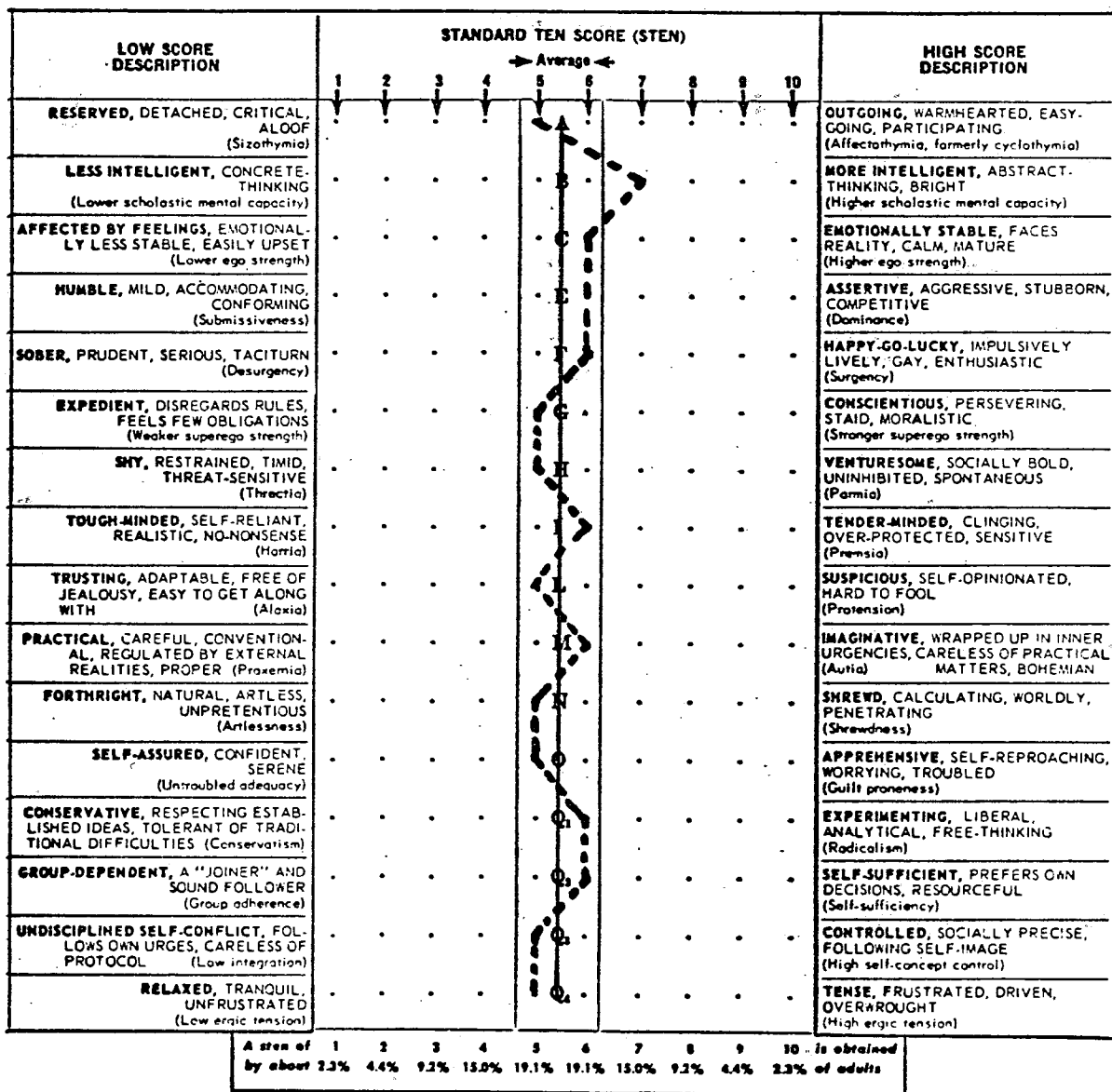
Factor	Swimmers		Norm		t
	Mean	S.D.	Mean	S.D.	
Q <sub>1</sub>	10.04	2.99	9.64	2.75	.69
Q <sub>2</sub>	10.93	3.71	9.97	3.50	1.34
Q <sub>3</sub>	8.93	3.21	10.14	3.07	1.97
Q <sub>4</sub>	11.48	4.17	12.01	4.81	.66

a<sub>t</sub> (.05) at df 26 = 2.056

b<sub>t</sub> (.01) at df 26 = 2.779

Figure 1

16 PF Test Profile for Primary Factors for Swimmers Versus Males of Similar Age in the Normal Population



Swimmers-----

Normal Population\_\_\_\_\_

Adapted from Cattell's Sixteen Personality Factor Questionnaire Profile

Outstanding Swimmers Versus Less Outstanding Swimmers  
(Table II, Figure 2)

The personality traits of outstanding male intercollegiate swimmers were compared to less outstanding male intercollegiate swimmers. The investigator found no significant differences on the 16 primary factors as measured by the 16 PF (Table II).

Outstanding Swimmers Versus Norm (Table III, Figure 3)

The personality traits of outstanding male intercollegiate swimmers were compared to the national norm established for Cattell's Sixteen Personality Factor Questionnaire (16 PF). The outstanding swimmers differed from the national norm on four of the sixteen primary personality factors (Table III). The investigator found that the outstanding swimmers tended to be more reserved, detached, critical and aloof (Factor A-); more intelligent, abstract-thinking and bright (Factor B+); more forthright, natural, artless and unpretentious (Factor N-); and more undisciplined self-conflict, follows own urges and careless of protocol (Factor Q<sub>3</sub>-) than the national norm (Table III, Figure 3).

Less Outstanding Swimmers Versus Norm (Table IV, Figure 4)

The personality traits of less outstanding male intercollegiate swimmers were compared to the national norm established for Cattell's Sixteen Personality Factor Questionnaire. The less outstanding swimmers differed from

Table II

Mean Raw Scores, Standard Deviations, t-Test  
Values of Outstanding Swimmers Versus Less  
Outstanding Swimmers for the Primary Factors

Factor	Outstanding Swimmers		Less Outstanding Swimmers		t
	Mean	S.D.	Mean	S.D.	
A	8.19	2.86	9.00	2.76	.74
B	9.19	2.32	8.55	1.92	.76
C	16.63	3.26	16.45	4.20	.12
E	14.75	4.54	16.91	2.70	1.41
F	15.00	4.23	17.45	4.57	1.44
G	11.50	4.91	13.18	3.57	.97
H	12.13	5.48	13.64	4.92	.73
I	8.75	3.86	8.91	2.95	.12
L	8.00	3.78	9.00	3.63	.69
M	12.19	4.28	11.18	3.12	.67
N	9.13	3.22	10.73	2.94	1.32
O	9.00	3.50	9.55	3.96	.38

Table II (Continued)

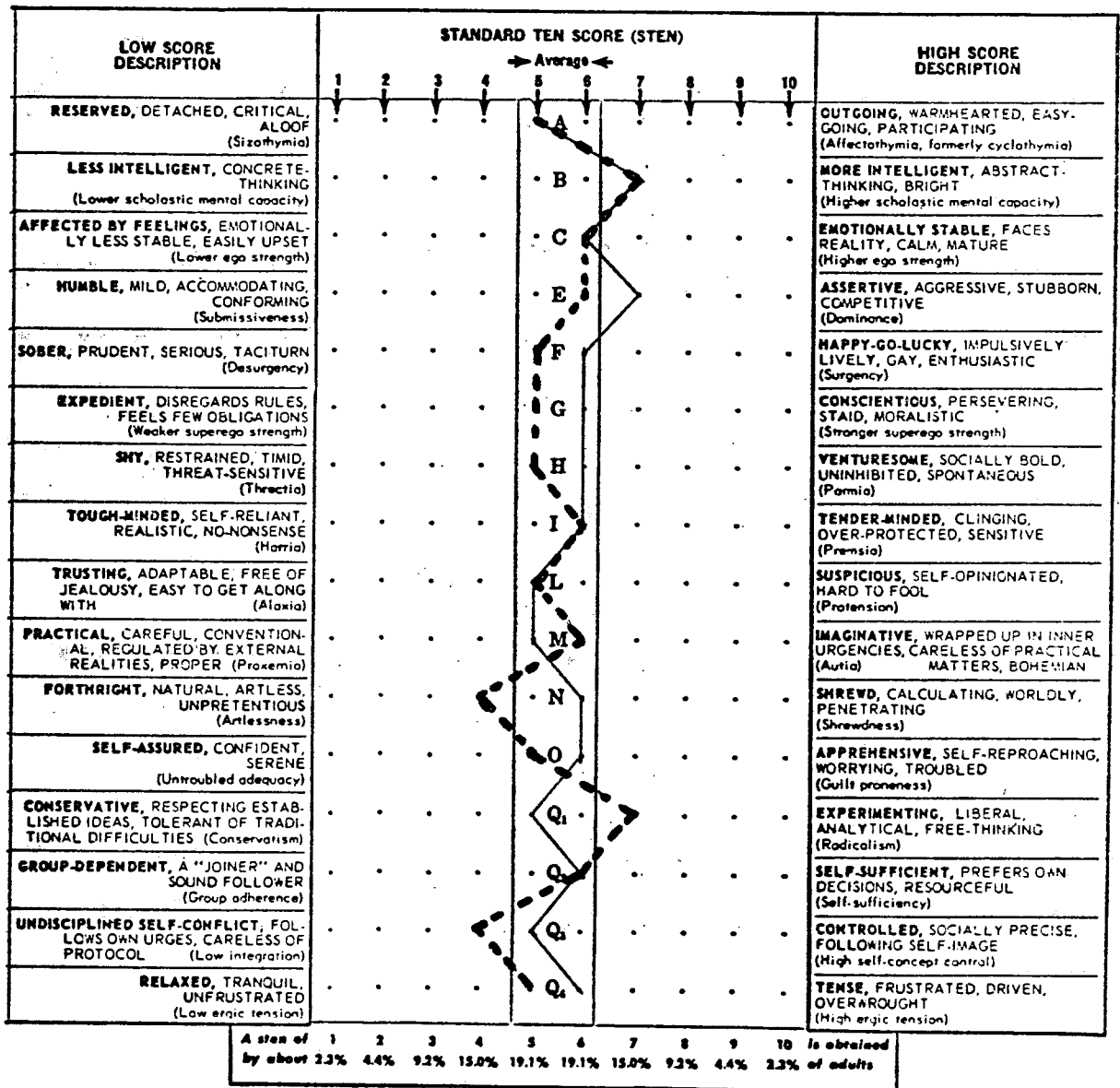
Factor	Outstanding Swimmers		Less Outstanding Swimmers		t
	Mean	S.D.	Mean	S.D.	
Q <sub>1</sub>	10.63	3.28	9.18	2.40	1.24
Q <sub>2</sub>	11.25	4.01	10.45	3.36	.54
Q <sub>3</sub>	8.25	3.04	9.91	3.33	1.34
Q <sub>4</sub>	10.56	4.19	12.82	3.95	1.41

$a_t$  (.05) at df 25 = 2.060

$b_t$  (.01) at df 25 = 2.787

Figure 2

16 PF Test Profile for Primary Factors for Outstanding Swimmers Versus Less Outstanding Swimmers



Outstanding Swimmers-----

Less Outstanding Swimmers\_\_\_\_\_

Adapted from Cattell's Sixteen Personality Factor Questionnaire Profile

Table III

Mean Raw Scores, Standard Deviations, t-Test  
Values of Outstanding Swimmers Versus the  
Norm for the Primary Factors

Factor	Outstanding Swimmers		Norm		t
	Mean	S.D.	Mean	S.D.	
A	8.19	2.86	9.80	3.43	2.26 <sup>a</sup>
B	9.19	2.32	7.72	1.80	2.53 <sup>a</sup>
C	16.63	3.26	15.50	3.69	1.38
E	14.75	4.54	13.94	3.92	.71
F	15.00	4.23	15.73	4.40	.69
G	11.50	4.91	12.73	3.60	1.00
H	12.13	5.48	13.01	5.24	.65
I	8.75	3.86	8.79	3.49	.04
L	8.00	3.78	9.47	3.13	1.56
M	12.19	4.28	11.68	3.41	.47
N	9.13	3.22	11.07	2.63	2.41 <sup>a</sup>
O	9.00	3.50	10.65	3.90	1.88



Table III (Continued)

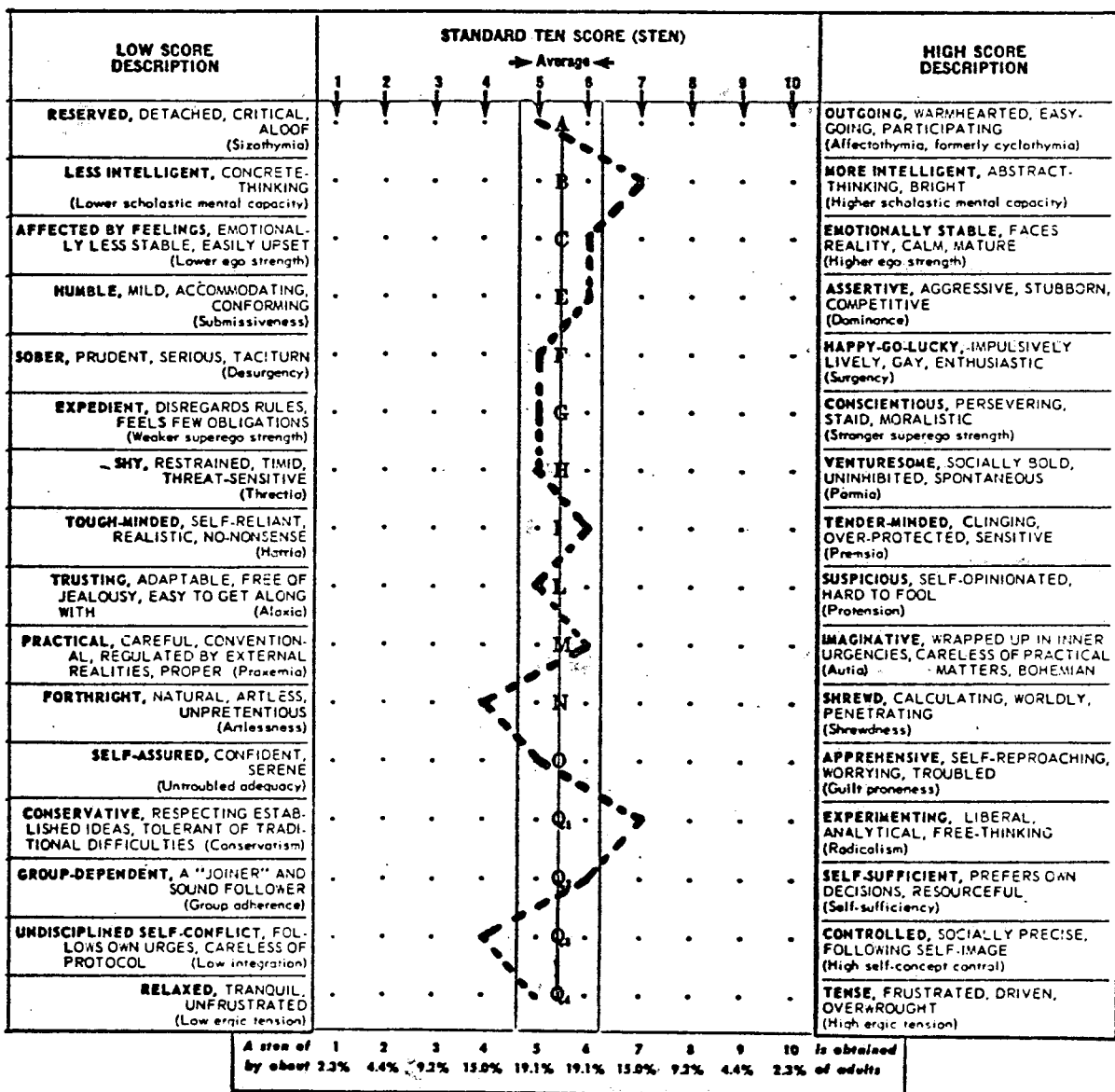
Factor	Outstanding Swimmers		Norm		t
	Mean	S.D.	Mean	S.D.	
Q <sub>1</sub>	10.63	3.28	9.64	2.75	1.20
Q <sub>2</sub>	11.25	4.01	9.97	3.50	1.28
Q <sub>3</sub>	8.25	3.04	10.14	3.07	2.48 <sup>a</sup>
Q <sub>4</sub>	10.56	4.19	12.01	4.81	1.38

a<sub>t</sub> (.05) at df 15 = 2.131

b<sub>t</sub> (.01) at df 15 = 2.947

Figure 3

16 PF Test Profile for Primary Factors for Outstanding Swimmers Versus Males of Similar Age in the Normal Population



Outstanding Swimmers-----

Normal Population\_\_\_\_\_

Adapted from Cattell's Sixteen Personality Factor Questionnaire Profile

Table IV

Mean Raw Scores, Standard Deviations, t-Test  
Values of Less Outstanding Swimmers Versus the  
Norm for the Primary Factors

Factor	Less Outstanding Swimmers		Norm		t
	Mean	S.D.	Mean	S.D.	
A	9.00	2.76	9.80	3.43	.96
B	8.55	1.92	7.72	1.80	1.43
C	16.45	4.20	15.50	3.69	.75
E	16.91	2.70	13.94	3.92	3.65 <sup>b</sup>
F	17.45	4.57	15.73	4.40	1.25
G	13.18	3.57	12.73	3.60	.42
H	13.64	4.92	13.01	5.24	.42
I	8.91	2.95	8.79	3.49	.13
L	9.00	3.63	9.47	3.13	.43
M	11.18	3.12	11.68	3.41	.53
N	10.73	2.94	11.07	2.63	.39
O	9.55	3.96	10.65	3.90	.93

Table IV (Continued)

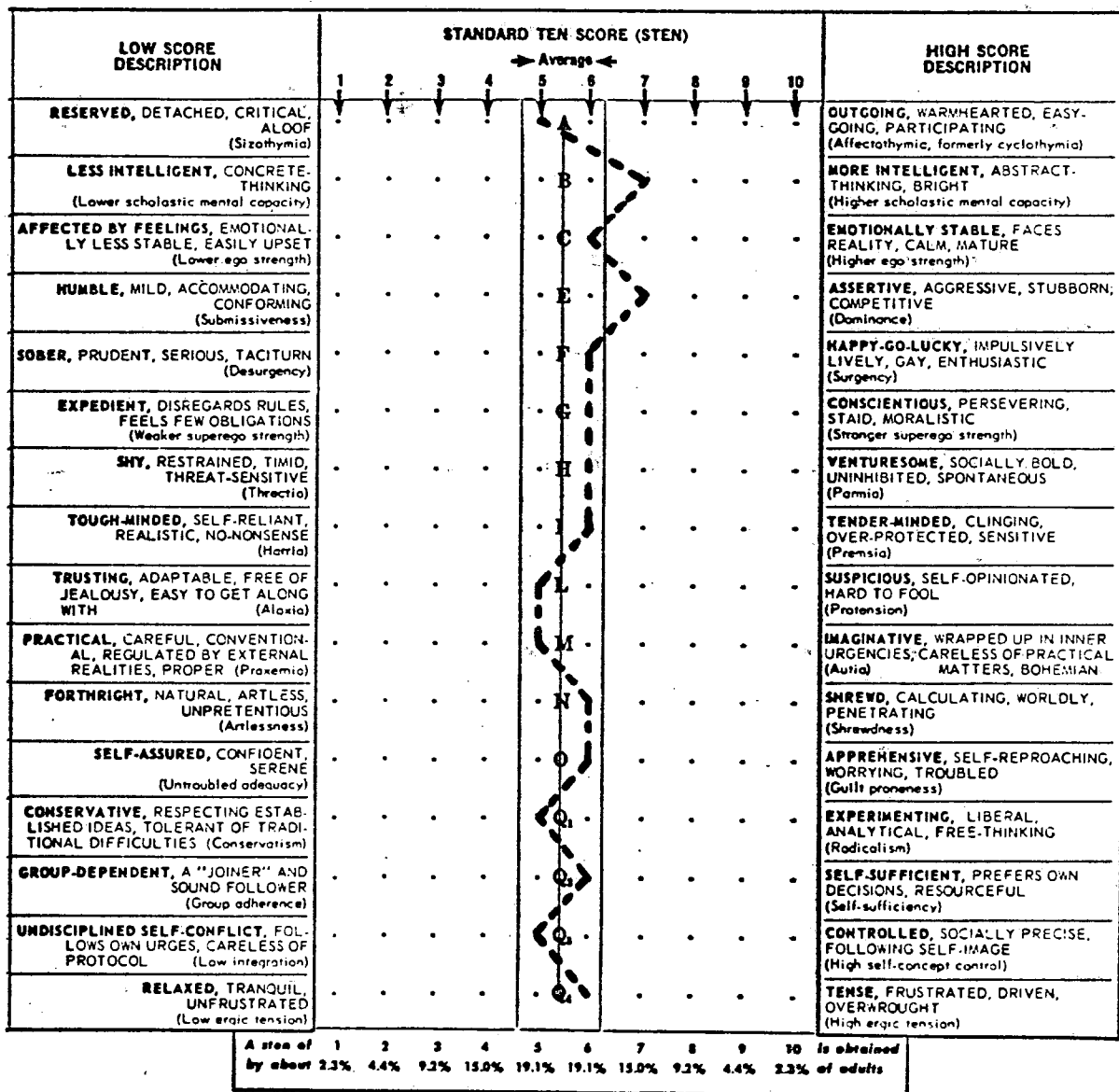
Factor	Less Outstanding Swimmers		Norm		t
	Mean	S.D.	Mean	S.D.	
Q <sub>1</sub>	9.18	2.40	9.64	2.75	.63
Q <sub>2</sub>	10.45	3.36	9.97	3.50	.48
Q <sub>3</sub>	9.91	3.33	10.14	3.07	.23
Q <sub>4</sub>	12.82	3.95	12.01	4.81	.68

$a_t$  (.05) at df 10 = 2.228

$b_t$  (.01) at df 10 = 3.169

Figure 4

16 PF Test Profile for Primary Factors for Less Outstanding Swimmers Versus Males of Similar Age in the Normal Population



Less Outstanding Swimmers-----

Normal Population\_\_\_\_\_

Adapted from Cattell's Sixteen Personality Factor Questionnaire Profile

the national norm on one of the 16 primary personality factors (Table IV). The investigator found that the less outstanding swimmers were more assertive, independent, aggressive, stubborn, and competitive (Factor E+) than the national norm (Table IV, Figure 4).

### Summary

In this chapter, the investigator explained the analyzed data with respect to the total sample of swimmers versus the normal population (Table I, Figure 1), outstanding swimmers versus less outstanding swimmers (Table II, Figure 2), outstanding swimmers versus the normal population (Table III, Figure 3), and less outstanding swimmers versus the normal population (Table IV, Figure 4).

## Chapter 5

### DISCUSSION OF FINDINGS

#### Introduction

This chapter is divided into the following areas:

- (1) discussion of the findings--male intercollegiate swimmers versus males of similar age in the normal population;
- (2) outstanding male intercollegiate swimmers versus less outstanding male intercollegiate swimmers;
- (3) outstanding male intercollegiate swimmers versus males of similar age in the normal population;
- (4) less outstanding male intercollegiate swimmers versus males of similar age in the normal population; and
- (5) summary.

#### Discussion of the Findings: Swimmers Versus Norm

Clearly there were four factors on which significant differences were revealed (A,B,E and N). Since there was greater support for hypothesis one, that male intercollegiate swimmers were not significantly different (12 factors out of 16) from males of similar age in the normal population, the null hypothesis was accepted. However, four differences did appear and discussion will focus on these differences.

The investigator found that male intercollegiate swimmers were significantly more reserved, detached,

critical and aloof (Factor A-); more intelligent, abstract-thinking and bright (Factor B+); more assertive, independent, aggressive, stubborn and competitive (Factor E+); and more forthright, natural, artless and unpretentious (Factor N-) than males of similar age in the normal population.

The findings of the study were in disagreement with some of the studies (23,42,43,46,67,70,72,73,75,79,90,92) reviewed in Chapter 2. All of the above studies comparing athletes to non-athletes found the athletes to be more extraverted. However, the fact that the male intercollegiate swimmers in this study were significantly more introverted (Factor A-) was unusual. Previous investigators (23,70,73,90) concluded that, in general, swimmers were more extraverted and socially confident than males of similar age in the normal population.

If one were to accept the assumption that personality does change slightly with age then it would be possible to accept Kane's results (17,18). Kane (18) expressed a particular interest in the relationship of higher athletic ability and extraversive tendencies. He reported that care must be taken with respect to generalizations about this trait because there was a tendency for team versus individual sport differences to appear. While extraversion correlated highly with competitive athletic success among British schoolboys, it was not apparent that extreme extraverts would proceed to the highest levels.



From observation of the "individual" athlete's overt behavior, the explanation seems to lie in the development of intense subjectivity and self-analysis that result from constant competitive crises. In the present study, since the outstanding male intercollegiate swimmers more heavily influenced the data than did less outstanding male intercollegiate swimmers with respect to Factor A when comparing the total sample of swimmers versus the norm, it was the belief of this investigator that swimming, being an individual sport, possibly accounted for the swimmers being significantly more introverted than the normal population. Kane (18) concluded that the relationship between introversion and extraversion has been shown to change with sport, age of competitors and level of competition. Agreement with this study can be found in Warburton and Kane's study (37). Although in general, extraversion relates to physical ability, many top "individual" athletes (track and field, swimming and tennis) are found not to be markedly extraverted and many world class performers are clearly introverts. Where individuals must, in the final analysis, go forward on their own to success, it may well be that introverts are temperamentally more suited than the extravert.

Male intercollegiate swimmers tended to be more intelligent, abstract-thinking and bright (Factor B+). Conflicting reports were available as to whether or not athletes were more intelligent than non-athletes (25,58,

69,88). Quite possibly the conflicting reports might be the result of the use of different test instruments and/or due to their administration under different conditions. However, a previous study (73) comparing swimmers with the normal population agreed with the findings of the present study. It might be noted that Cattell included Factor B (intelligence) as one of his 16 primary factors because he wanted to study the "complete" individual and although he did not feel that intelligence was a true factor of an individual's personality, he also felt that it should not be excluded. As far as he was concerned it added completeness to the profile.

The fact that male intercollegiate swimmers were significantly more assertive, independent, aggressive, stubborn and competitive (Factor E+) than males of similar age in the normal population, was not unusual. The studies reviewed, especially those of Rushall (73) and Schendel (75), closely paralleled the results of this present study in that athletes tended to reveal higher scores on Factor E (dominance). The swimmers were revealed to be dominant, "take charge" type of individuals, yet ones that did not actively seek the leadership role. It was the belief of this investigator that without a significant difference from the norm on Factor E, the swimmers perhaps would not be successful and would probably discontinue competition.

Kane (18) and Rushall (73) found significant

differences between different samples of swimmers on Factor F (surgency). The results of this study did not indicate significance on Factor F which was unusual. Kane (18) concluded that on the second-order complex, anxiety, male athletes were low. When, however, Factor C (ego strength) is low, as it sometimes is in young athletes who are not fully integrated emotionally, the anxiety rating is seriously affected. This may explain why significant difference was not found on Factor F (surgency) in this study whereas Kane (18) and Rushall (73) found significance.

Male intercollegiate swimmers were significantly more forthright, natural, artless, and unpretentious (Factor N-) than the males of similar age in the normal population. There seems to be no established theory to account for the significance on Factor N. It is possible that "survival" depends upon the development of this factor. If the individuals were not shrewd, there is the possibility that they would not desire to continue in the activity.

#### Outstanding Swimmers Versus Less Outstanding Swimmers

The null hypothesis was accepted for hypothesis two, that outstanding male intercollegiate swimmers were not significantly different from less outstanding male intercollegiate swimmers. Superior athletic performance is usually achieved by individuals with a background of

success which has elicited a generally high need for achievement with an accompanying high aspiration level. Athletes are constantly reviewing their performances, and are thus involved a considerable part of the time in setting challenging goals for themselves.

The superior athlete is usually motivated by both negative and positive social attitudes, the potential disapproval as well as the approval. The coach has the obligation of aiding the high-striving athlete to set goals the athlete is capable of obtaining, so that with frequent success, his level of aspiration remains high. Continual overmatching of an athlete against opponents or goals which are too high would seem to detract from this desirable personality trait.

It was the belief of this investigator that physical ability was more important to success in swimming than the personality of the individual. The possibility of selecting individuals on the basis of personality alone, as to whether they have the capacity for performance of a high degree, appears to be non-existent. Specific personality factors did not differentiate top performers in swimming. Further investigation would likely reveal that champion athletes possessed both high score descriptions and low score descriptions as described by Cattell's Sixteen Personality Factor Questionnaire (16 PF) profile. Some of these traits would be considered desirable and some would not. Likewise, athletes of lesser ability

could possess personality traits similar to champion athletes. These also would be considered desirable and undesirable.

Another topic of discussion was the ability of the athlete to exhibit a certain personality profile while on the field and yet be a different person off the field. Some individuals have the ability to "turn it on" while on the field and as soon as the competition is over, they "turn it off;" while other individuals appear the same at all times. It was the belief of this investigator that the true inner self is brought out while the athlete is competing.

#### Outstanding Swimmers Versus Norm

Since there was greater support for hypothesis three, that outstanding male intercollegiate swimmers were not significantly different (12 factors out of 16) from males of similar age in the normal population, the null hypothesis was accepted. However, four differences did appear and discussion will focus on these differences.

The study revealed that of the four significant factors (A,B,E and N) between male intercollegiate swimmers and males of similar age in the normal population, analyses revealed three repeated factors (A,B and E) when outstanding male intercollegiate swimmers were compared to males of similar age in the normal population. Factor E was significant between male intercollegiate swimmers and

males of similar age in the normal population and Factor  $Q_3$  was significant when comparing outstanding male intercollegiate swimmers and males of similar age in the normal population. This investigator concluded that the outstanding swimmers more heavily influenced the data on Factors A, B and N, than did the less outstanding male intercollegiate swimmers when they were compared to males of similar age in the normal population.

#### Less Outstanding Swimmers Versus Norm

The null hypothesis was accepted for hypothesis four, that less outstanding male intercollegiate swimmers were not significantly different from males of similar age in the normal population. Hypothesis four was accepted because significance was revealed on only one of the sixteen primary personality factors.

The less outstanding male intercollegiate swimmers were significantly more assertive, independent, aggressive, stubborn and competitive (Factor E+) than males of similar age in the normal population. Factor E was significant at the .01 level and it was also significant at the .05 level when comparing outstanding male intercollegiate swimmers to males of similar age in the normal population, thus the conclusion that the less outstanding male intercollegiate swimmers more heavily influenced that factor than did the outstanding male intercollegiate swimmers. It was the conclusion of this investigator that athletes,

irregardless of the level of proficiency, were significantly different on Factor E when compared to the normal population.

### Summary

In this chapter, the investigator discussed the findings of the study. The chapter was divided into the following areas: discussion of the findings--male intercollegiate swimmers versus males of similar age in the normal population; outstanding male intercollegiate swimmers versus less outstanding male intercollegiate swimmers; outstanding male intercollegiate swimmers versus males of similar age in the normal population; and less outstanding male intercollegiate swimmers versus males of similar age in the normal population.

When comparing outstanding male intercollegiate swimmers to males of similar age in the normal population, this study revealed that Factors A, B, E and N were significantly different ( $\alpha=.05$ ). Because 12 out of the 16 primary personality factors were not significantly different, hypothesis one was accepted.

Hypothesis two was accepted, that there were no significant differences between outstanding and less outstanding male intercollegiate swimmers, because no significant differences ( $\alpha=.05$ ) were found on any of the 16 primary personality factors. The conclusion was made that personality does not distinguish levels of swimming

proficiency.

When comparing outstanding male intercollegiate swimmers to males of similar age in the normal population, Factors A,B,E and Q<sub>3</sub> were significantly different. Factors A,B and E were the same factors that were significant when comparing male intercollegiate swimmers to males of similar age in the normal population. Because only four of the sixteen primary personality factors were significantly different, the null hypothesis was accepted.

Because only one primary personality factor, (Factor E), was significantly different ( $\alpha=.01$ ) when comparing less outstanding male intercollegiate swimmers to males of similar age in the normal population, hypothesis four was accepted. It was concluded that the significance of this factor greatly influenced the significance of the factor when comparing the total sample of swimmers to the norm. It also was summarized by this investigator that, perhaps, not all outstanding athletes rate high on surgency and that all swimmers were more assertive, independent, aggressive, stubborn and competitive.



## Chapter 6

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY

#### Introduction

This chapter is divided into the following areas: (1) summary; (2) conclusions; and (3) recommendations for further study.

#### Summary

Cattell's Sixteen Personality Factor Questionnaire (16 PF) was utilized to measure all of the personality factors for the subjects (N=27) for this study. From an analysis of the data, the investigator accepted hypothesis one, that the total sample of swimmers were not significantly different ( $\alpha=.05$ ) from males of similar age in the normal population. However, the swimmers differed from the normal population on four of the sixteen primary personality factors. The swimmers differed significantly from the national norm on Factor A (more reserved, detached, critical, aloof), Factor B (more intelligent, abstract-thinking, bright), Factor E (more assertive, independent, aggressive, stubborn, competitive), and Factor N (more forthright, natural, artless, unpretentious).

From an analysis of the data, the investigator accepted hypothesis two. The outstanding male

intercollegiate swimmers (N=16) did not differ significantly ( $\alpha=.05$ ) from the less outstanding male intercollegiate swimmers (N=11) on any of the 16 primary personality factors.

Although the investigator found four out of sixteen factors significantly different ( $\alpha=.05$ ) when comparing outstanding male intercollegiate swimmers to males of similar age in the normal population, he accepted hypothesis three. The outstanding male intercollegiate swimmers differed significantly from the national norm on Factor A (more reserved, detached, critical, aloof), Factor B (more intelligent, abstract-thinking, bright), Factor N (more forthright, natural, artless, unpretentious) and Factor  $Q_3$  (more undisciplined self-conflict, follows own urges, careless of protocol).

From an analysis of the data, the investigator accepted hypothesis four. The less outstanding male intercollegiate swimmers did not differ significantly ( $\alpha=.05$ ) from males of similar age in the normal population except on Factor E. The less outstanding swimmers were more assertive, independent, aggressive, stubborn and competitive than males of similar age in the normal population.

### Conclusions

Within the limits of this study, the following conclusions were made: personality did not distinguish

male intercollegiate swimmers from males of similar age in the normal population; personality does not distinguish levels of swimming proficiency; and personality did not distinguish outstanding male intercollegiate swimmers and less outstanding male intercollegiate swimmers from males of similar age in the normal population.

#### Recommendations for Further Study

Upon completion of this investigation, it is recommended that future studies should: use the 1967 edition of Cattell's Sixteen Personality Factor Questionnaire (16 PF) Form A and Form B in order to make comparisons with this and other studies; investigate the personality traits of swimmers prior to and after the competitive season as well as during the competitive season; investigate a larger number of subjects so that it would be possible to use multivariate analysis; investigate an equal number of outstanding and less outstanding swimmers; and administer the test instrument to all subjects at the same time and under identical conditions.

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APPENDICES

Appendix A

Form A 1962 Edition

Raw Scores - Outstanding Swimmers

Subjects	A	B	C	E	F	G	H	I	L	M	N	O	Q <sub>1</sub>	Q <sub>2</sub>	Q <sub>3</sub>	Q <sub>4</sub>
1	7	12	16	12	18	14	12	4	8	8	9	11	12	9	5	15
2	8	12	15	24	19	4	20	14	2	11	6	3	18	17	10	4
3	8	7	13	14	6	8	1	18	14	22	8	14	12	13	7	16
4	3	9	15	20	14	4	5	8	5	13	8	6	11	15	5	7
5	9	7	22	16	12	16	17	10	8	12	4	7	9	9	12	9
6	4	11	16	16	9	14	7	7	9	15	8	6	13	15	8	10
7	5	12	20	17	15	15	14	6	4	12	12	7	10	16	12	12
8	9	7	20	18	18	4	15	11	10	15	8	6	10	15	3	9
9	11	5	18	11	14	12	6	6	5	11	6	11	12	8	6	7
10	9	9	14	20	16	4	6	5	14	20	7	10	14	10	4	16
11	14	11	12	15	22	13	19	6	4	7	8	14	6	7	9	9
12	10	11	13	12	18	13	15	9	10	13	11	11	8	5	9	17
13	11	6	16	11	10	16	14	5	11	10	13	15	8	14	8	10
14	9	11	21	15	13	17	15	7	3	6	16	6	12	12	13	3
15	5	9	21	8	18	15	15	13	11	10	8	7	11	11	10	12
16	9	8	14	7	18	15	13	11	10	10	14	10	4	4	11	13

Appendix B

Form A 1962 Edition

Sten Scores - Outstanding Swimmers

Subjects	A	B	C	E	F	G	H	I	L	M	N	O	Q <sub>1</sub>	Q <sub>2</sub>	Q <sub>3</sub>	Q <sub>4</sub>
1	4	10	6	5	7	6	5	3	5	3	4	6	7	5	2	7
2	5	10	5	10	7	1	8	8	1	5	2	1	10	9	5	2
3	5	5	4	6	2	3	1	10	8	10	3	8	7	7	4	7
4	1	7	5	9	5	1	3	5	3	6	3	3	7	8	2	3
5	5	5	9	6	4	7	7	6	5	6	1	4	5	5	7	4
6	2	9	6	6	3	6	3	5	5	7	3	3	8	8	4	5
7	3	7	8	7	5	7	6	4	2	6	6	4	6	9	7	5
8	5	5	8	7	7	1	6	7	6	7	3	3	6	8	1	4
9	6	2	7	4	5	5	3	4	3	5	2	6	7	5	3	3
10	5	7	5	9	6	1	3	3	8	10	2	6	9	6	2	7
11	8	9	4	6	9	6	8	4	2	3	3	8	3	4	5	4
12	6	9	4	5	7	6	6	6	6	6	6	6	4	3	5	7
13	6	4	6	4	3	7	6	3	6	5	7	8	4	8	4	5
14	5	9	8	6	4	8	6	5	1	2	9	3	7	7	7	1
15	3	7	8	2	7	7	6	8	6	5	3	4	7	6	5	5
16	5	6	5	2	7	7	5	7	6	5	8	6	2	2	6	6



Appendix C

Form A 1962 Edition

Raw Scores - Less Outstanding Swimmers

Subjects	A	B	C	E	F	G	H	I	L	M	N	O	Q <sub>1</sub>	Q <sub>2</sub>	Q <sub>3</sub>	Q <sub>4</sub>
1	5	11	11	23	20	11	16	6	15	13	10	14	4	11	8	18
2	10	7	12	14	10	12	9	6	12	12	13	15	10	16	6	14
3	9	7	20	14	19	14	5	5	4	5	16	9	7	10	13	13
4	9	10	14	19	20	8	13	10	10	9	10	9	11	8	5	12
5	7	7	16	16	12	8	10	12	10	14	12	12	10	12	8	12
6	4	6	14	18	20	18	16	10	10	14	10	12	8	8	13	16
7	10	9	19	19	19	13	16	9	6	13	9	9	9	13	14	13
8	12	8	23	15	21	16	16	10	3	8	4	1	10	3	12	4
9	11	7	22	16	10	18	22	7	10	14	11	6	11	12	14	15
10	13	11	18	15	23	16	18	8	12	8	11	7	13	10	8	8
11	9	11	12	17	18	11	9	15	7	13	12	11	8	12	8	16

Appendix D

Form A 1962 Edition

Sten Scores - Less Outstanding Swimmers

Subjects	A	B	C	E	F	G	H	I	L	M	N	O	Q <sub>1</sub>	Q <sub>2</sub>	Q <sub>3</sub>	Q <sub>4</sub>
1	3	9	3	10	8	4	6	4	9	6	5	8	1	6	4	8
2	6	5	4	6	3	5	4	4	7	6	7	8	6	9	3	6
3	5	5	8	6	7	6	3	3	2	1	9	5	4	6	7	6
4	5	8	5	8	8	3	5	6	6	4	5	5	7	5	2	5
5	4	5	6	6	4	3	4	7	6	7	6	7	6	7	4	5
6	2	4	5	7	8	9	6	6	6	7	5	7	4	5	7	7
7	6	7	7	8	7	6	6	6	3	6	4	5	5	7	8	6
8	7	6	10	6	8	7	6	6	1	3	1	1	6	1	7	2
9	6	5	9	6	3	9	9	5	6	7	6	3	7	7	8	7
10	7	9	7	6	9	7	7	5	7	3	6	4	8	6	4	4
11	5	9	4	7	7	4	4	9	4	6	6	6	4	7	4	7