Chapter II

PROBLEM AND OBJECTIVES
Chapter II

PROBLEM AND OBJECTIVES

1. The Problem

Performance in competitive sports is determined by various physiological, physical, technical, tactical, and psychological factors. Optimum levels of all these abilities are required to achieve optimum performances in sports. Sports scientists throughout the world are engaged to find out the different requirements for developing performance in different sports. In sport advance countries many sports laboratories have been set up to investigate the physical abilities, physiological abilities of sportsmen, bio-mechanical aspects influencing the technique and tactics of sports, psychological abilities required for various sports and to find out the means and methods to develop sports performance determinants to maximum level. Investigation of these abilities is the basic step considered in these laboratories in modern competitive sports. In the present study the investigator has tried to investigate the selected psychological factors, i.e. personality factors, sports competition anxiety, concentration, physical abilities level i.e. strength and flexibility level and age, height and weight of the Indian male gymnasts participating in the National Gymnastics Championships. The study has been aimed to investigate the present status of these abilities among the gymnasts and to determine the contribution of various psycho-physical abilities to performance in gymnastics.
Training of psychological factors plays an important role in competitive sport performance. No longer physical and technical preparation are sufficient for preparation of Olympic championship. It is the psyche of the players which moves them to use their physical fitness, tactical and technical preparedness at its maximum. As the training programmes and competitions become more intensive, especially in case of elite gymnasts, the psychological preparation of the gymnast becomes more important. The fact has been supported by researchers like Schollander (1971), Singer (1972), Krueger (1984), Cratty (1989).

Out of many psychological factors determining performance, the basic three factors i.e. personality traits, sports competition anxiety and concentration have been investigated in the present study. Among all the psychological factors influencing sports performance it is perhaps the personality traits of the sportsmen on which maximum research has been conducted by the sports psychologists. Personality characteristics of the sports have been investigated by innumerable psychologists specially Kene (1964), Ogilvie and Tukro (1966), Hardman (1968), Singer (1969, 1972), William & Parkin (1980) Eysenck (1982), Cooper (1969), Daino (1985), Chisholm (1986), Morgan et al. (1988), Cratty (1989) etc. The relationship between personality and physical ability has been argued by those who are concerned with training, advising and helping the champion athletes. Cofer and Johnson (1960) suggest that champion athletes are a "special breed" in personality. Personality is a vital
factor in discriminating process which singles out champions from amongst those other who participate even at the same level of competition. Kane (1964), Kroll (1965), Singer and Hasse (1975) Ejem (1978), William and Parkin (1980), Costa (1984), and Clarke (1987) have reported differences in personality traits between the low and high achievers in different sports. Many gymnasts participate in national level competition but those who excell might posses different personality traits. The outstanding athletes have been found by Johnson, Hutton and Johnson (1951) to posses several distinguishing characteristics like extreme aggressiveness, high level of aspiration and feelings of exceptional self assurance. William and her associates (1970) have reported that high level national achievers differed from low level national participants on measure of dominance. Thus it becomes evident that personality has important role to play in sports achievements.

Anxiety, which may be defined as complex emotional state, is characterized by general fear or foreboding usually accompanied by tension. Quite a good amount of research has been conducted on anxiety and its influence on sports performance. Anxiety is one of the important performance determining factors in those fields, where proficiency and quality of performance is required.

Research has shown that anxiety is present in all of us, including athletes in varying degree. The degree of perceived anxiety is an important factor to be considered in the performance of an individual.
Both the extremely low anxiety which has been termed as hypo-
anxiety by Sinha (1986) and extremely high level of anxiety are
disasterous for performance. Those who have extremely low anxiety
are under motivated and sluggish, those who have very high anxiety
lose neuro-muscular coordination which lead to poor quality of mov-
emnt and poor performance. Singer (1980) while examining the
relationship of anxiety to learning mentions that performance
improves with increasing level of arousal to an optimum point
where upon further increase in arousal causes performance impair-
ment. Tutko (1971) states that relationship between learning and
anxiety is like inverted "U". As the anxiety is extremely low
the learning will take place very slowly. The pace of learning
increases with increased anxiety to an optimum degree. When
the degree of anxiety goes beyond optimum, the pace of learning
and performance starts reducing. Read (1960) found that both
high and low levels of anxiety tended to disrupt the learning
process, whereas moderate levels of anxiety created an ideal
atmosphere for learning and performance. Tutko (1971) suggests
that the athlete who is able to maintain a moderate level of
anxiety would be the most efficient performer. Many other resear-
chers like Spence and Spence (1966) Bush (1970), Burton (1976),
Born (1977), Cook et al. (1983), Ellickson (1987) have shown relation-
ship between anxiety and sports performance.

Concentration is required in learning in every sphere
of life. Krueger (1984) states that there is nothing in life that one
can do without concentration and perfect concentration is that what
enables one to perform perfectly. The role of concentration becomes still important in those professions where proficiency, accuracy and quality is decisive for performance like technical sports. For learning the sports movements and technical aspect of any sport and its execution a proper amount of concentration, freedom from distraction and sustained alertness and attentiveness are required. That is why the greater athletes are legendary for their power of concentration. Many researchers have reported the relationship of concentration to performance in sports (Mahaney and Avener (1977), Nideffer (1981), Gardin et al. (1987).

Nideffer (1976) states that it is conceivable that highly successful gymnasts may differ in their attentional and inter-personal characteristics from those who are less successful. Concentration during competition is more important than concentration during training. Loss of concentration even for 1/100th of a second in gymnastics while performing on apparatus may lead to deduction of some points, fall from apparatus or serious injuries. Competitive situations require more concentration than training situations as there are more chances of distraction of thought because of competition surroundings, presence of spectators, presence of opponents etc. More one concentrates on skill learning and performance better performance he achieves.

The role of physical abilities in sports performances especially strength and flexibility is quite obvious. Though gymnastics is a technical sport in which performance is evaluated on the basis of the
movement executed and the quality of performance, yet the learning and execution of some complicated movements in gymnastics entirely depend upon strength and flexibility.

Gymnastics is a strength dominating activity in which a gymnast has to perform about 12 movements continuously one after another on apparatus. Execution of complete routine, consisting of 12 movements, requires strength endurance. Explosive strength is required while learning and performing single movement. Many studies (Cureton, 1941; Stuart, 1964; Johnson, 1968; Austin, 1970) have reported a relationship between strength, flexibility and speed on one hand to performance in sports on the other hand. Prestidge (1972) states that a gymnast requires a great deal of strength in almost all parts of the body but more especially in arms, abdomen and legs. deGaray et al. (1974) are of the opinion that strength and speed are important physical determinants in gymnastics. Gates (1974) has reported a significant correlation of dips on parallel bars ($r = .811$) and pull-ups on horizontal bar ($r = .799$) to competitive performance in gymnastics.

Outstanding gymnasts have been found very flexible. Baley (1977) observed that flexibility was essential for development of skills in gymnastics. A few researchers like Allsen (1978), Fox (1979), Fukushima (1981), Walia (1981), Harre (1982), Debnath (1983) have reported that high performance gymnasts have higher amount of strength and flexibility than low performance gymnasts.
Age, height and weight are other performance determinants in gymnastics. The peak performance age differs for different games and sports. In games and sports like long distance running, cycling and football the peak performance age is higher when compared with peak performance age in swimming and gymnastics. In men gymnastics peak performance age is between 20 to 22 years. Similarly height also plays a decisive role in obtaining optimum performance in various games and sports, for example, greater height is one of the performance determinants in basketball and volleyball. A man of 160 cm. height can never become a good basketball player of international standard. The average height of the top class basketball and volleyball players of the world is above 200 cms. Where as greater height is not beneficial in gymnastics. A taller person has mechanical dis-advantage as he has more difficulty to control his body during rotatory and twisting movements on apparatus in gymnastics. So outstanding gymnasts are found to be below average in height. Bird (1961), Bosco (1962), Medved (1966), and Singh (1981) have found the gymnasts to be below average in height when compared with the normal adults. Read (1973) found that the better male gymnasts were less in standing height. Gunny (1973) reported that if two gymnasts were equally trained with identical body build the taller gymnast was at dis-advantage because he had smaller strength body weight ratio than shorter gymnast.

Light body i.e. lesser body weight and more strength has advantage in gymnastics. Gymnastics movements are performed on
the apparatus or in the space in which a gymnast has to lift his own body. Heavier the weight greater force will be required to lift the body in each movement against gravity. Many research workers have shown a negative relationship of weight to performance in gymnastics (Le Veau et al. 1974; Salmela 1980; Carter et al. 1982; Singh and Debnath 1988). Carter (1984) reported that gymnasts of 1976 olympic games were the lightest among all the athletes of 1976 olympics. Smaller and lighter body and more strength in upper body is a prerequisite of physique to achieve optimum performance in gymnastics.

Thus the problem of the present study deals with the investigation of psycho-physical characteristics of male gymnasts of senior national gymnastic championship and the contribution of these psycho-physical characteristics to competitive performance in gymnastics.

**Need of Study**

Performance in competitive sports is multi-dimensional process which is influenced by various physical, physiological, technical, tactical, sociological and psychological factors. The requirements of physique, technique, tactics and psycho-physical abilities are different in different sports. For example in long distance running, swimming or cycling, alongwith concentration and tolerance capacity, endurance plays significant role, where as technique plays significant role in diving and figure skating. During training, besides developing good technique and tactics of an athlete, the emphasis is also laid down on the deve-
lopment of the psycho-motor abilities required to achieve an optimum performance as these psycho-physical factors play very significant role in achieving optimum performance in competitive sports. Until recently the coaches have been paying inadequate attention to the social and psychological factors which although have been proved to contribute to performance in events in the higher competitive sports. It is only recently that sports administrators and coaches have realized the importance of psychological preparation and training of the athletes to enable them to bear the strain and stresses of inherent in sports participation. So, now the coaches and sports trainers have started giving more importance to the psychological conditioning or building the mental make up of the players before their participation in international competition. Recently a few Indian National Teams have started taking the help of the psychologists for the psychological preparation and conditioning of players and the teams. For the first time a psychologist accompanied the Indian Hockey Team for psychological preparation and conditioning during the 1988 Olympic Games at Seoul, Korea. In modern competitive sports, psychological preparation of athletes and teams is as important as teaching them different skills of a game with scientific methods. In these days the teams are prepared not only to play but to win the games. And for winning the games, it is not only proficiency in the skills which matters but also the spirit and attitude of the players, with which they play. The mental attitude of each player as well as of the team can enhance
or hinder their performance. Most of the coaches agree that physical characteristics, skills and training of the players are extremely important to obtain optimum performance but they also feel that good mental and psychological preparation for competition is a necessary component of success. It is also observed that there is great relationship between the psychological and physical abilities. The realization of physical abilities in competitive sports depends upon psychological and mental abilities of an athlete. For example, an athlete may have a lot of strength, unless he is properly motivated or he reaches his optimum level of arousal he cannot make use of his proper strength. Similarly a long distance runner who has a lot of endurance can not use this endurance to win long distance running unless he has pain tolerance capacity and will to complete the race. Thus it is found that psychological factors and mental attitude of an athlete also influence the realization of physical abilities like strength, flexibility endurance and speed.

Sport has become a psycho-social activity full of tension anxiety, fear, strain and stresses. In competitive sports, teams and individual players compete to win or give peak performance and this aspect of winning causes many psychological stresses. So the job of the coach is to understand the physical as well as psychological abilities and mental attitude required for a particular sport in which he trains the athletes and prepares the athletes psycho-physically to give optimum performance in collaboration of the psychologist. Some of the coaches
and sports administrators still believe that psychological preparation of an athlete is important aspect during competitions, but their this belief is not completely right. The psychological preparation of an athlete during training is even more important than during the competition, because if an athlete during training learns and develops psychological abilities and mental attitude required for competition he will make use of psychological abilities in better way during competition. It has also been seen that some of the personality traits (surface traits or dynamic traits) can also be changed with training. So the job of the coach is to prepare or train the individual athletes and teams in such a way that they are able to bear all types of stresses and overcome the effect of over stresses and strains which may deteriorate the sport performance. The athletes should be trained in such a way that they should be able to tolerate the physical as well as psychic load during training and competitions.

In modern competitive sports, the role of anxiety in sports performance has attracted the attention of sports scientists. As the physical load during the training of sportsmen for national and international competitions is increasing day by day, the psychic stresses during the training especially during competitions have also intensified. Many athletes are anxiety prone. It is also observed that as the level of competition goes on becoming tougher the anxiety state also goes on increasing, hence the psychological training related to anxiety and arousal during competition is attracting a great attention.
Hyper-anxiety and over anxiousness leads to disturbances in coordination, loss of concentration and faulty movements in skill execution. Thus it is very important for a gymnast to have an optimum level of arousal during competition. So a coach must know the optimum level of anxiety and arousal of his gymnasts and the procedures to overcome the hyper-anxiety or hypo-anxiety during competition. It may be possible if proper research on scientific lines is conducted on the national level gymnasts, to find out that which are the personality traits which contribute to successful performance in gymnastics; what should be the optimum concentration, and anxiety level to attain optimum performance; and how much is the contribution of these factors for successful gymnastics performance. There is also need to know the contribution of strength and flexibility of different parts of the body, age, height and body weight to successful gymnastics performance. As no such study is available in literature on Indian Gymnasts, so there is a dire need to study the psycho-motor characteristics of Indian National Level Gymnasts. Besides, the investigator being National Gymnastics Coach of India and Chief Coach of Netaji Subhas National Institute of Sports, feels that the investigation into psycho-motor characteristics of the Indian Gymnasts of national level is essential to uplift the standard of gymnastics in country. There is a need for such a study to understand that why some gymnasts excel and why the others don't. This need becomes clear from the following statement of Alderman (1974) who points out that:
"At any one time the group of the best athletes in the world is a finite population consisting of only a very few individuals in each sport. In various levels below this selected groups exists thousands upon thousands of the other participants, some good, some not so good, and some in between. Because of the obvious differences that exist between these participants in term of quality of their performances, one can be interested exactly what factors contribute to this differentiation."

Thus there is a need to investigate the present status of these psycho-physical abilities (Personality factors, competition anxiety, concentration, strength and physical abilities, age, height and weight) of the Indian National Level Gymnasts and their contribution to the competitive performance in gymnastics.

**Significance of the Study**

The findings of the present study would help the coaches, sports trainers, sports administrators, and physical educationists in their professional work, the details of which are discussed below:

1. The present study would acquaint the gymnastics coaches, physical educationists and gymnastics promoters with the psychological factors which play significant role in performance during national level competitions.

2. The findings of the study would help the coaches to find-out the ways and means for psychological preparations of a gymnast.
in ensuring a peak performance.

3. The coaches and physical educationists would come to know the role of various personality characteristics, (16 PF) during gymnastic competition.

4. The findings of the study would facilitate the coaches to know the role of strength of arms, legs and hand grip and significance of flexibility of different regions of the body for achieving successful performance in gymnastics.

5. The coaches would get knowledge regarding the role of age, height and weight in gymnastics from the study. This knowledge might help coaches to select talented children for gymnastics.

6. The findings would help the coaches and gymnastics trainers to prepare suitable training schedule for developing the required psycho-physical characteristics which are important for achieving successful performance in gymnastics.

7. The selection of gymnasts for training, coaching camps or selection of a team for competition is, presently, done only on the basis of competitive performance. The findings of the study would help the selectors, administrators and coaches to incorporate the required psycho-physical abilities for selection of gymnasts for training, camps or competitions.
8. The results of the study would add further knowledge to the existing literature of sports psychology and sports training especially the role of anxiety, concentration and personality characteristics and role of strength and flexibility.

9. The findings of the study would provide a guide-line to the future research investigators in sports psychology and sports sciences to conduct further research in this field.

Objectives of the Study

The present study was conducted with the following objectives:

1. To find out the relationship between competitive performance in gymnastics and various personality traits (16 Personality Factors) of high performance group.

2. To find out the relationship of competitive performance in gymnastics to sports competition anxiety of high performance group.

3. To find out the relationship of concentration to gymnastics performance of high level performance group.

4. To find out the relationship of strength variables to gymnastics competitive performance of high level performance group.

5. To find out the relationship of flexibility variables to gymnastics performance of high level performance group.
6. To find out the relationship of age, height and weight to gymnastics performance of high level performance group.

7. To find out differences in various personality traits (16 PF) among high, medium and low performance group.

8. To find out differences in sports competition anxiety and concentration among three level of performance groups.

9. To find out differences in strength and flexibility (Physical Ability) variables among three level of performance group.

10. To find out differences in age, height and weight among high, medium and low performance groups.

**Hypotheses of the Study**

The research hypotheses of the present study are as follows:

1. There is non significant relationship between personality traits and competitive gymnastics performance of high performance group.

2. There is non significant relationship of competition anxiety to competitive performance of high performance group.

3. There is non significant relationship of concentration ability to competitive performance in gymnastics of high performance group.

4. There is non significant relationship between strength abilities and competitive gymnastics performance of high performance group.
5. There is non-significant relationship between flexibility of different joints of the body and gymnastics performance of high performance group.

6. There is non-significant relationship between age, height and weight on one side and gymnastics performance on the other side of high performance group.

7. There are non-significant differences in means of different personality traits (16 PF) among high, mediocre and low performance groups.

8. There are non-significant differences in means of competition anxiety among three performance groups.

9. There are non-significant differences in means of concentration among high, mediocre and low performance groups.

10. There are non-significant differences in means of strength measuring variables among high, mediocre and low performance groups.

11. There are non-significant differences in means of flexibility among high, mediocre and low performance groups.

12. There are non-significant differences in age, height and weight among high, mediocre and low performance groups.
Delimitation of the Study

The present study was delimited to three psychological variables i.e. sport competition anxiety, concentration and personality characteristics, and two motor ability variables i.e. strength and flexibility; and age, height and weight.

The strength variables were further delimited to the strength variables measuring strength of arms, legs, and hands grip. The flexibility variables were further delimited to the variables measuring flexibility of trunk and shoulders.

Secondly, the study was delimited to those gymnasts who participated in the Senior Men National Gymnastics Championships in 1988-1989.

Limitations of the Study

1. Many factors like diet, physical and social environments, economic conditions and life style of the subjects could not be controlled and were accepted as limitation.

2. The influence of above factors on psychological and physical abilities and competitive performance could not be assessed and this was also recognised as limitation.

Meaning of the Terms Used

Selected Psycho-Physical Abilities

The contribution of a few psychological and physical abilities
has been studied in the present investigation. The selected psychological abilities which have been studied are - personality factors, (16 PF), sports competition anxiety and concentration, and the physical abilities i.e. strength and flexibility and age, height and weight. The meaning and definition of the above selected psychological as well as physical abilities are given as under:

**Meaning of Personality**

Personality has been viewed from various angles and as such its definitions have never been fixed, they have been changing from time to time. In defining and estimating personality, not to talk of a layman's view even a greater number of sane men took cognizance of the 'outward' appearance of an individual as the crux of the matter. Some define personality as the pattern of behaviour in a certain way: for others, personality consitutes the intelligence of mind. The word personality is derived from the latin word 'Persona' which means 'mask'. In the ancient Rome people acting in dramas and plays used to wear "Personas" (Mask) to depict their particular character to the audience. The modern concept of personality is the extension of same concept which takes into account all physical, psychological and social characteristics of the individual while describing his personality. Hence, the personality in its modern scientific sense is the sum total of various characteristics of the individual, which indicates towards a particular behaviour pattern of the individual. These characteristics or qualities
of the individual are called traits. There have been several attempts to define personality as suitably and comprehensively as possible. Hall and Lindzay (1958) have defined personality as a set of values or descriptive terms which are used to describe the individual being studied according to the variables or dimensions which occupy the central position within the particular theory utilized. According to Eysenck (1960) "Personality is more or less stable and enduring organisation of a person's character, temperament, intellect and physique which determines his unique adjustment to the environment. Eysenck (1947) has developed two broad personality scales E (Extraversion-Introversion) and N (Neuroticism) and later on he also included the third personality scale P (Psychotocism). Eysenck's interpretation of the introversion-extraversion dimensions are based upon balance between cortical excitation and inhibition. Excitation in neural and behavioural terms refers to the facilitation of perceptual, cognitive and motor responses in the central nervous system and inhibition refers to just the opposite effect, this is to the depression of those responses. Catté (1965) has defined personality as "that which tells what a man will do when placed in a given situation. Alderman (1974) defines personality as "an integration or merging of all the parts of one's psychological life - the way one thinks, feels, acts and behaves. Alderman's definition suggests that personality is two folds: one side thinks and feels, the others acts and behaves. Alderman (1974) in discussing the development of personality, he said that "individuals are born with a 'blue
print' of basic traits, for example a child of athletic parents might inherit certain basic traits which, if nurtured, could lead him or her to select sports the same or similar to those of the parents. Personality begin to develop at birth, when infants interact with those around them. As the child grows older he begins to display behaviours that can be traced to specific personality traits. Although for potential a given behaviour must first be present. In the words of Munn (1975) personality may be defined as the most characteristic integration of an individual structure, mode of behaviour, interests, attitudes capacities, abilities and aptitudes" Wood-worth (1964) defined personality "as total quality of the individual behaviour."

Personality is neither an individuals outward appearance nor his physical stature but "a sum total of various aspects of his behaviour." Whether inherited or acquired it is rather, in Allport's (1960) words. "... The dynamic organisation with in the individual of those psycho-physical systems that determine his unique adjustment of environments. This definition clearly indicates that physical and psychological characteristic together form the personality which is dynamic in nature and every individual has got his own unique characteristic or traits with which his behaviour and thinking is determined. The personality traits which one inherits from his ancestors (source traits) are resistant to change where as certain acquired traits (surface traits) can be changed through environmental manipulation. That is why there is a strong thinking that participation in sports provide ample opportunities
to develop and change one's personality. Participation in athletic activities helps in developing all kinds of physical, mental and social traits of an individual. Several researchers have undertaken the task of labeling personality traits and explaining their origin. Someoneoff (1966) has suggested that personality traits are divided into the following three areas:

1. Dynamic traits: motivation, action, purpose, attitudes, sentiments, desire, need, habit, prejudice and will.

2. Temperament Traits: Pervasive, unchanging qualities and temper in our actions.

3. Ability or cognitive Traits: Intelligence, verbal, spatial or musical.

Dynamic traits such as motivation, actions and attitudes are likely to change in response to outside influences, temperament traits are either static or slow to change. This indicates that a coach is in a position to influence the personality development of children and young adults. Cattle (1965) classifies traits as either source traits or surface traits. Although surface traits are susceptible to change, such changes do not occur quickly. It can not be expected from an athlete to change his or her personality in a span of a few weeks of even few months. Alderman (1974), in summing up, theoretical position and dealing with traits changes proposes the following explanation.
"Certain personality traits can be learned while participating in any endeavour, including sports, but this acquisition is dependant on a highly complex inter-relation between each individual's gentic endowments, his previous and current environments and his own particular behaviour pattern. In addition it would appear that personality changes occur only over a fairly significant length of time ...."

Interpretation of the Primary Factors of 16 PF

Each of the primary factors measured by the 16 PF questionnaire has an alphabetic designation (A through Q). A brief definition and interpretations of the 16 factors are given below:

Factor - A (Reserved Vs Outgoing).

The person who scores low (sten of 1 to 3) on Factor -A tends to be stiff, cool, skeptical, and aloof. He likes things rather than people, working alone, and avoiding compromises of viewpoints. He is likely to be precise and "rigid" in his way of doing things and in personal standards, and in many occupations these are desirable traits. He may tend, at times, to be critical, obtrusive or hard.

The person who scores high (sten of 8 to 10) on Factor A tends to be good natured, easy-going, emotionally expressive (hence naturally affectothymia), ready to cooperate, attentive to people, soft-hearted, kindly, adaptable. He likes occupations dealing with people and socially impressive situations. He readily forms active groups.
He is generous in personal relations, less afraid of criticism, better able to remember names of people.

Factor - B (Less Intelligent Vs More Intelligent)

The person scoring low on Factor B tends to be slow to learn and grasp, dull, given to concrete and literal interpretation. His dullness may be simply a reflection of low intelligence or it may represent poor functioning due to psycho-pathology.

The person who scores high on Factor B tends to be quick to grasp ideas, a fast learner, intelligent. There is some correlation with level of culture, and some with alertness. High scores contraindicate deterioration of mental functions in pathological conditions.

Factor - C (Affected by Feelings Vs Emotionally Stable)

The person who scores low on Factor C tends to be low in frustration tolerance for unsatisfactory conditions, changeable and plastic, evading necessary reality demands, neurotically fatigued, fruitful easily emotional and annoyed, active in dissatisfaction, having neurotic symptoms (phobias, sleep disturbances, psychosomatic complaints, etc.). Low Factor C score is common to almost all forms of neurotic and some psychotic disorders.

The person who scores high on Factor C tends to be emotionally mature, stable, realistic about life, unruffled, possessing ego strength,
better able to maintain solid group morale. Sometimes he may be a person making a resigned adjustment to unsolved emotional problems.

Factor -E (Humble Vs Assertive)

The person who scores low on Factor -E tends to give way to other, to be docile, and to conform. He is often dependent, confessing, anxious for obsessional correctness. This passivity is part of many neurotic syndromes.

The person who scores high on Factor E is assertive, self-assured, and independent-minded. He tends to be austere, a law to himself, hostile or extrapunitive, authoritarian (managing other), and disregards authority.

Factor - F (Sober Vs Happy-go-lucky ).

The person who scores low on Factor F tends to be restrained, reticent, introspective. He is sometimes dour, pessimistic, unduly deliberate, and considered smug and primly correct by observes. He tends to be a sober, dependable person.

The person who scores high on this trait tends to be cheerful, active, talkative, frank, expressive, effervescent, carefree. He is frequently chosen as an elected leader. He may be impulsive and mercurial.

Factor -G (Expedient Vs Conscientious).

The person who scores low on Factor G tends to be unsteady
in purpose. He is often casual and lacking in effort for group undertakings and cultural demands. His freedom from group influence may lead to anti-social acts, but at times makes him more effective, while his refusal to be bound by rules causes him to have less somatic upset from stress.

The person who scores high on Factor G tends to be exacting in character, dominated by sense of duty, perserving, responsible, planful, "fills the unforgiving minute." He is usually conscientious and moralistic, and he prefers hard-working people to witty companions. The inner "categorical imperative" of this essential super-ego. (in the psychoanalytic sense) should be distinguished from the superficially similar "social ideal self" of Q+.

Factor -H (Shy Vs Venturesome).

The person who scores low on this trait tends to be shy, wallflower." He usually has inferiority feelings. He tends to be slow and impeded in speach and in expressing himself, dislikes occupations with personal contacts, prefers one or two close friends to large groups, and is not given to keeping in contact with all that is going on around him.

The person who scores high on Factor H is sociable, bold, ready to try new things, spontaneous, and abundant in emotional response. His "thick-skinnedness" enables him to face wear and tea in dealing
with people and grueling emotional situations, without fatigue. However, he can be careless of detail, ignore danger signals, and consume much time talking. He tends to be "pushy" and actively interested in the opposite sex.

Factor - I (Tough-minded Vs Tender-minded).

The person who scores low on Factor I tends to be practical, realistic, masculine, independent, responsible, but skeptical of subjective, cultural elaborations. He is some times unmoved, hard, cynical, smug. He tends to keep a group operating on a practical and realistic "no-nonsense" basis.

The person who scores high on Factor I tends to be tender-minded, day-dreaming, artistic, fastidious, feminine. He is some times demanding of attention and help, impatient, dependent, impractical. He dislike crude people and rough occupations. He tends to slow up group performance, and to upset group morale by unrealistic fussiness.

Factor - L (Trusting Vs Suspicious).

The person who scores low on Factor L tends to be free of jealous tendencies, adaptable, cheerful, un-competitive, concerned about other people, a good team worker.

The person who scores high on Factor L tends to be mistrusting and doubtful. He is often involved in his own ego, is self-opinionated, and interested in internal, mental life. He is usually deliberate in
his action, unconcerned about other people, a poor team member.

Factor \( M \) (Practical Vs Imaginative).

The person who scores low on Factor \( M \) tends to be anxious to do the right things, attentive to practical matters, and subject to the dictation of what is obviously possible. He is concerned over detail, able to keep his head in emergencies, but some times unimaginative.

The person who scores high on Factor \( M \) tends to be unconventional, unconcerned over every day matters. Bohemian, self-motivated, imaginatively creative, concerned with "essentials," and oblivious of particular people and physical realities. His inner-directed interest some-times lead to unrealistic situations accompanied by expressive outbursts. His individually tends to cause him to be rejected in group activities.

Factor \( N \) (Forthright Vs Shrewd).

The person who scores low on Factor \( N \) tends to be unsophisticated, sentimental, and simple. He is some times crude and awkward, but easily pleased and content with what comes, and is natural and spontaneous.

The person who scores high on Factor \( N \) tends to be polished, experienced, wordly, shrewd. He is often hardheaded and analytical.
He has an intellectual, unsentimental approach to situations, an approach kin to cynicism.

Factor - O (Placid Vs Apprehensive).

The person who scores low on Factor O tends to be placid, with unshakable nerve. He has a mature, unanxious confidence in himself and his capacity to deal with things. He is resilient and secure, but to the point of being insensitive of when a group is not going along with him, so that he may evoke antipathies and distrust.

The person who scores high on Factor O tends to be depressed, moody, a worrier, full of foreboding, and brooding. He has a childlike tendency to anxiety in difficulties. He does not feel accepted in groups or free to participate. High Factor O score is very common in clinical group of all types.

Factor Q₁ (Conservative Vs Experimenting).

The person who scores low on Factor Q₁ is confident in what he has been taught to believe, and accepts the "tried and true," despite inconsistencies, when something else might be better. He is cautious and compromising in regard to new ideas. Thus, he tends to oppose and postpone change, is inclined to go along with tradition, is more conservative in religion and politics, and tends not to be interested in analytical "intellectual" thought.
The person who scores high on Factor Q₁ tends to be interested in intellectual matters and has doubts on fundamental issues. He is skeptical and inquiring regarding ideas, either old or new. He tends to be more well informed, less inclined to moralize, more inclined to experiment in life generally, and more tolerant of inconvenience and change.

Factor Q₂ (Group-dependent Vs Self-sufficient).

The person who scores low on Factor Q₂ prefers to work and make decisions with other people likes and depends on social approval and admiration. He tends to go along with the group and may be lacking in individual resolution. He is not necessarily generous by choice; rather he needs group support.

The person who scores high on Factor Q₂ is temperamentally independent, accustomed to going his own way, making decisions and taking action on his own. He discounts public opinion. But is not necessarily dominant in his relation with others (See Factor E). He does not dislike people but simply does not need their agreement or support.

Factor Q₃ (Undisciplined Vs Controlled).

The person who scores low on Factor Q₃ will not be bothered with will control and regard for social demand. He is not overly considerate, careful, or pains-taking. He may feel maladjusted, and many maladjustments (especially the affective, but not the paranoid) show Q₃.
The person who scores high on Factor Q₃ tends to have strong control of his emotions and general behaviour, is inclined to be socially aware and careful, and evidences what is commonly termed "self-respect" and regard for social reputation. He sometimes tends, however, to be obstinate. Effective leaders, and some paranoids, are high on Q₃.

Factor Q₄ (Relaxed Vs Tense).

The person who scores low on Factor Q₄ tends to be sedate, relaxed, composed, and satisfied (not frustrated). In some situations, his over-satisfaction can lead to laziness and low performance, in the sense that low motivation produces little trial and error. Conversely, high tension level may disrupt school and work performance.

The person who scores high on Factor Q₄ tends to be tense, excitable, restless, fruitful, impatient. He is often fatigued, but unable to remain inactive. In groups he takes a poor view of the degree of unity, orderliness, and leadership. His frustration represents an excess of stimulated, but undischarged, drive.

Meaning of Anxiety

Anxiety is a psychological response to a real or imagined threat. It is a complex emotional state characterised by a general fear or foreboding usually accompanied by tension. It is related to apprehension and fear and is frequently associated with fear, either
real or anticipated. The symptoms in anxiety state may be expressed by apprehension, gloomy foreboding, general excitement, fatigue, isonomia, gastro-intestinal disturbances and depressions, are found in many individuals having anxiety. Some individuals exhibit cardiac disorders, emotional instability, inferiority feelings, panic and headaches. Indecision, intolerance, suicidal - pre-occupation and panic, stress, strange fear, giddiness etc. are noted in many cases. Many anxiety ridden persons often complaint of general loss of interest and an inability to concentrate. Anxiety has been defined by different persons in different ways. Johnson (1951) calls anxiety "A disturbed state". Hardman (1968) has labeled it as "emotional reactivity." Skubic (1968) thinks "it is arousal". Ikegami (1970) terms it as "nervousness" and Kane (1970) "neuroticism." Medical dictionary defines anxiety as "apprehension of danger accompanied by restlessness and a feeling of oppression in the apigestrium." According to Rethlingshafer (1963) "A fear is a quickly passing cloud that moves across the sun, anxiety is the cloud that lingers and truely be clouds the man." Pikunas (1969) feels anxiety is an "unrealistic and unpleasant state," of the body and mind. English and Pearson (1947) considered anxiety to be an "effect" which means an emotion or a feeling tone or a specific effective state which grows out of the conflict between instinctual needs and social constraints clouding fulfillment of these needs. Followers of psycho-analytic steam of psychology consider anxiety to be a "defence mechanism" against repression and supersession of the
primary and secondary needs of life. According to Frost (1971) "anxiety is an uneasiness and feelings of forebodings often found when a person is about to embark on a hazardous venture. It is often accompanied by a strong desire to excel." Morehouse and Miller (1976) summed up that anxiety is a disorganisation of a person's motor nervous system that renders him incapable of skilled movements. According to Kauss (1980) anxiety is a state of mind in which the individual responds with discomfort to some events that has occurred or going to occur. A person's worries about events, their occurrence and consequences in general are the sources of anxiety. Hence, anxiety state arises from the faulty adaptations of the stresses and strains of life and is caused by overactions in an attempt to meet these difficulties. Spielberger (1966) has defined anxiety in two terms: trait anxiety and state anxiety. Trait anxiety is a tendency to respond emotionally to a wide range of non-threatening stimuli. It refers to a predisposition to respond with heightened arousal to certain class of stimuli, state anxiety on the other hand is actual feeling of tension and nervousness. According to Spielberger (1972), "two distinct concept of anxiety should be distinguished viz. trait anxiety and state anxiety. The former concept refers to a general disposition of individual to respond to psychological stresses with more or less intense anxiety reactions. The later reactions, which are evoked at particular moment in response to specific situations, are refered to as state anxiety. Trait anxiety is a relatively stable personality characteristics whereas state anxiety is considered
to be a transitory emotional state."

Spielberger's theory of anxiety is based upon not on the actual psychological or physical threat that exists in the situation but rather on the person's perception of threat. Further, spielberger developed a way to assess this perception of threat with the construct of state anxiety. The theory assumes that when threat is perceived, state anxiety levels are elevated (Gaudry and Spielderger 1971).

Trait anxiety relates specifically to threat to self esteem, as opposed to threat due to potential physical harm. Findings in the general anxiety literature indicate that high trait anxious persons perceive self esteem threatening situations as more threatening as indicated by elevation in state anxiety levels, then do low trait anxious persons (Hodges 1968; Hodges and Durham 1972; Mc.-Adoo 1970; Sarason 1960; 1968; Spielberger et al. 1969). Research evolving from Spielberger's theory also indicated that success failure is a major situational determinant of the perceived threat to self esteem. The findings of several studies evidenced that perceived threat and corresponding state anxiety levels decrease with success experiences and increase with failure experiences (Gaudry and Poole 1972; Hodges and Durham, 1972; Mc.-Adoo 1970).

Martens (1977) increased the situational specifically of trait anxiety to the competitive sport situation. He defined the construct
of competitive trait anxiety as "a tendency to perceive competitive situation as threatening and to respond to these situations with feelings of apprehension and tension." The Sport Competition Anxiety Test (SCAT) was developed to assess this disposition and threat was again operationally defined as elevation in state anxiety levels (Marten's 1977).

Recent investigations indicated that competitive trait anxiety is an important inter-personal development of perceived threat when people are anticipating participation in a competitive experience. The result of these studies showed that high competitive - trait - anxious adults and children exhibit higher elevations in state anxiety than do low competitive - trait - anxious persons when facing competitions. (Martens and Gill 1976; Martens, 1977; Martens and Simon 1976; Scanlan 1975). According to Martens (1977) it appears that high competitive - trait anxious persons probably have not been successful in their past competitive endeavour, have incurred negative evaluations, and therefore, face the competitive situation with the expectation of again feeling short of its demand.

Concentration and its Meaning

In these days most of the sports psychologists are engaged in findings and preparing those psychological characteristics which
are commonly required to achieve high performance in specific categories of sports. The psychologists are also helping the coaches to understand the psychological make-up of their athletes and prepare the training schedule to bring and modify the psychological characteristics required by the athletes to achieve optimum performance. The psychological profile to attain optimum performance which are being found and prepared by many sport psychologists can also be used for the selection purpose in competitive sports.

The different cognitive demands are put by different sport disciplines. Some scientists and psychologists such as Mahoney and Avener (1977), Rudin (1968), Spotts and Macklear (1967), Young (1979), Taylor (1980), MacGallievery (1980), Sandhu (1982), Sharma (1985), Khan (1985) have tried to study various cognitive characteristics involved in the competitive sports. In some sports reactionability, visual-perceptual accuracy, in some, audio-perceptual accuracy and in some other concentration play important role for optimum performance e.g. in 100 m. sprint start it is audio-perceptual accuracy which plays role, in Lawn Tennis it is visual perceptual accuracy and reactionability and in sports like archery, shooting and gymnastics, it is concentration which plays role in achieving optimum performance. Though concentration is required for each kind of learning and performance yet the role played by concentration in different sports is different.
Concentration may be defined as a mental state so deep that one's attention is free from all outside pulls and individual is able to channel his thoughts or energy to a desired direction.

**Definition and Kinds of Strength**

Muscle strength is the basis of all kinds of work and sports because in sports activities, some amount of resistance (if not external than one's own body weight) has to be overcome. Muscular strength is an important factor on which the sports performance is dependant. 

"Strength is the ability to overcome resistance or to act against it," (Singh 1984). Strength is not only a product of the muscles but also of the nervous system, which controls and regulates the muscular contraction. According to Fukushima (1981) muscular strength can be defined "as the amount of tension (Kilograms or Pounds) a muscle or a group of muscles can exert in one maximum contraction."

The strength can be dynamic (e.g. lifting and moving objects or one's own body) or static (e.g. holding a barbal at certain joint angle or holding "T" scale on rings in gymnastics). The static (isometric) and dynamic (Isotonic) strength are two principal types of strength which we come across in sports activities. Dynamic strength is more common and hence more important in most of the sports.

Mostly the following three kinds of strength are common in sports activities.
Maximum Strength

It is the highest possible resistance which a sportsman can overcome through voluntary contraction of the muscles. Maximum strength can be static or dynamic. Maximum strength is important in those sports where heavy resistances have to be overcome, e.g. in weight lifting and throws. Moreover maximum strength form the basis of explosive strength and strength endurance in gymnastics and sports where relatively heavier resistance have to be overcome with high speed or for a longer duration.

Explosive Strength

Explosive strength may be defined as the ability of an individual to overcome resistance with high speed. Explosive strength is also known as power. "Power" according to Harre (1982) "is the ability of an athlete to overcome resistance by a high speed of contraction." Explosive strength is always dynamic and is an important ability in almost all the sports. Explosive strength is a complex conditional ability and is a combination of strength and speed. These two components of explosive strength are combined together in different proportions in different sports. Hence different type of explosive strength is seen. In sports like, throws and weight-lifting strength element is stronger than the speed element, but in sports like boxing, sprints, the speed element is stronger. In sports in which heavy resistances have to be tackled with speed, explosive strength is largely based
upon maximum strength. But in sports where higher resistance are to be overcome quickly, speed forms the basis of explosive strength.

Strength Endurance

Strength endurance is the ability of the organism to overcome resistance under condition of fatigue or for a long duration. Schroder, Harre and Bauersfeld (1982) have defined strength endurance as "an athlete's tolerance level against fatigue in strength performances of longer duration." Strength endurance is also a complex conditional ability comprising strength and endurance. The strength endurance can be static or dynamic. The dynamic strength is more common in sports where heavy resistance have to be tackled under conditions of fatigue, the strength endurance depends much upon maximum strength. The strength endurance is also related to explosive strength. In jumps, gymnastics and combative sports, resistance have to be overcome again and again with high speed under conditions of fatigue. This is termed as explosive strength endurance or power endurance. The strength endurance of a body part or a body region is also termed as local muscular endurance.

In addition to above mentioned three types of strength, strength is related to body weight of the athlete and is termed as 'relative strength.'
Relative Strength

According to Dick (1980) "maximum force that an athlete can express in relation to his body weight is known as relative strength." It is a strength which a sportsman possess in relation to his body weight. The relative strength is a ratio which is got by dividing the maximum strength by body weight and reduction in body weight will increase relative strength. The relative strength is important in sports where there are weight categories or where excessive body weight is a limiting factor for achieving good performance e.g. in jumps and gymnastics. In such sports, increased body weight means increased resistance to be tackled.

Flexibility and its Definition

Flexibility is other important physical ability for a good quantitative and qualitative execution of sports movements. Flexibility is the ability to execute movements with wider amplitude. Flexibility is the ability to perform movements with a wide range. Maximum amplitude is the value of flexibility. Harre (1979) has defined flexibility as a degree to which an individual is capable of movement within the range of joint action of a single joint or a functional combination. It is combination of anatomical limitation of joint action and the degree of extensibility of muscles and tendons. Flexibility is neither clearly a conditional ability nor a coordinative ability (Bauresfeld and Schroter 1979). Flexibility is partly dependant upon the energetic
processes and partly on the coordinative processes.

Flexibility is mostly referred to as pertaining to a particular joint. But in most of the sports activities, the greater amplitude of certain movement is a result of flexibility of more than one joint. Flexibility is provided by the joints. The athlete's flexibility is specially limited by the elasticity of his muscles. The range of movement possible at a joint (i.e. flexibility) is dependant on number of factors. The important factors which affect the flexibility are anatomical structure of the bone ends forming the joint, the length, arrangement and stretchability of the muscles and ligaments of a joint, muscle strength, coordination, muscle temperature, time of the day, fatigue, age and sex, emotions etc. Flexibility, like any other motor ability is of following three types:

Passive Flexibility :

It is the ability to do the movement with large amplitude with external help. This external help may be the help by partner or force of gravity. Passive flexibility forms the basis of all other forms of flexibility. It is dependant upon the stretchability of muscles and ligaments of joint as well as on the anatomical shape and structure of the bone ends forming the joint.

Active Flexibility :

It is the ability to perform a movement with larger amplitude without any external help, i.e. with the muscular force. Active flexibility
is always lesser than the passive flexibility. Active flexibility does not depend only on the stretchability of ligaments and muscles of a joint but also on the strength of the muscles of the joint. Harre (1979) states that too much difference between amount of active and passive flexibility indicates weaker muscles.

Dynamic Flexibility:

Dynamic flexibility may be defined as the ability to do movement with larger amplitude when the body is in motion e.g. leap jump in gymnastics. Dynamic flexibility is a form of active flexibility as the sportsman does the movement without any external help. The ability to do movements with large amplitude, when the body is stationary, is called the static flexibility, also a form of active flexibility. The dynamic flexibility is much more complex in nature as compared to passive and active flexibility. In addition to stretchability of muscles and ligaments and muscle strength, it depends also on the ability of the nervous system to contract and relax the agonists and antagonists at correct moment so that a particular limb can move through a great range.

Performance Level

The word has two aspects - i) The level of competition and ii) the competitive performance i.e. performance scores in that competition. As regards to level of competition the senior national gymnastics
championships have been considered as the level of competition for the present study. As regards to competitive scores i.e. "competitive performance" it was total scores (performance) on all the apparatuses which a gymnast obtained in the national senior gymnastics championship. There are six apparatuses (events) in men gymnastics; namely, floor exercise, pommel horse, rings, vaulting horse, parallel bars and horizontal bar. Each gymnast has to participate in all the events. A gymnast gets marks out of a maximum of 10.00 points on each apparatus. So the total marks comes to 60.00 points as there are six apparatus (i.e. 10.00 x 6 = 60.00 points). The marks obtained by a gymnast, out of a maximum of 60.00 points, in senior national gymnastics championship has been considered as his performance level.

Official results of the Senior National Gymnastics Championships have been considered as performance level of each gymnast. In National Gymnastics Championship performance of each gymnast was evaluated on each apparatus as per the rules and regulations of International Gymnastics Federation which have been adopted by Gymnastics Federation of India. The performance of each gymnast on each apparatus was evaluated by a panel of five judges i.e. one Chief Judge and Four Judges. Each judge evaluates each performance out of 10.00 marks keeping in view the 4 evaluation factors i.e. difficulty, combination, execution and bonus points. The marks awarded by the 4 judges separately are sent to Chief Judge for verification. The Chief Judge eliminates the maximum and minimum scores out of the 4 scores and takes the average of middle score as final scores for each performance.