CHAPTER - I

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1. Cricket

Cricket, a bat and ball game is one of the oldest sports in the world and has its Origin in 16th century in England. The expansion of the British Empire spread this once colonial recreational sport into a spirited game to all corners. Today cricket seems to be a virtual lifeline of many commonwealth nations (Twenty/20).

Cricket is played in more than 104 countries and is also popular in India (Wikipedia, 2009). Traditionally, cricket has been perceived as a relatively mild sport from a physiological point of view. The intermittent nature of the game with its long rest intervals provides plenty of recovery time between any short spells of higher intensity activity. However, the demands of cricket may be underestimated (Noakes & Durandt, 2000). In one study of the 1999 South African World Cup side, a number of physiological tests for explosive power and aerobic endurance capacity showed they were as 'fit' as the South African national rugby side.

The standard of cricket specific skills has tremendously improved in the international arena due to innovations in training methods practised by coaches and players. Sport-specific strength training programme are fundamental to an athlete's development and success. It is now accepted that a high level of strength is a prerequisite to superior speed, power, strength endurance and overall sporting performance. Cricket players are susceptible to overuse injury
(Leary & White, 2000). Strength training and conditioning play an important role in chronic and acute injury prevention, particularly in asymmetrical sports such as cricket (i.e. batting, bowling and throwing are performed with a dominant arm or stance (Cricket, 2009).

1.1 Essentials of Cricket Performance

Conditioning for cricket should not only be sport specific but also position specific. Fast bowlers require different preparation from that of spin bowlers. Similarly there are many aspects of cricket training applicable to all players as each individual will be required to bat and field during a game. Not surprisingly, given the flying speed of a cricket ball, players often lose the ball because of poor judgement. Part of this process relates to the visual system and the ability of the player to quickly sight the target while under pressure (Meir, 2005). The drills focus on three visual motor skills; vergence, focusing and tracking. If players can locate, fixate, and focus rapidly on a target they would be less likely to make errors. Linked to the proprioceptive centers of the brain, the visual system relies on the awareness of the body of its position in space. These systems provide the player with detailed information about what is going on in his or her external and internal environments. The brain absorbs this information and then tries to make sense of it. The player then uses this information and interprets it in a way that allows him or her to act in the best way, based on experience and learning.

In Cricket, the ability to accelerate, decelerate and move rapidly in all directions is more important than simply running fast. Power training enables an athlete to apply the greatest amount of their strength in the shortest period of
time. This is not crucial for many sportsmen and for women who will rarely be required nor have the time to produce maximal forces. Most athletic activities involve far faster movements and far higher power outputs than are found in maximal strength exercises (Moss et al., 1991 & Komi, 1979). An athlete can be exceptionally strong but lack significant explosive power if he is unable to apply his strength rapidly.

1.2 Biomotor ability

Performance in cricket is a complex process, both physical and mental fitness play vital roles in the performance of cricketers. It is influenced by factors like talent, technique, skill and training.

Bompa (1996) observes that, almost all physical activities incorporate one or more of the elements of force, quickness, duration and the range of motion. When a given exercise is required to overcome resistance, it is called a strength exercise. When quickness and high frequency is maximized, it is referred to as speed exercise. If distance, duration or the number of repetitions is high, an endurance exercise is performed. On the other hand, if the range of motion is maximized, a flexibility movement is performed; and finally, when in a given activity a high degree of complexity is required, coordination exercises are performed. Strength, Speed, and Endurance are inherited abilities which play the most important role in one’s chances of reaching high levels of performance. These are called dominant motor or bio motor abilities.

In Cricket, we find an excellent integration of these physical attributes in different actions executed by batsmen, bowlers, wicket-keepers and fielders in general. Strength is required when executing a powerful hit out of the
ground or to bowl a fearful bouncer. Speed is required to take a quick single, and to stop a ball before it crosses the boundary. Flexibility is shown by an acrobatic fielder. A square drive or a square cut speeding though the cordon of fielders show a high degree of coordination. A pace bowler bowling through the entire session shows ample evidence of endurance. Even a single shot executed by a master batsman shows an excellent combination of all these characteristics, when to a casual observer what was apparent was only good timing. Let us see an example of a well-executed cover drive. As a bowler runs in, the batsman begins to concentrate and watch and then in a split second he lunges forward showing speed and flexibility and times the ball well, showing strength and coordination. If he sees a chance to take a quick single, he speeds off to take one, and he does this, ball after ball which shows his stamina (Sharangapani, 1992).

Running, jumping, throwing are referred to as the fundamentals of natural human locomotion (Romanov, 2008). An essential element of successful cricket performance is the ability to accelerate, change direction quickly and move one’s feet quickly while at the crease. This requires development of speed and agility.

Speed is not a simple matter of leg length, muscle fiber type, race, culture or environment. While genetic predispositions will influence every human capability, the greatest error one can make is to under-estimate the range of potential that exists in every person. If an athlete does not demonstrate obvious sprinting ability at an early age, or on the first day of training, he need not necessarily be directed towards some other discipline. Over time, the capacity to run faster can be developed. Speed is not a matter of fact, a
question of luck or even a gift of genetics. Speed is a skill. Like any skill, it can be learned and developed by those who know how (Seagrave, 1996).

Running has long been accepted as an essential training component for the competitive athlete in almost every sport. Running is a skill that most of us learn at an early age. Because no two persons are anatomically exactly the same, each person has slightly different running style or form. However, there are certain things that all runners should pay attention to in terms of running style and proper form to help make running more efficient and reduce the possibility of injuries (Prentice, 1994).

Athletes can be exceptionally strong but lack significant explosive power if they are unable to apply their strength rapidly. Speed training drills are designed to develop quick feet, power and acceleration. Speed and agility training is an integral part of training for all top players, and can help one successfully perform most of the required movements for cricket.

Cricket is not a continuous steady state sport - there are frequent changes in running speed and intensity of effort, plus various strength and power movements like smashing the ball and leaping for a catch. Core stability allows hitting harder and bowling faster by enhancing ability to control arm and leg movement. Core stability is the origin of movement and the foundation for safe and dynamic cricket. It provides central body control, and allows generating power by maximizing the efficiency of muscular effort.

Core stability is the foundation for explosive movements and control (agility, balance and co-ordination), qualities vital meant for cricket. It is the ability of the trunk to support the effort, and forces from the arms and legs.
Muscles and joints can then perform in their safest, strongest and most effective positions.

In Cricket terms, one becomes more stable while batting, has better control while bowling, and becomes solid in one’s ability to catch and throw the ball.

At first glance cricket training and strength training might not seem to be a natural fit. However, batting, bowling and fielding (be it jumping, sprinting or throwing) are athletic movements that demand a high level of strength and power. A correctly designed programme can increase hitting power, throwing speed (and distance) and speed of the cricket player around the pitch. Athletes on the other hand should train movements rather than muscles. Throwing is a basic ability of humans which is expressed from the early stages of development (Schmitt and Churchill, 2003). Nowadays, the improvement of throwing skill is one of the main objectives in many sports, such as baseball, javelin, handball and others. During the last century, several training methods have been established in order to achieve higher ball speed release. Concerning handball – and in part with other relevant sports – it has been suggested that weight training results in improvement in ball throwing performance. One of the most important upper-limb sporting movements is the throw; indeed, in many sports the balance of a game could depend on the speed and accuracy of a single throw (Plyometrics, 2008).

Strength is the ability of the body, or a part of the body, to apply or withstand force. The development of strength relies on resistance training and involves exercising at various loads, modes, speeds, angles and frequencies.
The combination of these variables dictates the outcome of the resistance programme. Strength is required for power production, stabilizing a joint, supporting arms and legs, avoiding injury and coping with contact.

Maximal strength is the highest level of force an athlete can possibly generate. Its importance will vary between sports but this relates more to the length of the maximal strength training phase than whether it should be included or not (Bompa, 1999).

Power is the application of speed that translates strength into power. It is essential that players develop strength and core stability before progressing to power drills. Strength alone will enhance speed and jumping ability even before starting specific power training options. Power training options include sprinting while wearing a weighted vest or pulling a sled, plyometrics and Olympic lifts.

Improved strength is probably the single best way to improve a player's bowling speed and ability to hit the ball harder. Baseball pitchers throw at speeds of up to 160 km/hr and professional tennis players serve balls that cross the court at up to 250 km/hr. This equates to a rotation speed at the shoulder joint (‘shoulder angular velocity’) of more than 7,000 degrees per second, made possible by the arm moving through a series of stretch shortening cycles to produce a rapid development of force (Plyometrics, 2008).

Along with building a good base of strength and fitness, the skills of the game should be worked on, ideally as a team in order to produce a higher level of combined skills, as cricket is a sport that is played in different forms as batting, bowling, wicket keeping and fielding.
1.3 Skills in Cricket

Batsmen stay at the crease for as long as possible, sometimes for periods of over four hours. In order to occupy this position, a good batsman must be able to stay focused, have good ball / eye skills, and have the strength and fitness to make each played shot productive. On the other hand, power comes from having a strong core, abdominal mid-section and the ability to generate explosive upper body actions. While on the other, the kinetic energy of the ball may be used to score four runs by the batsman by a slight change in direction. Unfortunately this skill has only be given to a few class batsmen.

Fielders need the ability to sustain a concentrated effort for a period of six hours or more without fatigue and in sometimes very warm conditions. The body must be capable of explosive bursts at any given time - such as racing for a ball, jumping for a catch. Every cricket player can contribute his part to fielding unlike batting and bowling. In a tight game, fielding performance will invariably be the decisive factor between winning a match and losing it.

Cricketers while progressing through different stages of their development should find fielding enjoyable rather than a tiresome chore. Fielding drills and mechanisms thereof are taught from a very young stage. Even in international cricket one could observe fielders picking up the ball with improper balance and finding it difficult to make accurate throws to effect a run out. Learning to pick up the ball on either side will make the fielder confident to stop the ball and this makes the batsman a little nervous to start for a run especially when the ball is within the 30 yards circle. Fielding too is an
important skill of the game. In recent times, more attention is being paid to fielding.

The thrill that spectators get with a brilliant piece of fielding can seldom be matched by a huge six or the sight of the stumps sent flying by a quick bowler. Good fielders like Rhodes are always more popular than big hitters. Fielding is a regular part of every cricket game, big hitting may not always be seen in every match (Gavaskar, 2009).

Batters require both explosive strength and speed, combined with good muscular endurance, in order to be able to maintain a high count of number of overs. Poor fitness and muscular strength will result in inaccurate bowling and greater risk of injury, especially for high speed bowlers and also allows the batsmen to settle down in the wicket to score more runs. All players will at some time in the game, bat and field. A cricket training programme shall be designed with these as objectives in the mind.

Fielding was once a neglected element in the game of cricket with regard to both the importance placed on its role, and the absence of specific scientific research. When the over arm throw is used in a cricket specific sense, both speed and accuracy components are required (Cook and Strike, 2000).

The aim of the throw is to reduce the return time of the ball to the stumps in order to affect a run-out or minimize the runs scored by the opposing team. The main performance benefits result from the opportunity to gather and return the ball with either hand. This may reduce the time required to pick-up and release the ball, and therefore the total time to return the ball to the stumps.
Obviously, this benefit only exists if the non-dominant arm throw is similar in speed and accuracy to the dominant arm throw (Bower, 2005).

1.4 Ambidexterity in Sports

Archery has been a part of human history since man first stepped out of the cave and is still a popular sport today. Findings of stone arrow heads in Africa indicate that the bow was invented there possibly as early as 50,000 BC. Traditional archery was not merely used for hunting or warfare. Ancient Greek mythology tells of the great Odysseus winning Penelope in an archery competition. In primordial human life, the bow, the spear and the throwing stone were all ambidextrous tools. One can be sure that the most successful early humanoids were those who developed both sides skill with basic tools.

Ambidexterity is the ability to use both hands with equal ease or facility. The Greeks encouraged and tried to promote ambidexterity because it was simply logical in sports and battle to be adept with both hands instead of one. By combining the Phoenician style of writing right to left with their own left to right system, the Greeks created a reading and writing system called boustrophedon, where the lines ran alternately right-to-left and left-to-right. With alternating sweeps of the eyes back and forth, reading was more swift and efficient.

At the dawn of civilization, legend told of great heroes: Hercules the archer who could out shoot all mortals, at distance with accuracy, left and right handed. Civilization’s earliest Olympic games included target archery, javelin throwing, stone and discus hurling, left and right handed. In medieval times
knights trained for combat and tournament as both left and right handed participants (Archery, 2009).

Exposure and development are two integral steps of grooming talented performers. Luke Jensen was nicknamed “Dual Hand Luke” because he was an ambidextrous player able to serve at 130 KMPH with either hand in the game of tennis. (Wikipedia, 2009)

Brian Close, Adam Gilchrist, Sourav Ganguly and Ian Harvey have in common, the ability to use either hand to bat, bowl or field. In future, cricketers will become multi-dimensional. Incidentally, bilateral coordination exists in other sports. Baseball is famous for its hitters who switch hands, while Soccer and Australian Rules football coaches encourage players to use both sides. Tyson, however, is more optimistic. Most skills are based on the establishment of a motor neuron path within the body. Scientists have dispelled the myth that the unnatural hand will not be as strong as the natural hand especially when it comes to batting or bowling. Strength is not the question here opines Suratwala, Sports Physician with the National Cricket Academy India and that is more to do with establishing better coordination. The Process has to start at a younger age. There is little proof that skills will deteriorate if executed with the unnatural hand. (Bhatia, 2003).

1.5 Psychomotor Ability and Training

In 1899 Woodworth systematically examined the accuracy of voluntary movement. Woodworth believed that to understand the workings of the mind, the output of mental activity, movement, must be examined in its own right.
Woodworth proceeded to claim that the accuracy of movement is an important aspect to examine (Zelaznik, 1996).

The movement must have a particular direction, a definite extent or goal, a definite force, a definite duration, a definite relation to other movements, contemporaneous, preceding and following. Even in comparatively unskilled movements it is remarkable how many groups of muscles must cooperate, and with what accuracy each must do just so much and no more (Woodworth, 1899).

Stallings (1982) identified the following psychomotor abilities: Muscular Power and Endurance, Flexibility, Balance, Coordination and Differential Relaxation (selective adjustment of muscle tension).


Psychomotor activity is the combination of absorbing and processing external data at high speeds (reaction time) through the conscious brain, transferring that data via neural paths to the subconscious level, making decisions on the data, converting those decisions into instructions to the muscle structure and executing those instructions through changes in the physical positioning of various body parts (Thornhill, 2007).
A method of training a person to perform a physical task comprising the steps of

a. Monitoring the patterning of the person’s body parts as the person executes movement;

b. Identifying a prescribed action modality with which the person is associated on the basis of the patterning of the person’s body parts as in step (a)

Establishing a sequence of action forms to be carried out by said person in the course of performing task in accordance with the actioning modality of said person as identified in step and causing the person to perform said task by executing the component movements thereof in accordance with the sequence of action forms established in step.

Psychomotor abilities, sometimes called sensori motor, or just motor abilities, deal with issues of coordination, dexterity, and reaction time (Landy and Jeffrey, 2007). A careful inspection of these abilities immediately would remind us the jobs performed by various professionals like surgeons, crane operators, organists, archers and pilots.

Performing a psychomotor skill or excellence in sport requires the execution of precise, fluent and effective movement patterns which require the combination of perceptual and motor skills. Techniques are the basic movements of any sport or event e.g. a block start in a 100 metre race is a technique. An Athlete combines a number of techniques into a pattern of movement e.g. triple jump - running and then the hop, skip and jump phases.
A sound technique is a prerequisite for consistently achieving speed and accuracy when throwing. The majority of throwing literature has noted that the success of the over arm throw is related to the lagging of the athlete’s distal joints behind the more proximal joints (Putnam, 1993). The most effective sequence for segments to reach their peak angular velocity is upper trunk and upper arm (as a unit), forearm and then hand. The peak velocity of the ball is ultimately the result of this transfer of momentum from proximal to distal (Atwater, 1979) a process known as the summation of speed principle (Bunn, 1972). In examining throws from a standing position, Gray et al., (2006) proposed that unskilled athletes produce a lower release velocity due to under-developed co-ordination mechanisms.

1.6 Handedness and Bilateral Skill Transfer

In common parlance it can be said that handedness is the use of one hand in preference to other. This use is not by the greater development of the hand itself but by the functional dominance of one side of the brain over the other, says Winchester, (1966). Unitas and Dintiman (1979) opined that theories on the acquisition of left or right-hand dominance are wide and varied, ranging from logical to the absurd. All share one common bond: lack of scientific support. Close (1966) observed that ninety percent of human prefer to use their right hands and feet. Children acquire their dominant side by the age of six months and this dominance can never be changed successfully. Peoples (1953) says even moderate left-handedness presents some difficulties.
Bilateral transfer is usually defined as the gain or loss in performing a task with a limb not generally used in practising or experiencing the task (Young & Schmidt, 1987). While individuals often prefer using one limb when performing a bilateral motor skill, the capability of performing with both limbs is particularly beneficial for certain sport skills. Examples might include dribbling a soccer ball with either foot or shooting a basket ball with either hand (Stallings, 1982).

Bilateral transfer is also a frequent objective of therapeutic rehabilitation programs that focus on recovering the function of injured or damaged limbs. Many of these programs are based on the finding of early research studies that demonstrated a positive bilateral transfer of muscular performance, power, and endurance in contra lateral limbs less amenable to training due to temporary functional limitations.

The learning of motor skills is very often restricted by the amount of time available for instruction or practice, added to that often is the strong feeling by the novice of wanting to be successful at the skill. Such factors combine to suggest that the novice, when given a choice, will emphasize the limb with which he or she feels most comfortable. Generally, that limb will be the one that will provide the greatest opportunity for quick success. The other limb remains largely ignored until the player becomes involved in the situations where a lack of bilateral competence becomes a distinct liability (Magil, 2006).

In the year 2009, people are no longer barbarians; they work in offices, or operate machinery, they do feudal combat in civil court. They do not have
to hunt. They purchase protein in packages at the market. Spine alignment and body balance are no longer important to survival. Left or right handed weakness has become more total and has been accepted within oneself, in the recesses of one’s own mind. Body balance is the key to every thing! In order to achieve body balance one must first free the mind (Archery, 2009).

The ability to learn a particular skill more easily with one hand or foot after the skill has been learned with the opposite hand or foot is related to what is known as bilateral transfer. The focus of bilateral transfer is the transfer of learning between limbs rather than between tasks.

Skill training refers to the development of the same class of psychomotor skills that are required to hit a curve ball, shoot a jump shot or play a piano.

Early practice sessions should concentrate on the development of a reasonable degree of skill performance proficiency with one limb before practice begins with the other limb. By achieving some level of proficiency, the individual will have answered most of the cognitive questions that need to be answered in early practice and will have developed a motor programme for the practised action to a point where skill refinement becomes the goal of practice.

1.7 Brain and Movement

The incredible ability of the injured and uninjured brain to reorganize, change and adapt is now a recognized process known as ‘plasticity’. It is now known that the brain is capable of ‘plastic change’ and learning throughout
life. This is also great news for sports people of all ages, insofar as improving proprioception and agility or honing tennis strokes and making changes to golf swing or other sporting techniques are possible whether one is four or 104 (Doidge, 2007). These motor skills are acquired through the formation of nerve circuits or ‘maps’ in the brain, which in turn need certain growth factors such as human growth hormone to stimulate nerve growth and ‘wiring’ together of the nerve circuits that make up each brain map. Human Growth Hormone is abundant during our formative years and until very recently it used to be thought that the release of this supercharged growth hormone reduced dramatically once human beings were past their early 20s (Ratey, 2008). Brain maps are like road maps, such that they spell out one-to-one correspondence between two different things. Body maps in the brain systematically map aspects of the outside world and the body’s anatomy onto brain tissue. Peripersonal space is the space around the body that extends to about arm’s length and therefore both body and our brain map of it changes every time the players move (Frith, 2007). This mapping also extends to any tools or sporting implements the people use such as Racquets, Golf clubs, Hockey sticks, Javelins etcetera.

Plasticity and motor learning is more prolific, however, during childhood and adolescence and it is much more likely that levels of sporting excellence akin to those achieved by elite professionals are possible if the individual starts to play sports such as golf or tennis in their childhood. In part, the likelihood of achieving sporting excellence is dependent upon learning specific motor skills early in life.
The brain and nervous system require periods of consolidation to reinforce motor learning and skill acquisition. Therefore, after periods of motor training, neuro physiological consolidation of these new movements and skills occurs. The experience of motor skill consolidation is the often apparent slowing or plateau in skill progress despite continuing training at the same or greater levels. However, it is really important at this juncture of motor learning not to give up. Persistence with training drills at this point achieves the consolidation necessary for longer term skill acquisition and stimulates the next burst of motor learning.

Biologically the brain and nervous system form brain maps through the wiring together of nerves. This process is referred to as long-term potentiation (LTP) (Sweatt, 2009 and LeDoux, 2002). LTP enables the brain and nervous system to learn and form ‘memories’. LTP is noticeable for those who have ever attempted to learn any skilled motor movements, be it performing a gymnastics routine, hitting a golf ball or bending a football around a defensive wall into the top corner of the goal.

First attempts at performing these activities are often clumsy and unsuccessful but continued practice with good technique stimulates more LTP and the formation and strengthening of a new brain map enabling successful completion and memory of the task. Continued practice stimulates increasing LTP and improves the efficiency of the nerve circuitry making up the ‘movement maps’, thus requiring less and less effort and concentration from the individual to initiate and carry out the task. Movements become easier, smoother and perhaps even perfected over time (LeDoux, 2002).
1.8 Imagery and Motor Performance

Weinberg and Daniel (1995) wrote that in any sport, a player’s success or failure results from a combination of physical and mental abilities. Most coaches consider that sport is at least fifty percent mental, with certain sports such as golf, tennis and figure skating, consistently receiving percentages in the 80 percent to 90 percent range. Jimmy Connors, known for his mental tenacity and toughness, has often stated that professional tennis is 95 percent mental.

According to Smith (1994), a former English Cricketer, "Cricket is played in the mind, more than any other game". The mental training strategies which players use these days are not new. Many of them have been in use for centuries. An ancient book which describes the training programme for the Samurai warriors of Japan devoted half of the text to the mental preparation of these superior athlete warriors.

Weinberg (1984) categorizes the psyching-up strategies into five domains. They are attention focus, self talk, relaxation, imagery and preparatory arousal. Athletes need to be capable of shutting out distractions and paying attention to the things that matter in their sport performance. This is particularly the case at the critical moments of performance. It is essential at these times that athletes are completely focused on the necessary cues for successful execution of a skill (Bull, 1996). Imagery is a most powerful mental training technique. Most of the world’s top sportspersons regularly practice imagery. Imagery is more of systematic practice of creating and strengthening
strong positive mental image. It is dramatically effective for converting the desires from mental state to physical state.

Mental practice alone cannot replace good range training, but it serves as an effective supplement when actual training is not possible because of weather, injury or time limitations (Bassham, 1995).

Imagery is one of the popular mental preparation strategies where players try to mentally picture themselves (going through the actual movement in their mind) prior to competition or training. The different terms used for imagery are visualization, mental rehearsal and mental practice.

Orlick (1980) opines that, the ability to physically relax and calm oneself mentally is important because it allows you to teach an optimum level of activation which enhances performance. Peak performances often occur when the mind and muscle combine in free flowing experiences.

Ten years of training had not fully prepared me to win the gold. I lacked the mental skills said Bassham (1995). If a slow, short, uncoordinated kid can become an Olympic champion, then it must be the mental and not the physical abilities that earn the medals. Performance is a function of three mental processes: controlling the Conscious Mind, the Subconscious Mind and the Self–Image.

Mental imagery has attracted a great deal of attention from psychologists and those interested in functional brain imaging. It does not exist in isolation, as a critical part of generating a mental image in memory itself (Arthur and Mazziotta, 2000).
It is difficult to single out a study or two, but one ingenious approach to the study of mental imagery was to use imageable and non imageable verbal paired associates and then to ask subjects to recall the associates while undergoing a PET scan (Fletcher et al., 1995). Brain mapping techniques have made significant inroads into understanding the mechanisms of human vision. Both PET and fMRI have been major contributors to this effort by defining loci and networks in the brain, but structural imaging can still play an important part.

1.9 Improvised Skill in Cricket

The spiritual home of cricket may well be the Lords in London. But the future of the game most definitely lies elsewhere. The skills that are now in the game of cricket may be looked at differently to modify the skills or add new or improvised ones in future.

Players and coaches like Mushtaq and Hanif Mohammad, Bob Woolmer, Andy Flower and Javed Miandad were all exponents of the reverse sweep and would have been labelled unorthodox at one time during their careers. Soon they will be seen as the pioneers that inspired Kevin Pietersen to turn and bat left handed.

In June 2003 at The Rose Bowl in Hampshire, England, the very first game of Twenty 20 cricket was played between the two English county teams Hampshire and Sussex. Twenty 20 cricket will produce cricketers the likes of which the cricket lovers have not seen before. It would not be long before ambidextrous players become more common. Soon the Einsteins of the cricketing world will be bowling both left arm and right arm, spin and seam in
an over, before throwing down the stumps with either hand. They will follow
that up with switch hitting sixes on both the on and off sides (McGlasham,
2009).

A reverse sweep is a cross-batted sweep shot played in the opposite
direction to the standard sweep, thus instead of sweeping the ball to the leg
side, it is swept to the off side, towards backward point or third man. The
batsman may also swap his hands on the bat handle to make the stroke easier to
execute. The advantage of a reverse sweep is that it effectively reverses the
fielding positions and thus is very difficult to set a field to. It was first regularly
played in the 1970s by the Pakistani batsman Mushtaq Mohammad, though
Mushtaq's brother Hanif Mohammad is sometimes credited as the inventor.
Cricket coach Bob Woolmer has been credited with popularising the stroke.
Damien Martyn of Australia has been said to have "the most brutal reverse-
sweep in the game" (Batting, 2009).

A switch hit is a shot pioneered by Kevin Pietersen in 2008, and first
used during the New Zealand series in England in 2008. In this shot, a batsman
changes his handedness and posture to adopt a stance the mirror image of his
traditional handedness while the bowler is running in to bowl. As a fielding
team cannot maneuver fielders while the bowler is in his run-up, the fielding
side is effectively wrong-footed with the fielders out of position. The legality
of such a ploy was questioned during the series but the shot was cleared by the
International Cricket Council as legal.
1.10 Advantages of non dominant limb usage

In all tasks where velocity and accuracy are performance requirements, a trade-off between the two objectives exists. A study on European Handball found projectile velocity to be approximately 85% of maximal velocity when accuracy is a consideration (Tillaar and Ettema, 2003). Interestingly, this study also showed that when instructions to athletes emphasized accuracy, a significant decrease in velocity occurred with no corresponding increase in accuracy.

Athletes who use both their dominant and non-dominant limbs in the sport of cricket benefit from performance improvement and injury prevention. The increased use of the non-dominant arm may support the build-up of muscles on both sides of the body possibly decreasing the prevalence of these overuse injuries that plague the sport of cricket. Fielding in cricket has improved in the last decade. What the game of cricket needs now is multi-skilled players. In Cricket, ambidextrous fielders make shot selection difficult, leaving batsmen unsure as to whether to aim shots to their right or left.

Training a non-dominant limb may increase a competitor’s ability to perform with either side of his body and confer an advantage over competitors who use one side of the body exclusively. Ambidextrous cricketers will be the most sought after in any competitive team in future. Therefore the need at present is to have scientifically designed psychomotor training packages to improve ambidextrous cricketers.
1.11 Statement of the Problem

The main objective of this study was to analyze the effects of a preseason psychomotor training package on selected physical and performance parameters related to the use of the non-dominant arm among cricketers.

1.12 Need of the Study

In the game of cricket ambidextrous fielders make shot difficult for the batsman and thus create pressure to them. Ambidextrous fielding ability not only proves to be an asset to the fielding side but also minimizes the fielders from the possibility of getting injured due to overuse of the shoulder. In the recent form of Cricket Twenty20 ambidextrous fielders will have a definite advantage during fielding. In order to find out the training effects on the non dominant side, this study was selected.

1.13 Hypotheses

It was hypothesized that

1. Practice of a preseason psychomotor training package may significantly develop the selected physical and performance parameters of cricketers.

2. There may be considerable improvement in velocity and accuracy of throws with the non-dominant hand which may closely match the dominant arm.
1.14 Significance of the Study

1. This study would help to evolve a preseason psychomotor training programme to augment the performance of Polytechnic college level cricket players and others.

2. This study may guide the Cricket coaches and trainers to follow a suitable psychomotor training programme to improve non-dominant side performance.

3. The result of this study would be useful as guideline for Physical Education professionals or coaches to design various programmes to suit the cricketers at different levels.

4. This study would provide an understanding about skill transfer and the underlying mechanism behind bilateral coordination, training and ambidextrous performance.

1.15 Delimitations

1. This study was delimited to Cricket players in the age group of 16 to 19 years who had participated in the Polytechnic College tournament during 2008-2009.

2. This study was confined to preseason training only.

3. This study was delimited to Physical Fitness variables of speed, Sit-ups & grip strength, reaction time, over arm throwing parameters throwing velocity of dominant and non dominant arms and performance
parameter of MNK skill test for throwing accuracy of both dominant and non-dominant arms.

4. Training was limited to non-dominant arm only. Training benefits to the dominant due to activities that are bilateral in nature was considered as delimitation of the study.

5. The duration of training period was scheduled to 12 weeks and the number of sessions per week was confined to five with each session lasting for two hours including warming up and cool down.

6. Though there are alternate methods to measure velocity of the throws, hand held Radar gun was used in this study.

7. The data were collected on the selected variables two days prior and immediately after the training period.

8. No attempt was made to equate the groups.

1.16 Limitations

The following limitations were not considered while interpreting the result of the study.

1. The participants’ were aged between 16 and 19; hence the results can not be generalized to other populations.

2. Certain factors like personal habits, diet, climatic condition and players past training which might have an influence on the result of this study were not taken into consideration.
3. Though the participants were motivated verbally, no attempt was made to differentiate motivation levels during the period of training and testing.

1.17 **Operational Definitions**

1.17.1 **Psychomotor Training**

A technique for training a subject to successfully perform a physical task and thereby acquire a skill in the performance of that task involves analyzing the action characteristics of the subject and, from that analysis, establishing an optimal sequence of movements to be carried out by the subject that are associated with particular patterning of the subject’s body parts. (psychomotor training)

1.17.2 **Ambidexterity**

The property of being equally skillful with each hand (Saunders, 2009).

1.17.3 **Plyometrics**

Plyometric exercise is an activity that involves and capitalizes on the mechanisms of the stretch shortening cycle to increase the efficiency of force production at a joint or increase performance (Chmielewski and Gregory, 2006).

1.17.4 **Speed**

Speed is “the displacement per unit time and is typically quantified as the time taken to cover a fixed distance (Baechle & Earle, 2000).
1.17.5 Speed Training

Speed training is to condition the athlete to move at high velocity, employing maximal power when needed. In order to do this, the neuromuscular system must be conditioned to very fast movements and training need to be very specific, with a very high anaerobic component (Bloomfield, Ackland and Elliott, 1994).

1.17.6 Bilateral Coordination

It is the ability to use both sides of the body at same time.(Bilateral 2008).

1.17.7 Muscular Endurance

Muscular endurance is the ability of a muscle or muscle group to do repeated contractions against a less-than-maximum resistance for a given period of time (Baechle & Earle 2000).