Chapter I

INTRODUCTION

In the world of sport, winners and losers are often separated by inches, tenths of a second, a single missed shot, or one critical error. It is not unexpected therefore that athletes and coaches have started to emphasize proper mental preparation as one way to stay a step ahead of their competitors. One of the most popular of the mental preparation techniques is imagery.\(^1\)

Mental imagery is the process by which, an athlete visualizes himself or herself performing an upcoming task. There are many names for mental imagery including visualization, mental rehearsal, mental practice, and cognitive enactment. Each name for mental imagery has its unique style in the way it is used. However, they are all used for the same purpose: to improve the performance of the individual. The use of mental rehearsal and mental imagery by an athlete prior to a competition results in improved performance in the competition. Many experiments in track and field, volleyball, and golf have been done to test this hypothesis.\(^2\)

The ability to repeat the skills and movements over and over in ones head will help them to create a lasting memory, that will do nothing but help the athlete perform the task perfectly without hesitation. Many coaches see the mental practice as important as the actual physical

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practice and will ask their players to complete a mental workout at home after the practice is over. The best athletes are those who follow through with the instructions, deeming that more practice leads to success. Imagery can help enhance performance with its enhanced repetition of a skill. It is also important to remember that when using imagery that it should be used frequently and not just in certain situations. It needs to be developed and practiced regularly.³

There are two factors to take into consideration when discussing the use of imagery by athletes. The first is the perspective from which imagery is practiced, and the second is the sensory mode from which imagery is experienced.

There exist two perspectives from which imagery can be applied. The two imagery perspectives are internal and external. In internal imagery, the athlete imagines herself executing a sport task from within her own body. Shut your eyes and imagine for a moment that you have a basketball in your hand and you are preparing to shoot a free throw. If your perspective at this moment is from within, our body looking toward the basket, this is an example of internal imagery. You imagine yourself bouncing the ball a few times, you position yourself for the shot, and you shoot what do you see? You see your hand releasing the ball and traveling toward the basket. However, you do not see the rest of your body. Internal imagery is very natural for us, because this is the way we actually see the world when we execute a sport skill.

Conversely, external imagery is very unnatural to us. In external imagery we imagine our self to be outside of our body watching from a dis-

tance. Let's take the basketball free throw example again. Shut your eyes and imagine you are going to shoot a free throw—only this time, imagine that you are outside your body, watching yourself from a distance. You see yourself bounce the ball a few times, position yourself for the shot, and then shoot it. You can see all of these things. You can see, for example, that your right foot is about six inches in front of your left foot, and you notice that your elbow is pointing toward the basket immediately prior to the release of the ball. External imagery provides an excellent perspective from which to observe skill technique and form. We might assume that internal imagery is superior to external imagery because it is more natural to us. However, it might be the case that because the internal perspective is the natural state of affairs, external imagery might add something new and unique to our perspective. The uniqueness might actually make external imagery more beneficial from a performance enhancement perspective.

We defined imagery as “using all the senses to recreate or create an experience in the mind.” Notice that this definition includes the notion that all of the senses are involved in imagery. This would include vision, hearing, smell, taste, and proprioception (feel). Proprioception is a broad term that refers to tactile and kinesthetic input to the brain. Kinesthetic sensitivity informs the brain about movements in the joints and in the muscles.4

The effectiveness of imagery has received a great deal of anecdotal support with such noted athletes as Chris Evert, Jack Nicklaus, Jean-Claude Killy, Dwight Stones, and Greg Louganis (Just to name a few), all reporting the use of imagery in their training and providing testimonial to its effectiveness in enhancing their performance. The extensive use of imagery by elite athletes was substantiated in a recent study by Hall,

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Rodgers, and Barr (1990), who found that national, international and state level Canadian athletes from a variety of individual and team sports used imagery more extensively than recreational athletes. Similarly, a study conducted on United States Olympic athletes (Murphy, Jowdy, & Durtschi, 1990) found that 90% of the 159 Olympic athletes surveyed reported using imagery and 94% of the Olympic coaches surveyed used imagery with their athletes and teams. In addition, 40% of the Olympic Athletes reported that they used imagery on the average of three to five days a week with 20% saying that they used imagery everyday.  

Imagination is omni present, people utilize their imagination to achieve a diversity of goals, to relax, to experience excitement, to enjoy their holidays over and over again, to resolve a mathematical problem, to create new objects, to find solutions for persistent practical problems, to acquire stress management skills, and to practice motor tasks, to mention only a few examples. However, not with standing this variety, all imagery has one feature in common, it is essentially a cognitive process and hence images do not have to obey the laws of the physical world. That is one of the reasons why imagination is such an attractive past time. Through imagery, one can meet beloved people who are thousand miles away, ignore gravity, and fly like a bird or jump over 2.40 meters.

Imagery is a tool that has been used for many years. With all the new technologies, developments of equipment and performance enhancing drugs, the use of mental practice still weighs out to be one of


the most beneficial forms of preparation for a sport. The focus and attention paid to the detailed motions and routines of a skill in imagery keeps it high on the basic practice schedule of coaches all across the world. The professional athletes are always seen on the court or field with their eyes shut or pointing to their head pointing out to the crowd and their opponents that the real game and preparation is in the mind not in performing the action. Success is the desired goal of anyone who wants to be an athlete. Mental imagery alongside practice is the best combination to ensure positive outcomes in the life ahead of the athlete.⁷

Visualization is the process of creating pictures or images in mind where as language is thinking in words, visualization is thinking in pictures. Very simply, it is the use of imagination, seeing with the mind’s eye. It is the recreation of past experience through mental images. The term, visualization includes the recreation of the feelings, sensation, and emotions that accompany those images. Visualization then represents the mental reconstruction of experience. In visualization, one needs to think in pictures not in words. Rather than telling himself to get that important hit, to make the shot, or to serve an ace, he needs to see himself doing it. Create the picture and then copy the image.⁸

Mental imagery gives a chance to deal with a problem or event in the head before one is confronted with it in the real world. Mental practice is used by many superior athletes to practice physical skills, such as jumps, shots, lifts, tricks, plays, routines, strategies and so on. Virtually any physical skill or combination of physical skill can be practiced in imagery, once an athlete becomes adept at using imagery. However, the effective

⁷http://webmail.mobap.edu/portfolios/hss/Mumm/Imagery/In/Sport-Grad/School
use of imagery requires practice. It is important to note that the major
difference between mental imagery working and not working relates to
the athlete’s ability to vividly imagine that he executes the desired skill or
response.

Many athletes find it helpful to visualize that they perform perfectly
prior to their competitive performance. For some athletes it serves as a
last minute reminder of the pattern they wish to produce, for others it
takes their mind off any thoughts of worry or self doubt, gives a last feeling
of confidence and free their body to perform. Engaging in mental practice
after a successful experience can also be valuable.9

Imagery has- both a cognitive and a motivational function. It is the
motivational function that makes imagery a viable energizer. As the tennis
player prepares for an important serve, he visualizes the ball "leaping" off
his racket and "exploding" into the backhand corner of the opponent's
receiving court. As the spiker in volleyball approaches the net, she
visualizes herself "smashing" the ball over the block and into the
unprotected deep down-the-line corner of the opponent’s court. In golf,
the golfer sees himself “drive” the ball in a low trajectory deep into the
middle of the fairway. Visualizing successful outcomes in situations re-
quiring activation and strong effort is motivating and energizing.10

Successful athletes use imagery and visualization to their advantage.
Not all athletes are able to verbally describe exactly how they use imagery.
but some can. Jack Nicklaus, one of the greatest golfers of all time, not only
used imagery but was able to describe in detail how he used it. The

following quotation provides an eloquent description of how one great athlete used imagery prior to every shot:

I never hit a shot, not even in practice, without having a very sharp, in-focus picture of it in my head. It's like a color movie. First, I "see" the ball where I want it to finish. Then the scene quickly changes and I "see" the ball going there... Then there is sort of a fade-out, and the next scene shows me making the kind of swing that will turn the images into reality (Nicklaus. 1974. p. 79).

Other great athletes who have commented on the use of imagery in preparing for competition include Michael Jordan in basketball, Chris Evert in tennis, Greg Louganis in diving, Mike Piazza in baseball, and Nancy Kerrigan in figure skating. Clearly, imagery has been useful for great athletes. It is also instructive to hear how figure skaters utilized imagery in a controlled scientific investigation. Garza and Feltz (1998) randomly assigned elite figure skaters into a control condition and two different experimental imagery conditions. One imagery condition used a paper drawing exercise in which skaters traced with a pencil their imagined moves on ice. A second condition did a walk-through on the ice and imagined their skating moves along the way. The control condition simply engaged in stretching. When the post-intervention skating performance of the three groups was compared, no differences were observed between the imagery groups but significant differences, favoring the imagery groups were observed between the control group and the imagery groups.\footnote{Richard H. Cox, Sports Psychology Concepts and Applications, 5th ed., McGraw-Hill, Inc., New York, (2002), p.261 cited by Nicklaus, J., Golf My Way, New York: Simon and Schuster, (1974), p.79,cited by Garza, D. L., Effects of Selected Mental Practice on Performance, Self-efficacy, and Competition Confidence of Figure Skaters, The Sport Psychologist, 12 (1998):pp. 1-15.}
Imagery has been defined as "using all the senses to re-create or create an experience in the mind" (Vealey & Greenleaf, 2001, p. 248). An expansion of this brief definition clarifies that (a) an image can be created in the mind in the absence of any external stimuli, (b) an image may involve one or all of the senses, and (c) an image is created from information stored in the sensory register, working memory, or long-term memory.12

Block (1981) identified imagery as one of the most important topics in cognitive science. Two general theories have evolved. The first states that when we imagine a scene in our mind’s eye, we are scanning an actual image that has somehow formed in our brain. This is not to say that a brain surgeon could find actual physical pictures lodged in our brain, but that the images are as real to us as an image taken from the retina of the eye. This position is held by the so-called pictorialists. The second position in that of the descriptionist. The descriptionist argues that there is no such thing as a mental image. That is, when we imagine a physical scene in our mind’s eye, we are not really seeing an internal image, but the graphic and detailed nature of our language makes it seem so. Our thoughts, as it were, actually manufacture an image so clear that we think we are seeing one.

Regardless of whether the pictorialist or the descriptionist perspective is most accurate, the images seem very real to us. Most everyone has experienced either dreams or daydreams that are so vivid and lifelike that for a moment we truly believe they are real.

Imagery is the language of the brain. In a real sense, the brain cannot tell the difference between an actual physical event and the vivid imagery of the same event (Fisher, 1986). For this reason, imagery can be used by the brain to provide powerful repetition, elaboration, intensification, and preservation of important athletic sequences and skills.

The powerful effect of images and thoughts is highlighted by a study reported by Hale and Whitehouse (1998). They presented skilled soccer players with videos of critical game situations in which either the word "challenge" or the word "pressure" was flashed on the screen. The word "pressure" resulted in an increase in self-reported anxiety and a decrease in self-confidence compared to the presentation of the word "challenge." The images we see influence the emotions we feel, which in turn influence how we perform. Other terms that have been used as synonyms to imagery include cognitive and symbolic rehearsal, mental rehearsal, visualization, and mental or covert practice. Some distinction, however, can be made between imagery and mental practice. In the case of learning, imagery is used by the learner in conjunction with physical practice to strengthen the learning pattern. Used in this way, imagery is referred to as mental practice. In the case of performance preparation, imagery is used to prime or prepare the athlete for correct execution of a physical skill. Used in this way, imagery is referred to as mental rehearsal (Rushall & Lippman, 1998).

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Imagery is widely used in sport psychology research and practice to increase/maintain physical and psychological skills, and to build confidence in training and competition (Martin, Moritz, and Hall, 1999; Murphy and Martin, 2002). Optimal use of imagery requires consideration of the types of imagery performers use (Morris, Spittle and Watt, 2005). Research has shown that specific types of imagery are more effective than others in different contexts (e.g., Cumming and Stemarie, 2001).

Many sportsman make use of mental training to enhance their performance respectively when preparing for competitions. Actual research in sports psychology is focusing on methods and effects of mental training from it is necessary to measure the structure of mental representation of the movement which has to be enhanced. We hypothesized that athletic expertise is characterized by well integrated networks of perceptual cognitive concepts. Drawing on experimental studies, these concepts have been labeled basic action concepts (BAC). BACs are cognitive compilations of movements based on their shared functions in the attainment of action goals. Their characteristics set of features results from the perceptive and functional properties of movement effects.

Imagery has been described as “an experience that mimics real experience, and involves using a combination of different sensory


modalities in the absence of actual perception” (Cumming & Ramsey, 2009, p.5).

Imagery is a psychological technique which has demonstrated its effectiveness in sport through positively affecting psychological states, such as decreasing anxiety and enhancing self-confidence, self-efficacy and concentration (Garza & Feltz, 1998; Post & Wrisberg, 2012). It is also beneficial for use as a coping strategy, maintaining existing skills, and reviewing past performances (Thelwell & Maynard, 2002; White & Hardy, 1998).

Imagery is popular among all athletes, from grassroots level up to elite sports personalities. For example, Brazilian footballer Ronaldinho employs imagery for game preparation and strategy purposes:

“When I train, one of the things I concentrate on is creating a mental picture of how best deliver the ball to a teammate, preferably leaving him alone in front of the rival goalkeeper. So what I do, always before a game, always, every night and every day, is try and think up things, imagine plays, which no one else will have thought of, and to do so always bearing in mind the particular strength of each team-mate to whom I am passing the ball. When I construct those plays in my mind I take into account whether one team-mate likes to receive the ball at his feet, or ahead of him; if he is good with his head, and how he prefers to head the ball; if he is stronger on his right or his left foot. That is my job. That is what I do. I imagine the game”.

Former England rugby international fly-half, Jonny Wilkinson, also uses imagery as an important mental preparation technique. He talks about how he listened to a pre-recorded imagery script (another method of employing imagery) before the 2003 World Cup Final:
“I surface for my usual pre-match ritual of a shave and shower before settling down to listen to a mental rehearsal CD. The script is prepared by myself and [my coach] but read by him. This visualization technique is a sort of clarified daydream with snippets of the atmosphere from past matches included to enhance the sense of reality. It lasts about twenty minutes and by the end of it I feel I know what is coming. The game will throw up many different scenarios but I am as prepared in my own head for them as I can be. If you have realistically imagined situations, you feel better prepared and less fearful of the unexpected” (p.49).

The PETTLEP model of imagery

In 2001, Holmes and Collins proposed a model of imagery that highlights the link between physical and imagined movements. The model is based on work by Jeannerod (1994; 1997) which proposes that there are certain shared areas in the brain that are activated during both physical and imagined movements. This is defined as “functional equivalence” and is hypothesized as the means by which imagery can improve performance. It is suggested that if there is a greater similarity between the image and the physical movement (i.e. a greater degree of functional equivalence), it may help to add more detail to the image and enhance the vividness of the image.

PETTLEP is an acronym which stands for 7 key elements to include during imagery to create the most functionally equivalent image possible. Using the example of a footballer, the specific details to include would be:

Physical – image the relevant physical characteristics. For example, a footballer would image dressed in their kit with the football at their feet.
Environment – if possible, image in the environment where the performance takes place e.g. football pitch.

Task – try to image details relevant to the task (e.g. attentional demands) and image at the appropriate level of expertise for the performer (i.e. a novice footballer should avoid imagining an elite level player as it is not as functionally equivalent).

Timing – the most functionally equivalent approach is to image in ‘real time’, but ‘slow motion’ imagery can be used to emphasis and perfect more difficult aspects of a skill (O & Hall, 2009). For example, a footballer may wish to ‘slow motion’ image a particularly tricky piece of footwork.

Learning – the imagery should be continually adapted and reviewed over time to match changing task demands and the experience level of the athlete. For example, as a novice footballer progresses and masters a skill, they should adapt the imagery to reflect their improvement in performance.

Emotion – include the same images that would be felt in the physical situation. However, try to avoid debilitating emotions (e.g. fear, panic). For example, a player imaging taking a penalty would include feelings of confidence and adrenaline rushes.

Perspective – the imagery perspective can be first person (through your own eyes) or third person (like watching yourself on video). However, one perspective may be more advantageous depending on the task characteristics. A first person perspective (or internal visual imagery) may be more beneficial for tasks including open skills and with a focus on timing (e.g. tackling). On the other hand, a third person perspective (or external visual imagery) is preferred for tasks where form and positioning
is important, such as heading the ball or kicking technique (Hardy & Callow, 1999).

Imagery can be used at any time, whether it is pre-match, during performance, or post-match. It can even be the last thing you do before bed. Try to incorporate PETTLEP imagery into your sport routine and see if you notice the benefits!\(^\text{16}\)

**Relaxation:**

Learning and performing are separate but complementary processes. If each process is done well, the athlete cannot only become more proficient in that particular process, but can strengthen the effectiveness of the other process as well. That is, if one knows how to learn well, he can be in a better position to perform what has been learned, and if he can perform well, he can be in a better position to learn new things.

Relaxation: Is one of the cornerstones of consistently high-level performances. Those who place great value on relaxation believe that (besides the direct benefits derived from it), if one can control himself enough to relax, he can also exert the same control in his performances.

A relaxed state of mind prepares the performer to produce more effectively than if it were in a slightly tensed state, just as a relaxed muscle can contract more effectively than a slightly tensed state. Relaxation is nice in itself, but it also facilitates the organization of thoughts, conserves energy, heightens awareness, and controls minute aspects of a performance.


(Retrieved on September, 2012)
Relaxation is the foundation of handling performance pressures and channeling energies into productive directions. Relaxing is a skill that like any other skill will take time to develop and refine. The more proficient one becomes with one's own unique style, the less time it will take to become more deeply relaxed. The key is to regularly practice one's own style of relaxing. Relaxing, centering or meditating is the clue that forms our aspirations. Mental imagery is the tool that shapes, refines, and actualizes these aspirations.\textsuperscript{17}

Modem progressive relaxation techniques are all variations of those outlined by Edmond Jacobson (1929, 1938). Jacobson began his work with progressive relaxation in the early part of the twentieth century. It was Jacobson's basic thesis that it is impossible to be nervous or tense in any part of the body where the muscles are completely relaxed. In addition, Jacobson believed that nervousness and tenseness of involuntary muscles and organs could be reduced if the associated skeletal muscles were relaxed. According to Jacobson, an anxious mind cannot exist in a relaxed body.

Jacobson's progressive relaxation procedure requires that subjects lie on their backs with their arms to the side. Occasionally a sitting posture in a comfortable chair is recommended. In either case, the room should be fairly quiet and arms and legs should not be crossed, to avoid unnecessary stimulation. While the goal of any progressive relaxation program is to relax the entire body in a matter of minutes, it is essential that in the beginning the subject practice the technique for at least one hour every day. Once the relaxation procedure is well learned, the relaxation response can be achieved in a few minutes.

Jacobson’s method calls for the subject to tense a muscle before relaxing it. The tensing helps the subject recognize the difference between tension and relaxation. Once the subject can do this, he should be able to relax a limb completely without tensing it first. Jacobson warns that only the first few minutes of any relaxation session should be devoted to muscle tensing. The remaining time should be devoted to gaining complete relaxation. For a muscle to be considered relaxed, it must be completely absent of any contractions and must be limp and motionless.

Jacobson’s full progressive relaxation procedure involves systematically tensing and relaxing specific muscle groups in a predetermined order. Relaxation begins with the muscles of the left arm and proceeds to those of the right arm, left and right legs, abdomen, back, and chest and shoulders, concluding with the neck and face muscles. The full training procedure lasts many months. In the beginning stages, an entire session should be devoted to the total relaxation of a single muscle group. While it is unrealistic to expect an athlete to devote this much time to learning to relax, Jacobson’s point is well taken. A well-developed relaxation training program requires a great deal of practice in the beginning. It is unrealistic to expect all athletes to elicit the relaxation response at will after only one or two fifteen-minute practice sessions. However, after several months of practice and training, it should be possible to evoke the relaxation response in a matter of seconds.

Abbreviated versions of Jacobson’s full forty-Session procedure have been proposed (Davis et al., 1995; Greenberg, 1996). A review by Carlson and Hoyle (1993) provided evidence that abbreviated progressive relaxation training procedures are effective in reducing anxiety, tension, and stress. Numerous variations of Jacobson’s original progressive relaxation procedure have proved to be effective. For example: it is not
necessary that the procedure always start with the left arm. And in some cases a muscle contraction could be best accomplished by applying resistance to an immovable object.

The ultimate goal of any relaxation training program is to 'evoke the relaxation response to counter stress in a specific situation. For example, a professional golfer does not have thirty minutes to relax prior to a $15,000 putt. The golfer must be able to accomplish this while waiting to putt, a skill that takes many hours of practice to master.

Research has clearly shown that progressive relaxation procedures are effective in eliciting the relaxation response. Additionally, numerous investigations have shown that when used in conjunction with other cognitive or arousal control interventions, it is associated with increased sports performance. Greenspan and Feltz (1989) critically reviewed nine investigations in which forms of relaxation intervention were involved. The majority of the studies showed that increased performance was associated with arousal control in combination with some other cognitive technique. Few studies, however, have shown that progressive relaxation procedures alone effectively enhance performance. For example, Wrisberg and Anshel (1989) showed that relaxation used in conjunction with imagery was effective in enhancing the basketball shooting performance of young boys. Neither imagery nor relaxation training alone was effective in enhancing shooting performance. In conjunction with adequate preparation, muscle relaxation training is effective in enhancing an athlete's tolerance to pain (Broucek, Bartholomew, Landers & Linder, 1993).\(^\text{18}\)

Meditation, as a form of relaxation, is tied direct to the concepts of selective attention. In practicing meditation, the individual attempts to uncritically focus his attention on a single thought, sound, or object. Meditation will result in the relaxation response if practiced in a quiet environment that is associated with a passive attitude and decreased muscle tone.

The practice of meditation as a form of relaxation and thought control has its origin in Eastern cultures more than four thousand years ago. The individual most responsible for exporting meditation to the Western cultures was Maharishi Mahesh Yogi of India. Referred to as transcendental meditation, Maharishi Mahesh Yogi's brand of meditation has been widely accepted in the United States and throughout the world. Other forms of Eastern culture meditation practices include Chakra yoga, Rinzai Zen, Mudra yoga, Sufism, Zen meditation, and Soto Zen (Greenberg, 1996). The most common mental device used in transcendental meditation is the silent repetition of a mantra. The mantra is a simple sound selected by the instructor as a mental concentration device. One such sound, "Om- or "ahhom." has been popular (Nideffer, 1976a). Other mental devices that have been used in meditation include the mandala (a geometrical figure), nadam (imagined sounds), and pranayama (breathing).

In practice the subject sits in a comfortable position with eyes closed. The subject concentrates on deep breathing while at the same time repeating the mantra silently. Reportedly, the sound of the mantra soon disappears as the mind experiences more subtle thought levels and finally arrives at the source of the thought. While most Oriental approaches teach a sitting meditation position, both Zen and transcendental meditation emphasize that standing or sitting are acceptable. Davis et al. (1995) and Greenberg (1996) offer excellent ideas for enhancing and facilitating the
meditation experience. Similar to transcendental meditation, Tai Chi is a moving form of meditation which originated in China. The stress reduction effects of Tai Chi are comparable to those received from moderate physical exercise.

While it is clear that the various forms of meditation can reduce anxiety and tension by evoking the relaxation response, it is not clear whether its practice has a facilitative effect on athletic performance. Like the effects of other forms of relaxation, the effects of meditation upon athletic performance are likely to be indirect. Meditation has a direct effect on reducing anxiety, tension, and stress, which in turn should have a facilitative effect on the performance of the anxiety-prone athlete. Attempts to link meditation training directly with improved athletic performance have met with mixed success. Meditation seems to be beneficial for performing gross motor skills such as the 50-meter dash, agility tasks, standing broad jump, and coordination tasks (Reddy, Sal., and Rao, 1976). But it seems to be of little facilitative value for performing fine motor tasks such as the rotary pursuit, mirror tracing, or pistol shooting (Hall & Hardy, 1991).¹⁹

Motor skills are often categorized as being fine or gross. The word fine denotes a delicate or sensitive quality. The term gross refers to a quality opposed to fine: large, whole or obvious. A gross motor skill involves contractions and usage of the large muscles of the body. The whole body is usually in movement. Sport skills of all kinds may be considered as gross motor skills, and though reference is usually made to these skills without the term gross, it is implied. Various processes interact

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(e.g. cognitive, perceptual, affective, and motor) in order that the act may be integrated, meaningful, and successful. It is important to realize that the presence of these factors is necessary to almost any skilled performance.\textsuperscript{20}

Why are some athletes more successful than others in learning and mastering skills, as well as in achieving in competition? It may very well be due to the way they control and direct cognitive processes through the use of appropriate strategies. Successful athletes have been characterized by their ability to use cognitive strategies effectively. Although, research evidence has indicated that athletes can benefit from the use of appropriately designed cognitive strategies to enhance their skill acquisition and performance, the general consensus of opinion is that teaching strategies that athletes, can actually use for enhancing learning and performance is rather difficult.\textsuperscript{21}

In recent years, new research and theories have emerged from social psychologists, experimental psychologists, clinical psychologists and physiological psychologists, emphasizing the role of perception as a factor of learning, adjustment, and personality. This area of perception and perceptual learning is an exciting one, which no longer psychologists are avoiding. Perception is usually distinguished from other processes involving thought, consciousness and judgment. It is a form of discriminating behavior involving the overall activity of the person immediately following or accompanying stimulation of the sense organs. Perception may be defined as knowledge through the senses of the existence and properties of matter and the external world. It causes action which in term change it and is a continuous process. A clear distinction


between sensation and perception might help us to understand these terms better. A sensation involves the means for reception of stimuli. A perception on the other hand involves the means for the interpretation of stimuli.  

Perceptual learning has been studied separately from learning in general, but there is no doubt that although one refers to the learning of athletic skills as motor learning, perceptual mechanism operate in precluding and skilled motor act or subsequent to that act. A person’s ability to receive and distinguish among available cues in a given situation enables him to perform more skillfully. The better may have the smoothest, ideal practice swing. If he cannot concentrate and attend to the important cues when he is up to bat in a game, if he cannot follower the ball as it comes to the plate and perceive a fast ball or curve, a ball or a strike, his performance will not be effective.

Cognition consists of such higher mental processes as concept formation, problem solving, imagination, perception and intelligence. Cognitive processes are extremely difficult to study objectively, and much of our knowledge of them has been inferred from behavior. This was shown to be the case with perception. Although, we rely on the senses for environmental information, the object ultimately perceived results from the complex involvement of many neural mechanisms and the state of the organism. Even learning whether simple or more involved, must be measured through performance.


23. Ibid., p.264.

24. Ibid., pp. 264-265
Memory plays an important role in our processing of information in order to produce the desired responses. Whether in conversation with a friend, working mathematical problems, or playing tennis, we are confronted by situations that require the use of memory to produce action. Memory is best viewed as consisting two functional components, working memory and Long term memory. Working memory briefly stores information presented in the immediate past as well as information that has been retrieved from long term memory. It has a limited capacity for storing this information. It also serves an active information processing role as working memory processing activities integrate recently presented information with information retrieved from long term memory so that a specific problem can be solved. Long term memory is our “memory proper” and stores different types of information on a more permanent basis. It appears to have no real limits in terms of how much information can be stored or the length of time the information will remain there. There are three memory systems in long term memory: procedural memory, semantic memory and episodic memory. Each system stores a different type of information and has certain unique characteristics that distinguish it from other systems. These memory systems can be related to motor skill performance by relating their functions to the characteristics and functions of generalized motor programme and recall schema.25

Shooting

A shooting sport is a competitive sport involving tests of proficiency (accuracy and speed) using various types of guns such as firearms and air guns. Hunting is also a shooting sport, and indeed shooting live pigeons was an Olympic event (only once, in 1900). The shooting

sports are categorized by the type of firearm, targets, and distances at which the targets are shot from.\textsuperscript{26}

\textbf{STATEMENT OF THE PROBLEM}

The purpose of the study was to determine the effects of different types imagery techniques on sports performance.

\textbf{LIMITATIONS}

The difficulty of isolating, observing and controlling the mental activity related to the skills was considered as a limitation of the study.

\textbf{DELIMITATIONS}

1. The study was delimited to the students of Institute of Professional Studies, Gwalior, Madhya Pradesh, India.
2. The study was confined to the use of Mental Imagery Practice with PETTLEP technique.
3. The study was further confined to eight weeks of training.
4. The study was also delimited to male subjects.
5. The study was also delimited to sports performance i.e. Pistol Shooting Performance.

\textsuperscript{26} en.wikipedia.org/wiki/Shooting_sport.
HYPOTHESIS

On the basis of available literature it was hypothesized that there would be significant effects of different types imagery techniques on sports performance.

DEFINITION AND EXPLANATION OF TERMS

1. **Imagery**: in the context of sport may be considered as a creation or recreation of an experience generated from memorial information, involving quasi-sensorial, quasi-perceptual and quasi effective characteristics, that is volitional control of the imager, and which may occur in the absence of the real stimulus antecedents normally associated with the actual experience.” (Morris Spittle and watt, 2005).

2. **Imagery**: is defined as “An experience that mimics real experience, we can aware of seeing an image, feeling movements as an image, or experiencing an image of smell, tastes, or sounds without actual experiencing the real thing”. (White and Hardy, 1998).

Physical Practice: it may be defined as practice involving physical participation and observable movements by the subject on a particular task.

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Motor Skill: The term is used to denote any muscular activity that is directed toward a specific objective.30

Motor Learning: An area of study focusing on the acquisition of skilled movements as a result of practice.31

Cognitive Skill: The nature of the movement is not particularly important, but the decisions about which movement to make are critical. A cognitive skill mainly involves how to do, whereas a motor skill mainly involves how to do it.32

SIGNIFICANCE OF THE STUDY

About half a century in the field of sports psychology researchers have been trying to find out the effect of imagery technique to sports performance, and so many are agreed and have opinion that a greater extent of imagery technique effect the sports performance. This study will be significant in the following ways:

1. This study will help to the coaches and teachers of physical education to use proper coaching and teaching strategies in learning various sports skills in different sports.
2. This study will also help to provide knowledge of sports psychology and their use in the field of sports.

3. The result of this study will help to the coaches, players and physical education teacher to use imagery technique for training in future.

4. The teachers and coaches can take the help of appropriate imagery technique in developing the cognitive aspect which plays an important role in mastering a skill which will help to enhance sports performance.