

The Effects of Mental Rehearsal,  
Relaxation And Self-Talk Techniques  
on Basketball Game Performance

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A Thesis  
Submitted to  
The Faculty of Graduate Studies  
In Partial Fulfillment  
of the Requirements for the Degree  
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ON BASKETBALL GAME PERFORMANCE

BY

GAIL JANICE KENDALL

A thesis submitted to the Faculty of Graduate Studies of  
the University of Manitoba in partial fulfillment of the requirements  
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## ABSTRACT

The purpose of this study was to investigate the effects of mental rehearsal, relaxation and self-talk training on the performance of a specific defensive basketball skill during competition. An applied behavior modification approach was utilized in an attempt to improve game performance through the development of the subject's mental skills. Four University of Winnipeg female intercollegiate basketball players were chosen as subjects for the study.

A single subject design commonly referred to as a 'Multiple baseline across individuals' was employed to measure each subject's game performance. Each participant received the experimental intervention sequentially following a varying period of baseline data collection. The treatment was spread over a five day period requiring approximately one hour each day. The treatment package included mental rehearsal and relaxation training instruction followed by the development of an individual audio tape which was used by each subject for the remainder of the study period.

The data were analyzed graphically. Through visual analysis changes from the pre-treatment phase to the post treatment phase were indicated.

It was hypothesized that the treatment intervention (i.e. mental rehearsal, relaxation and self-talk) would enhance the player's specific defensive performance.

The results demonstrated that mental rehearsal, relaxation and self-talk training were effective in enhancing basketball skill performance. Treatment effects were noticeable across subjects and encourage further study in this area. Recommendations in terms of both research and practical implications based on the components of the study were then made.

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## CHAPTER 1

### Introduction

Psychological skills have always played a part in the athlete's preparation for competition. It is only recently, however, that psychological training has been systematically developed, investigated, and implemented.

Several studies have examined the effects of mental practice on performance. Feltz and Landers (1983) found that mentally practicing a skill does enhance performance somewhat more than no practice at all. Their research was based on a meta-analysis of existing research in the area of mental rehearsal.

Anxiety and outside distractions create a number of problems for athletes during competition. Today, the sport psychologist or informed coach can give the athlete information and direction on how to deal and effectively cope with these disruptions. Tutko (1976) compared the reaction to anxiety in sport to the "fight" or "flight" syndrome. As the body reacts physically to this anxiety, your mind picks up these cues, which brings on more anxiety and more pressure. The athlete must find a way to break this disruptive cycle. One method that has been implemented in many mental preparation programs is mental rehearsal. This technique, according to one theory, is actually mental simulation of an action or event which creates a neurological response in the body. As the performance is imagined, impulses are transmitted which travel the nervous patterns associated with the particular action (Rushall 1979). Through this technique, athletes can see and feel themselves performing correctly, consequently reducing their anxiety and improving performance.

One of the major methodological problems in much of the current literature is whether the subject is mentally practicing a skill correctly or incorrectly. It is very difficult to control, observe and evaluate. There does not seem to be a standard instructional approach to the mental rehearsal techniques used.

Rushall (1979) describes six situations which must occur for mental rehearsal to be effective.

1. The athlete must see him/herself in the athletic environment.
2. The athlete must visualize the performance in its entirety (if possible).
3. The performance must be successful.
4. Mental rehearsal should be done at least once before performing.
5. The desired rate of performance should be approximated.
6. The sensation or feel of the performance must be concentrated on.

As does the development of any athletic skill, mental rehearsal takes time and practice. The subject must understand and believe in the strategy for it to be as effective as possible (Botterill, 1987).

Robert Nideffer (1976) has identified attention control as the key to successful athletic performance. There are certain attentional demands in sport and the athlete must be able to adjust his/her focus of attention accordingly. Nideffer describes two dimensions of concentration; width and direction. The first dimension deals with the athlete's ability to shift from a narrow focus to a broad focus of attention. Secondly, the athlete must be able to focus internally or externally as the need arises. At any given time, a person's attention can be thought of as falling at some point along the width and direction continuum. Thus, at the particular instant, they may be described as having either a broad internal focus, a broad external focus, a narrow internal focus, or a narrow external focus. In the

competitive situation, the attentional demands will constantly change. The athlete, who is concentrating effectively, will be able to shift from one focus of attention to the other as the need arises.

The following schematic diagram gives examples of situations requiring these various attentional focuses.

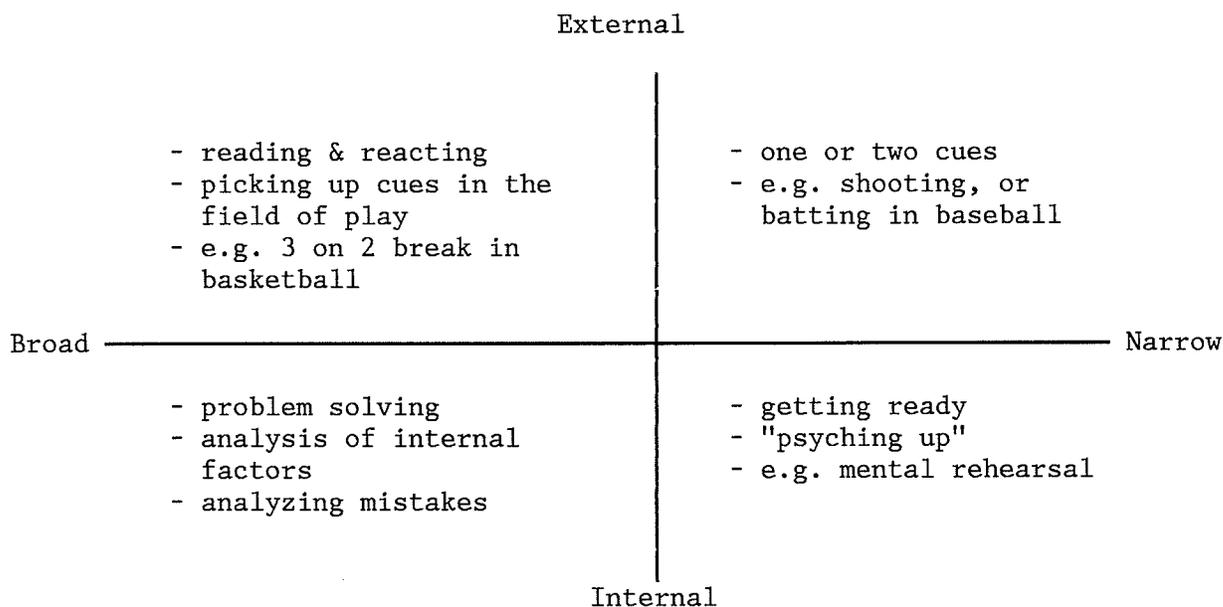


Figure 1 (Nideffer, 1976)

The most common disruption for an athlete is stress or anxiety. In a pressure situation, the athlete may experience the following:

1. The athlete will tend to go to their attentional strength, whether it is appropriate or not.
2. The athlete will tend to narrow their focus and lose their flexibility to shift from one focus of attention to the other.
3. The athlete will tend to go internal and concentrate on the stress or pressure they are feeling.

In these situations, the athlete can be assisted by specific mental strategies which can reduce their anxiety. Nideffer (1976) proposes a program combining relaxation techniques and mental rehearsal to alleviate the problems associated with athlete performance.

In the present study, a mental preparation program combining Rushall's mental rehearsal instructions with self-talk and standardized relaxation techniques, was implemented with four University of Winnipeg female intercollegiate basketball players. The purpose of this study was to investigate the effects of these strategies on a specific game skill with each athlete.

#### **Statement of the Problem**

The main focus of this study was to investigate the effects of mental rehearsal combined with relaxation and self-talk on the performance of a specific defensive skill during competition. The defensive skill of cutting off the baseline was measured using an observation technique. Four University of Winnipeg female intercollegiate basketball players were used as subjects. A single subject multiple baseline design across subjects was employed to measure the dependent variable (game performance) and the effect of the independent variable (mental rehearsal, relaxation and self-talk techniques).

#### **Justification for the Study**

This study was justified on the following grounds:

1. Coaches who are not cognizant of the interface between psychological

and physical skills are handicapped in their work. Providing these coaches with the kind of information which will enhance the understanding of the relationship between the two types of skills will benefit both the coach and the athlete. One of the goals of this study was to display in a clear and concise fashion, the kind of information needed to develop a practical mental preparation program.

2. A complete examination of the literature in this area, revealed the lack of applied studies and easily understood research covering mental skills. At the same time, with the exception of Feltz & Landers (1983), no real conclusions were arrived at. This study was an attempt to clarify this situation.

3. Canada has a serious lack of expertise in the area of mental preparation. Only a handful of practitioners have been carrying the message of attention control training. It was the hope of this author to highlight the advantages of these skills and present in simplified form, the ease with which these skills could be incorporated into a coaches' program.

### **Hypothesis**

Female intercollegiate basketball players using combined mental rehearsal, relaxation and self-talk techniques, as well as physical practice, would significantly increase the number of correct behaviors by cutting off the baseline drive by the offensive player during basketball game performance.

### **Delimitations**

1. The study was limited to four University of Winnipeg female basketball players, all of whom were members of the intercollegiate Lady Wesmen team.
2. The games examined were the 1987-88 Lady Wesmen games from October 29, 1987, through to the end of the play-off schedule. This limited the opportunity for experimental intervention to thirty-three games.
3. The behaviour measured in the study was limited to cutting off the baseline defensively and creating a turnover.

### **Limitations**

1. The subject's ability to rehearse effectively was a potential limitation to this study. The vividness and quality of the rehearsal was extremely difficult to monitor and evaluate.
2. The subjects were instructed not to communicate to anyone with regard to their mental preparation program.
3. The research design employed was a multiple baseline design across four subjects. Compared to larger sample studies, this design is very strong for internal validity considerations, but weaker for external validity considerations.
4. The experimenter's ability to monitor the subject's private rehearsal behavior.

### Definition of Terms

- Attentional Focus - Attentional focus is described in two dimensions: width - either broad or narrow and direction - either internal or external.
- Control of Rehearsal - Refers to the ability of the subject to see the desired picture with desired speed and control.
- Cutting Off The Baseline - A defensive skill used by the Lady Wesmen Basketball team. The defensive player attempts to force the offensive player to the baseline and then cut off her path to the basketball hoop.
- Forcing Baseline - A defensive position in basketball to force the offensive player to only drive towards the baseline and not to the middle of the key.
- Mental Rehearsal - A technique used in mental preparation programs. It enables the individual to actually feel and visualize a particular activity as though performing it successfully, but without full physical movements.
- Relaxation - The ability to physically relax and calm oneself so that concentration or effective rehearsal can be facilitated.
- Self-Talk - A technique used in mental training programs. The subject utilized positive self statements to assist in the mental rehearsal of the desired skill. In the present study, this was operationalized through the audio-tape developed by each subject.
- TAIS - Test of Attentional and Interpersonal Style developed by Robert Nideffer (1976).
- Turnover - A mistake in basketball by the offensive player forced by the defensive player which causes the offence to lose possession of the ball.
- Vividness of Rehearsal - Refers to the ability of the subject to see a clear and vivid picture of what is being rehearsed.

## CHAPTER 2

### Review of Literature

Past research has been inconclusive in determining whether a given amount of mental practice will enhance the performance of a particular motor task. The current literature continues to demonstrate conflicting results on the contribution mental rehearsal makes to performing various types of tasks by various types of subjects. The purpose of this review is to examine the literature in an attempt to offer additional information on the topic, and to include some possible suggestions for future study.

#### Mental Rehearsal

Mental practice refers to the symbolic rehearsal of a physical activity in the absence of any gross muscular movements (Richardson, 1967A). It enables the athlete to actually feel and visualize a particular activity as though performing it successfully but without overt movements. Over the years, the typical research design has involved the comparison of the performance of subjects who have physically practiced a skill to those who have privately practiced a skill. These studies normally include a control group which has not received any physical practice or mental rehearsal. There has been considerable variety in the type of tasks used and the length and duration of the experimental periods of both physical and mental practice. Consequently, there has been a great deal of diversity in the findings. For example, Richardson (1967A) found that in the majority of studies reviewed, motor performance was enhanced through some form of mental practice. On the other hand, Corbin (1972) was much more cautious and concluded that there were too many methodological, task and individual

differences in the studies, which led to inconclusive findings. Some of the key issues which must be examined in more detail are; 1. the psychoneuromuscular theory versus the symbolic learning theory of mental practice, 2. the quality versus the quantity of mental practice and its effect on performance, and 3. the effects of mental practice on the acquisition of motor skills.

### **The Psychoneuromuscular Theory**

As a result of Jacobson's (1932) electromyographical research this theory was formulated to explain what occurs during the covert practice of motor skills. The imagining of movement actually creates a slight innervation of the muscles used in the activity. This activity will enhance feedback and is presumed to transfer to the physical practice situation. Corbin (1972), suggested that kinesthetic feedback accompanies imagery and is essential for mental practice to be effective. This feedback ensures that the correct neuromuscular response may lead to the desired overt response.

Harris and Robinson (1986) found supporting results for Jacobson's (1932) early work in their study testing the effects of skill level on EMG activity during internal and external imagery. Beginning and advanced karate students were randomly assigned to conditions of skill level (beginning/advanced) by imagery perspective (internal/external) by side (right/left). The results of the investigation showed that advanced skill level subjects had greater EMG responses than beginning students and that this innervation appears specific to the muscle group needed to execute the task.

The imager's perspective, whether internal or external is a factor which may influence the impact of mental rehearsal (Epstein, 1980). External imagery is characterized by a third person perspective, where the imager sees himself performing the task as an onlooker, not as an actual participant. Internal imagery involves the individual feeling and performing the activity from a first person perspective. A study done by Mahoney and Avenier (1977) on elite gymnasts found that internal or kinesthetic imagery and not visual or external imagery was related to the successful execution in gymnastics. This supports Jacobson's observation that internal "muscular" imaging creates greater muscular activity than visual or external imagery, and is consequently more beneficial for the enhancement of motor skill performance.

Feltz and Landers (1983) in a meta-analysis of over 100 studies on the effects of mental practice found a lack of evidence to support this theory. These researchers noted that no attempt had been made to quantify the muscular activity during rehearsal and there was no direct evidence that the muscle innervation during rehearsal in Jacobson's work was localized to the particular muscles involved in the overt activity. In a study by Shaw (1940) to record action potentials in various body locations during rehearsal of the hand grip dynamometer, there was unexpected muscular activity in the lower leg as well as the arm involved in the visualization. Shaw concluded that there was a generalized muscle innervation from nearly all of the muscle groups tested but there was no indication that localization of this stimulus was occurring. Feltz and Landers (1983) found in more recent work by Hale (1980) that action potentials did not mirror the action of the agonist and antagonist muscle groups used in the biceps

curl. The more recent research fails to support the psychoneuromuscular theory and localization of muscular activity during rehearsal. Instead, it is more likely, that this innervation is generalized and involves the whole body or a complete limb.

### **The Symbolic - Perceptual Theory**

An alternative theory (Sacket, 1934; Morrisett, 1956), claims that mental rehearsal will only enhance motor performance if there are cognitive factors inherent in the activity. In other words, the imager will be able to rehearse the sequence of movements as symbolic components of the task and this will result in improved overall performance (Minas, 1978). The research that has supported this hypothesis has shown that mental rehearsal enhances learning of cognitive type tasks such as the dial-a-maze, block tests, or sequence learning, and that learning of low symbolic tasks, considered to be motor tasks, like the stabilometer were not effected by mental rehearsal.

One of the doubts of many researchers is whether mental rehearsal enables the performer to receive adequate feedback or knowledge of results which will lead to enhanced performance. One study (Minas, 1978) included a mental rehearsal condition with feedback. Her study tried to determine whether or not "the facilitating effects of mental rehearsal were the result of learning the sequence of events or an improvement of the individual motor acts" (Ryan & Simons, 1981). Minas used the throwing of balls into small

bins in a particular sequence for her study. Through separate analysis of the sequence learning and the accuracy of motor performance, it was hoped that the effect of mental rehearsal could be localized. Her results showed that the main analysis was not significant, however, mean scores for groups on each trial indicated that the mental practice group with feedback on the sequence was superior to the physical practice group and the control group. Minas concluded that mental practice under certain conditions facilitates the acquisition of the sequencing component of a complex motor skill. Ryan and Simons (1981), criticized Minas's study on the basis of the task tested. These researchers felt that the findings could not be strongly supported because even with physical practice the motor component (ball tossing), showed no improvement. Ryan and Simons (1981) also studied the effects of mental practice on performance and hypothesized that tasks higher in symbolic or cognitive elements would improve far greater than tasks considered to be high in motor components. The dial-a-maze and stabilometer were used in their experiment so that both types of tasks would be tested. Their results confirmed the major hypothesis that tasks nearer the cognitive end of the continuum (dial-a-maze) were enhanced whereas the task near the motor end (stabilometer) of the continuum showed little or no improvement. Similar results were reported by Smyth (1975) who used a mirror drawing task and Wrisberg and Ragsdale (1979) using a stabilometer and the "McLoy Blocks Test". These results and current research provides support for Morrisett's (1956) and Sacket's (1934) theory on mental rehearsal. However, a problem in much of the research in this area is the variability of the tasks and the definition of what a pure motor skill is. "Motor skills are actually

perceptual motor skills" (Ryan & Simons, 1981), which contain cognitive elements. So when does a skill become totally symbolic or totally motor? One explanation offered by Feltz and Landers (1983) is that "cognitive skills are those which are primarily cognitive with the motor response merely being an appendage to carrying out the previously conceived principle which governs the action."<sup>1</sup>

Weinberg, Jackson and Gould (1980), found that mental preparation strategies did in fact improve performance on a muscular strength motor task. Using the Apex Orthtron #7120 to measure muscular strength, power and endurance, Weinberg et al employed five different mental preparation conditions on thirty subjects to study their effects on performance. The researchers' results showed that preparatory arousal and imagery techniques produced a greater change than attentional focus, a control-rest condition, and a counting backwards cognitive distraction condition.

Until a clear definition of the task type used in future research can be standardized, it will be difficult to fully support one view from the other. An area that needs further research on the effects of rehearsal on motor and strength skills is, however, the quality versus quantity issue of the actual mental practice. This will be dealt with in the following section.

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<sup>1</sup> Feltz, D. & Landers, D., The effects of mental practice on motor skill learning: A meta-analysis, Journal of Psychology, 5, 1983. pp. 45-46.

### Quality Versus the Quantity of Mental Rehearsal and Its Effect on Performance

A common methodological problem in much of the research is the variability of the instructions given to participants in the mental practice groups. It seems that many researchers assume that subjects know what mental rehearsal is and are already proficient imagers without any previous practice. Mental rehearsal is a skill which must be learned and practiced to be effective in enhancing performance.

In a number of completed studies, the researchers commented on the problems of consistency related to mental rehearsal research (Epstein, 1980; Ryan & Simons, 1981; Richardson, 1967; Smyth, 1975; Wrisberg & Ragsdale, 1979; Zecker, 1982; Minas, 1978). Studies are required which will investigate the effect of differing instructions and experience with mental practice.

Ryan and Simons (1981) addressed two secondary questions in their study of the effects of mental rehearsal on the acquisition of motor skills (using a dial-a-maze and stabilometer). First, do individual differences in ability to use mental rehearsal influence performance and secondly, will mental rehearsal have a greater effect if the frequency of the rehearsal is greater in the actual practice time? To answer the first question the researchers had the mental practice group assess the "control" and vividness of their imagery by administering the Gordon test of Visual Imagery Control (White, Sheehan, & Ashton, 1977) and the Betts QMI Scale (Sheehan, 1967). To evaluate the frequency of mental practice, the subjects were asked to add the total number of times they completed the maze during their mental practice sessions. The results were somewhat inconclusive. There were only

thirteen subjects in the mental practice group thus making a meaningful interpretation of correlations difficult. Imagery vividness was found to be a significant factor on the dial-a-maze but insignificant on the stabilometer performance. From the inconsistency of results, the researchers felt these factors were not sufficiently examined.

The influence of relative frequency of mental rehearsal, had great variability. One subject failed to get through the complete maze on one trial while another subject averaged four trips around the maze per practice period. It was assumed by Ryan and Simons (1981) that the greater the number of rehearsals the more improved the performance would be. However, the results did not substantiate this claim. Those who mentally completed the maze more frequently had poorer results than those with fewer completions. These results indicate that the quantity or frequency of rehearsals does not necessarily enhance the effectiveness of the mental rehearsal process. On the critical features of successful mental rehearsal Rushall's (1979) fifth point is that the rehearsal should approximate the rate of performance. Therefore, the mental practice groups should be rehearsing their activity for the same amount of time that it takes the physical practice groups to perform their task.

In post experimental discussions with their subjects, Ryan and Simons (1981) found that those who rehearsed fewer repetitions on the maze, felt they concentrated more and attended and stayed focused on the task cues of the activity, thereby increasing the quality of their rehearsal. The rate of imagery was studied further by Andre and Means (1986). The purpose of this study was to examine the effects of mental practice that utilizes a