

THE EFFECTS OF TENSION RECOGNITION AND CONTROL  
ON BEGINNING TAEKWON-DO INSTRUCTION

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This study was designed to investigate the effects of Jacobson's differential relaxation techniques on beginning instruction in Taekwon-Do, a Korean form of self defense.

The subjects for this study consisted of twenty-two male and two female students enrolled in an introductory performance course in Taekwon-Do within the physical education program at the State University College at Brockport, Brockport, New York.

Videotaped evaluation of the students' techniques by master instructors was employed to measure improvement and skill level of the subjects. The test measured body position, leg or arm position, breathing, focus, relaxation, power, and stance of the subject while he/she performed two basic routines normally required for the promotion to yellow stripe. (Saju Jirugi and Saju Chagi) The class, consisting of twenty-four students, was randomly divided into two groups. Both groups received identical instruction in Taekwon-Do for approximately fifty minutes per day, three days per week for seven weeks. During the last ten minutes of class, one group received instruction in Jacobsonian methods of tension recognition and control (differential relaxation) while the other group practiced independently under the supervision of a black belt instructor. Prior to their separation into two groups, all

of the students were pre tested on their ability to perform the two test routines. Six weeks later, the students were post tested on their ability to perform the same two routines. Both the pre test and post test were recorded on videotape and scored by five master instructors (one 8th, two 7th, and two 5th degree black belts in Taekwon-Do).

An analysis of simple main effects demonstrated a significant ( $p < 0.5$ ) improvement of the experimental group over the improvement of the control group.

Within the scope and the limitations of this study, it is concluded that a ten minute instructional program in Jacobsonian methods of tension recognition and control, when given simultaneously with instruction in Taekwon-Do, three days per week, for six weeks, resulted in significant improvement in beginners, performance of the beginner patterns Four Directional Punch (Saju Jirugi) and Four Directional Kick (Saju Chagi).

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## CHAPTER I

### INTRODUCTION

"The most beautiful motion is that which accomplishes the greatest result with the least amount of effort." (Metheney, 1952) This observation by Plato, made over two thousand years ago, captures the thoughts of many modern day exercise physiologists, physical educators, coaches, and athletes who are becoming increasingly concerned with the study of muscular tension and its effects upon the ability of the body to perform various motor skills. Edmund Jacobson, a physiologist and physician, has studied muscular tension and relaxation for the better part of the twentieth century. Dr. Jacobson has given the name "differential relaxation" to the basic concept which Plato observed.

For many people, differential relaxation is not easily attained, but as skilled behavior is acquired, tension is dissipated. Excessive tension is a problem for a large segment of the population, and there is no reason to believe that athletes are exempt from this problem. Many coaches believe that this is especially true for beginners in a sport. In the present study, beginning Taekwon-Do skills are learned more efficiently by teaching tension control to beginners at the same time that the sport skill is being taught, this method could be utilized to save time and promote skill acquisition.

It is the purpose of this study to determine the effects of ten-

sign control instruction, given simultaneously with Taekwon-Do instruction, on the performance of beginning Taekwon-Do students.

### Statement of the Problem

This study was designed to investigate the effects of tension control (differential relaxation) on the performance of beginning Taekwon-Do techniques, a Korean martial art.

### Significance of the Problem

In athletics, there are few sports in which smoothness and efficiency of movement are not major factors in determining the level of performance. The aesthetics of sport are also enhanced by graceful and efficient movement. The absence of excessive muscular tension enables the athlete to conserve energy and continue activity longer without fatigue.

Efficient and relaxed movement is of great importance in Taekwon-Do, a Korean martial art which utilizes the hands and feet as tools of self defense. Choi (1979) says that muscles of the body should be either tensed or relaxed at the proper critical moments in performance of Taekwon-Do techniques. Conservation and concentration of strength and energy are needed for maximum power and endurance, and smooth, fluid motions add to the beauty of the art, as well as to the speed of execution, the latter a component of power.

A review of the literature indicates very little completed research investigating the effects of simultaneous instruction in tension control or differential relaxation on sport skill acquisition at the beginning level. No studies have been found which have specifically

examined the levels of performance of beginning martial arts students whose training has included instruction in tension control.

Taekwon-Do students have long practiced a form of meditation before and after their classes. To the knowledge of the author, instructions describing the locus of tension and relaxation in muscles involved in performing various Taekwon-Do techniques have never been given to students learning Taekwon-Do.

Due to the lack of research in this area, and the lack of this type of instruction in the traditional Taekwon-Do curriculum, it is hoped that the present study will contribute to the knowledge of effective instructional methods of this martial art, and possibly of other skills as well.

#### Delimitations of the Study

This study was delimited to twenty-two male and two female college students enrolled in an introductory performance course in Taekwon-Do within the physical education program at the State University College at Brockport, Brockport, New York.

Tests administered were delimited to two basic "patterns." Four Directional Punch (Saju Jirugi) and Four Directional Kick (Saju Chagi) (See Appendix B), required for promotion to the grade of yellow stripe, the first rank above beginner, in Taekwon Do.

#### Limitations of the Study

Tension levels were not scientifically evaluated in this study, as they would be if electromyography were used. Relaxation, as evaluated by master instructors of Taekwon-Do who participated as judges, was

determined solely on the appearance of the subjects' bodies as they performed their patterns. Thus, "relaxation" was evaluated using traditional Taekwon-Do methods.

The investigator had no way of controlling the outside actions of the subjects. For this reason, it is possible that some sharing of information may have occurred outside of class between the two groups.

### Definition of Terms

The terms used in this study are defined as follows:

Differential relaxation - The optimum amount of tension in the muscles required for an act, along with the relaxation of other muscles. Action with the absence of excessive tension. Those muscles alone are used which are needed for the act and no excess tension appears in them or in others. (Jacobson, 1978)

Relaxation - Discontinuance of muscle contraction. (Jacobson, 1978)  
In Korean, "loose body" (신체이완) has the same general meaning.

Tension - The shortening or contraction of muscle fibers. (Jacobson, 1978)

Tension recognition and control - The ability to recognize and locate the sensation of tension in the body and to be able to produce and reduce specific muscle contraction.

Breathing - Slow inhalation through the nose is performed in preparation for a movement in Taekwon-Do. A short, rapid exhalation of the breath through the mouth is performed at the moment the movement is completed. This tenses the abdomen and consequently the entire body, augmenting force.

Focus - The concentration of power delivered to a specific, select-

ed point.

Power - The force that a technique can deliver. Speed is an important factor in determining the power of a technique. Power is defined as the force times the distance divided by the time spent.

$$P = \frac{F \times D}{T} \text{ or } P = \frac{\text{Work}}{\text{Time}} \quad (\text{Fox and Mathews, 1981})$$

Speed - The magnitude of a body's displacement without regard to direction. (Fox and Mathews, 1981)

Taekwon-Do - A Korean martial art which means literally, "art of hand and foot fighting," which involves the scientific use of the body in methods of self defense. (Choi, 1979)

Yellow Stripe - The first rank above beginner in Taekwon-Do, usually achieved after two to four months practice. The belt order in Taekwon-Do is as follows: white belt, white belt with a yellow stripe, yellow belt, yellow with a green stripe, green belt, green with a blue stripe, blue belt, blue with a red stripe, red belt, red with a black stripe and black belt. There are nine degrees of black belt.

Pattern - Patterns are various fundamental movements, most of which represent either attack or defense techniques, set to a fixed and logical sequence. (Choi, 1979)

## CHAPTER II

### REVIEW OF RELATED LITERATURE

The following chapter describes completed research investigating the effects of tension recognition on the performance of various sports skills.

Edmund Jacobson was the early pioneer in tension control techniques and has written many books and articles on the subject. Jacobson uses the term "differential relaxation" to emphasize tension recognition and control when the body is not fully at rest, (Jacobson, 1978).

Steinhaus and Norris (1964) studied the effects of a relaxation training program utilizing Jacobson's methods, on a sample of 121 college students and 81 members of the general population. Following eight weeks of instruction in Jacobson's methods, 40% of the college students and 26% of the general population showed reduction in neuromuscular tension. The researchers also found that ordinary teachers and other intelligent persons could be taught to teach neuromuscular relaxation to others with satisfactory, measurable results.

Swimming teachers have long been aware of the need for beginning swimmers to relax. In an early study, Benson (1958) investigated the effects of concomitant learning in tension control and swimming on children at the beginning and intermediate levels. In this study, it was found that training in tension control techniques accelerated the learning process in beginning swimmers. All of the beginning swimmers in



Benson's experimental group learned to swim twenty yards during the course of the experiment, but only one half of the beginners in the control group learned to swim the same distance. Benson found little difference in the improvement of swimming speed between the two groups. However, the experimental group showed significant improvement in an arm stroke test and was found to have significantly lower levels of muscular tension.

A study by Anderson (1970) agreed with the beliefs of many coaches, that beginners display more unnecessary tension when performing a sport skill than do more advanced players. A comparison of beginner, intermediate and advanced tennis players indicated higher levels of muscular activity in the intermediate players than in the advanced players, with the beginners possessing the highest levels of muscular activity while executing the tennis forehand stroke. For this reason we can expect beginners and intermediate players to tire faster than more experienced players who have learned to relax the muscles which are not needed for the action being performed, and, so, to conserve energy.

Paben and Rosentsweig (1971) investigated the effects of tension control on the learning of a gross motor skill. Fifteen college women were trained in neuromuscular tension control using Jacobson's techniques.

A control group, also consisting of fifteen women, received no training in tension control. Both groups were pretested on their ability to hit a ball attached to a paddle by a rubber string using their nondominant hands. The two groups were then post-tested after the experimental group had reached the point where they could control tension as shown by the electromyograph. Paben and Rosentsweig concluded,

based on the number of trials and hits by both groups needed to reach a set criterion, that a program in neuromuscular tension control facilitates motor learning in the novel, gross motor skill of paddle ball hitting.

Zardus (1972) studied the effect of a relaxation training program on the development of badminton skills in college women. In this study, the experimental group (n = 22) was given instruction in badminton in conjunction with a relaxation training program utilizing Jacobson's method. The control group received only the badminton instruction. Subjects in experimental and control groups were pre and post-tested on both relaxation and badminton skills. While the experimental group differed significantly from controls in the development of relaxation skills, no significant differences between these groups were discovered in the development of badminton skills.

While the review of the literature has yielded little specific information about the efficacy of tension recognition in beginning sport skill instruction, such techniques, when submitted to experimental test, broaden the scope of investigations related to the general use of relaxation and tension control techniques in sport skill instruction. Tension recognition is always emphasized in Jacobsonian relaxation training and such training is described in terms of skill acquisition (e.g., Frederick, 1981). There is reason to believe that tension recognition is also valuable in the acquisition of a number of beginning sport skill techniques which would emphasize needed tension associated with such skilled behaviors.

There is a need to investigate the extent to which one might

accelerate the process of movement efficiency by showing students the exact focus of tension during novel sports skills. Jacobson's general relaxation training employs the method of tension recognition for purposes of testing its effect on beginning Taekwon-Do skill learning. No studies were found which employed tension recognition in this special way.

## CHAPTER III

### METHODS AND PROCEDURES

The major divisions of this chapter include the grouping of the subjects, the orientation of the subjects, the qualifications of the instructor, the design of the experiment and the basis of evaluation.

#### Grouping of the Subjects

Twenty-two male and two female college students enrolled in an introductory Taekwon-Do course within the physical education program at the State University College at Brockport, Brockport, New York, served as subjects for this study.

The class was randomly divided into control and experimental groups, each consisting of eleven males and one female. A table of random numbers was used to assure random assignment.

The subjects received instruction from 10:45 - 11:45 a.m. on Mondays, Wednesdays and Fridays for a seven week quarter.

#### Orientation of Subjects

The subjects were told that the reason for their separation into two groups was that the instructor wished to compare two methods of teaching Taekwon-Do, (i.e., with and without tension control). The subjects were told that the study might be used for research. Class attendance was emphasized to all students because of the importance of regular and equal practice by all subjects. Students in the study

were volunteers who had signed an informed consent form. (See Appendix A)

### Qualifications of the Instructor

The instructor (the author), a sixth degree black belt, master instructor in Taekwon-Do, who has studied the art for twenty-two years and has been an instructor for fifteen years. The experimenter is also familiar with Jacobsonian methods of tension control, having successfully completed a course in teaching tension control within the graduate physical education program at the State University College at Brockport.

The assistant in the study is a second degree black belt in Taekwon-Do.

### Design of the Experiment

The design of the experiment was such that all of the subjects were pre-tested after the first week of instruction had been completed, and before the subjects had been separated into control and experimental groups. The class was randomly divided and the treatment began the first class of the second week of instruction. There was a total of 21 classes during which treatment was given.

After the class had been separated into experimental and control groups, the instructor taught both groups together for the first fifty minutes of class time. During this time all subjects received identical instruction in basic Taekwon-Do techniques and in the performance of the patterns they had begun during the first week of instruction. During the last ten minutes of class time, the subjects were separated into experimental and control groups. The experimental group rec-

eived the tension recognition treatment, while the control group spent an equal amount of time in independent practice under the supervision of the second degree black belt assistant.

The treatment given the experimental group consisted of tension recognition applied to Taekwon-Do techniques. The subjects were taught to recognize tension in various parts of their bodies as they performed Taekwon-Do techniques. Once the subjects had achieved an awareness of the presence of tension in specific parts of their bodies, the instructor began pointing out the muscle groups where tension was necessary for the execution of the technique. The muscle groups emphasized in the performance of specific techniques are illustrated in Appendix B.

The subjects practiced the techniques while attempting to eliminate tension in the muscles where it was unnecessary, and in some cases, to increase tension in the muscles where it was needed. In this manner, the students were taught to recognize and control muscular tension with the objective being the use of those muscles alone which were needed for the techniques being executed.

After the six week instructional period, both groups were post-tested on the same patterns which had made up the pre-test. The patterns (Four Directional Punch and Four Directional Kick) are a choreographed sequence of Taekwon-Do techniques which beginners in Taekwon-Do learn soon after they begin practice.

Both the pre and post-tests were recorded on videotape for evaluation by Taekwon-Do experts.

### Basis of Evaluation

The subjects were evaluated on their ability to perform two basic Taekwon-Do patterns, Four Directional Punch (Saju Jirugi) and Four Directional Kick (Saju Chagi). Both patterns consist of sequenced movements in four directions around a pivot point. Four Directional Punch includes two types of blocks and punching. Four Directional Kick includes punching and two types of kicks. All of the movements which make up the patterns are generally taught to beginners early in their instruction, as are the patterns themselves. Promotion to the rank of yellow stripe in Taekwon-Do is dependent upon successful performance of these patterns. These patterns are explained in more detail in Appendix B.

Evaluation of the videotape occurred several weeks after the post-test. The subjects were reviewed two at a time in no particular order (i.e., the two groups were, in no way, separated on the tape). Each subject announced his or her last name prior to beginning the patterns on both tapes as a means of identification for the judges. The subjects' pre and post-test performances were evaluated by five master instructors in Taekwon-Do. (A master instructor is one who has attained the rank of fifth degree black belt or higher) The ranks of the judges were as follows: one fifth degree, two seventh degrees and one eighth degree black belt. The experimenter did not participate in the evaluation. (See Appendix C. for specific qualifications of judges.)

All of the judges viewed the videotape at one sitting and were allowed to stop and replay any portion of the tape they believed

necessary. The judges used an evaluation sheet prepared by the experimenter in evaluating the subjects. The evaluation sheet (see Figure 1) breaks down each pattern into its components (kicks, blocks, punches, etc.). The components are then evaluated on the basis of hand/arm or foot/leg position, breathing, focus, power, relaxation, and stance. The subjects were graded on a scale of one to five, with one being the minimum score that a subject could receive for any area of evaluation and five being the maximum score possible. Total maximum score possible for the entire test was 280 points. Minimum possible score for the test was 56 points.



|                              | poor                  | fair | good | v.good | excell. | sec.total | total |
|------------------------------|-----------------------|------|------|--------|---------|-----------|-------|
| I. Lower<br>Section<br>Block | Hand Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Breathing             | 1    | 2    | 3      | 4       | 5         |       |
|                              | Body Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Focus                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Power                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Relaxation            | 1    | 2    | 3      | 4       | 5         |       |
|                              | Stance                | 1    | 2    | 3      | 4       | 5         |       |
| Middle<br>Section<br>Punch   | Hand Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Breathing             | 1    | 2    | 3      | 4       | 5         |       |
|                              | Body Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Focus                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Power                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Relaxation            | 1    | 2    | 3      | 4       | 5         |       |
|                              | Stance                | 1    | 2    | 3      | 4       | 5         |       |
| II. Side<br>Block            | Hand Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Breathing             | 1    | 2    | 3      | 4       | 5         |       |
|                              | Body Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Focus                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Power                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Relaxation            | 1    | 2    | 3      | 4       | 5         |       |
|                              | Stance                | 1    | 2    | 3      | 4       | 5         |       |
| Middle<br>Section<br>Punch   | Hand Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Breathing             | 1    | 2    | 3      | 4       | 5         |       |
|                              | Body Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Focus                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Power                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Relaxation            | 1    | 2    | 3      | 4       | 5         |       |
|                              | Stance                | 1    | 2    | 3      | 4       | 5         |       |
| III. Front<br>Snap Kick      | Leg and Foot Position | 1    | 2    | 3      | 4       | 5         |       |
|                              | Breathing             | 1    | 2    | 3      | 4       | 5         |       |
|                              | Body Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Hand Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Focus                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Power                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Relaxation            | 1    | 2    | 3      | 4       | 5         |       |
| Reverse<br>Punch             | Breathing             | 1    | 2    | 3      | 4       | 5         |       |
|                              | Body Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Hand Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Focus                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Power                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Relaxation            | 1    | 2    | 3      | 4       | 5         |       |
|                              | Stance                | 1    | 2    | 3      | 4       | 5         |       |
| IV. Side Kick                | Leg and Foot Position | 1    | 2    | 3      | 4       | 5         |       |
|                              | Breathing             | 1    | 2    | 3      | 4       | 5         |       |
|                              | Body Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Hand Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Focus                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Power                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Relaxation            | 1    | 2    | 3      | 4       | 5         |       |
| Reverse<br>Punch             | Breathing             | 1    | 2    | 3      | 4       | 5         |       |
|                              | Body Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Hand Position         | 1    | 2    | 3      | 4       | 5         |       |
|                              | Focus                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Power                 | 1    | 2    | 3      | 4       | 5         |       |
|                              | Relaxation            | 1    | 2    | 3      | 4       | 5         |       |
|                              | Stance                | 1    | 2    | 3      | 4       | 5         |       |

## CHAPTER IV

### RESULTS AND DISCUSSION

In the present investigation of the effect of differential tension recognition on beginning Taekwon-Do skill acquisition, twenty-four subjects were randomly assigned to experimental and control groups. Experimental subjects received instruction in the recognition of tension in appropriate muscle groups prior to the execution of certain specific Taekwon-Do movements. The control group simply reviewed the day's work under the guidance of a black belt rated instructor. The treatment and control conditions occurred for ten minutes following each of twenty-one class periods.

All subjects were given a pre-test after three introductory classes and prior to their assignment to either the experimental or control condition.

A post-test was administered to all subjects during the final week of course.

Pre-test and post-test performances were videotaped and evaluated by five Taekwon-Do Masters. Kendall's analysis of concordance ("W") was used to assess the extent to which the subjective evaluations of performances of both experimental and control subjects were in agreement. (Siegel, 1956)

A Lindquist (Type I) repeated measures analysis of variance

(Dayton, 1970, pp. 256-270) was employed to analyze the main effects and any interaction.

### Homogeneity of Judges

Agreement among the judges was of great importance in determining the meaningfulness of results obtained from the judges' evaluations of the subjects. Agreement among the judges was tested by comparing the order in which each of their scores eventually placed each subject in rank order from first to twenty-fourth. The rating scale and sheet used by the judges is found in Figure I (Chapter III). Each subject was rated from one (poor) to five (excellent) on four patterns of Taekwon-Do movements. The maximum possible score was 280 points while the minimum possible score was 56 points. For example, if all of the judges ranked all of the students in exactly the same order on the basis of performance, agreement among the judges would be 100%.

The test used to measure agreement among the judges was the Kendall's Coefficient of Concordance, a measure of the relation among several rankings of  $N$  individuals (Siegel, 1956). The null hypothesis for Kendall's "W" is whether or not a value of the squared deviations of ranks ( $S$ ) as large as obtained could actually occur by chance. Results of this test indicate concordance among the judges. A "W" score of .84 was found in the pre-test. A score of .97 was found in the post-test. "W" scores can range from zero, or complete disagreement, to one, or complete agreement. Ties were taken into account in determining the "W". Results of this analysis are found in Table I.

TABLE I

Kendall's Coefficient of Concordance and  $\text{Chi}^2$  Values

| Test      | "W" | $\text{Chi}^2$ Value |
|-----------|-----|----------------------|
| Pre-test  | .84 | 77.28*               |
| Post-test | .97 | 89.24*               |

\* $\text{Chi}^2 = 49.73$  with 23 degrees of freedom, significant at .001

Originally, five judges had participated in the evaluation of the subjects. One judge, however, was found to be markedly discordant with the other judges in the pre-test, and the above results were computed with the use of only four judges' scores. The judge in question holds the rank of fifth degree black belt.

Concordance among the judges was high in both the pre and the post-tests after the fifth judge was eliminated from the study ( $W = .84$  pre and  $.97$  post-test). Post-test concordance was higher than in the pre-test. This may be explained by the overall lack of technique exhibited by all subjects in the pre-test, which may have been more difficult to judge than the subject's improved post-test performance. Students are seldom formally evaluated in Taekwon-Do before six to eight weeks of instruction have been completed.

Agreement in the pretest, when all five judges' scores were used, resulted in a computed "W" of  $.69$ . Agreement in the post-test with all five judges was  $.96$ .

## Results (ANOVA)

The scores obtained on the pre and post-tests were analyzed by a Lindquist Type I analysis of variance (repeated measures). In the present study such measures were pre and post experimental assessments (Variables  $A_{Pre}$  and  $A_{Post}$ ). The group variables ( $B_E$  and  $B_C$ ) were represented by experimental and control treatments. The analysis also provided information about a potential A B interaction.

There was, in fact, a significant interaction between groups with a sign change over time ( $F = 19.55$ , 1 and 22 df,  $P < .05$ ). This indicated that one treatment group behaved differently under different levels from the other treatment group, thus negating the importance of the sign tests for main effects, and suggesting that additional insights would be obtained by tests for simple main effects (Kirk, 1968, p. 263).

The test for simple main effects involving comparisons of subject's mean scores at the pre and post-test levels was conducted with an error rate (level of significance) of .025 per comparison. Thus the error rate for the original test of the interaction effect (.05) was partitioned for each of the tests for simple main effects. This particular treatment is suggested by Kirk (1968, p. 181).

The analysis of simple main effects is given in tabular form in Table 2.

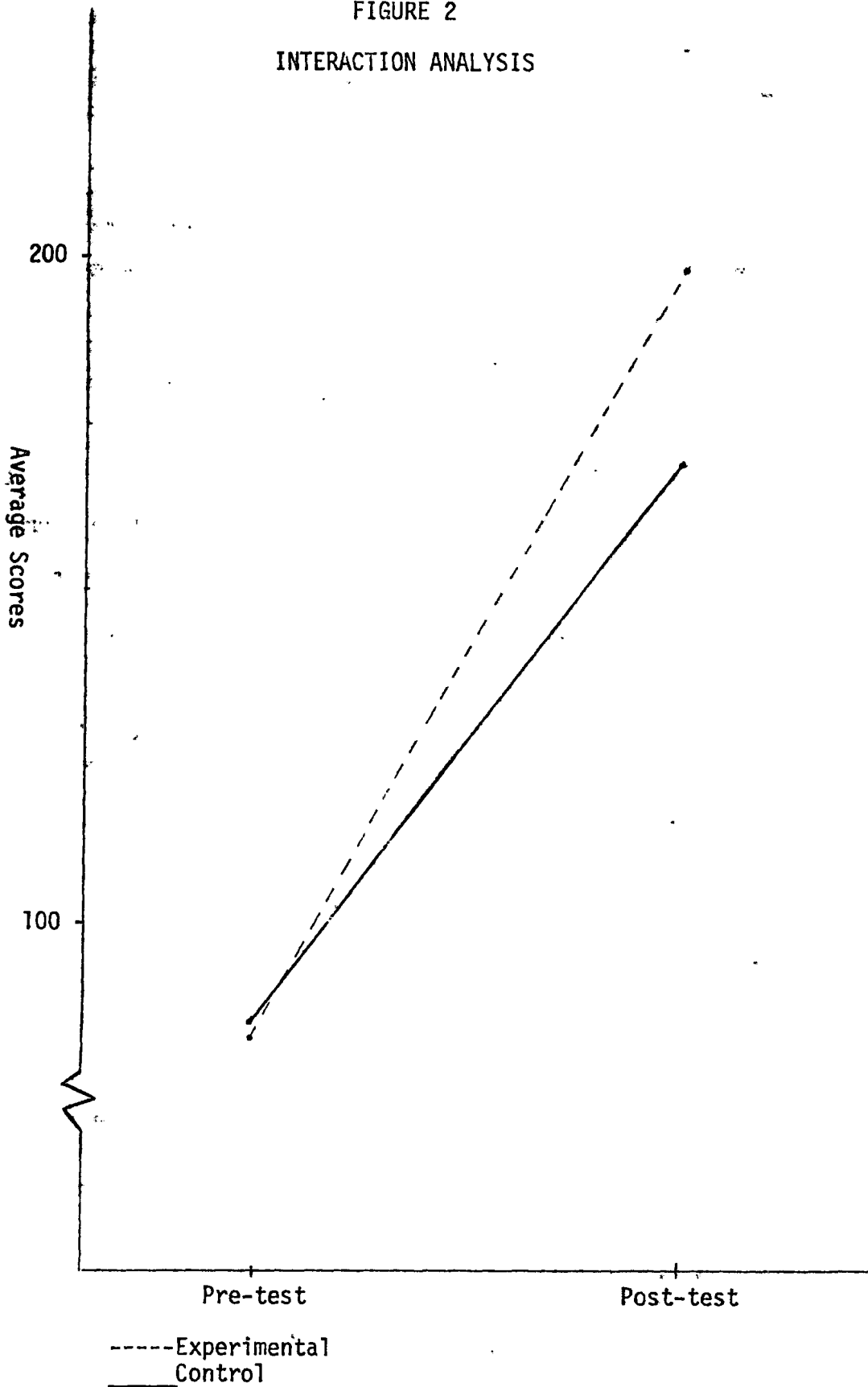
TABLE 2  
Analysis of Simple Main Effects

|              | Pre-test | Post-test |
|--------------|----------|-----------|
| Control      | 71.28    | 167.32    |
| Experimental | 67.83    | 196.98*   |

\*P .025 with 1 and 22 df

The test of simple main effects indicated no significant difference between the experimental and control group's pre-test mean scores. However, the post-test mean scores between groups were found to differ significantly. The critical value of F at the .025 level is given as 5.79 with 1 and 22 degrees of freedom. The F ratio obtained in the post-test analysis was 12.25. The unpartitioned probability value of F showed the experimental group's mean score to be significant at the .002 level of confidence. An interaction graph showing pre and post-test mean scores is presented in Figure 2.

FIGURE 2  
INTERACTION ANALYSIS



## DISCUSSION OF THE RESULTS

The results of this study will be discussed in terms of differences between the control and the experimental groups, differences within each of the two groups, and in terms of previous research.

### Comparison of Control Versus Experimental Pre-test Scores

Although the subjects were randomly divided into two groups a significant difference ( $P = < .05$ ) was discovered between the pre-test scores of the experimental and control groups favoring the control group. The standard deviation for pre-test scores was relatively small, with the potential of only slight differences in scores resulting in significance.

It is noted further that the difference found was in favor of the control group (i.e., the control group performed significantly better than the experimental group). Ideally, there should have been no difference between the two groups before the treatment began.

### Comparison of Control Versus Experimental Post-test Scores

The post-test scores of the two groups showed highly significant differences in performance in favor of the experimental group.

The experimental treatment itself is thus isolated as an important factor in accounting for the differences in learning and performance between the two groups.

In investigating other possible causes for the differences between groups, the so-called "Hawthorne Effect" (Hanson, 1967) came into question when a student who had been in the control group remarked on a course evaluation form that he believed that students of high ability



had been selected for extra instruction in the experimental group, while students of lower ability were left to practice with the black belt assistant in the control group. This may have resulted in motivational differences between the groups.

The "Hawthorne Effect" postulates that better performance may be due to a higher level of motivation, caused by extra attention being focused on one group. Researchers in the behavioral sciences believe that special attention and treatment of a group. The differences in post-test performance in the present study are large enough to discount a "Hawthorne Effect" as the exclusive agent for differences noted, however.

It is possible that the extra attention of a master instructor, in the case of the experimental group, may have added somewhat to the motivation of the subjects, and could have affected performance. The control group, on the other hand, may have experienced a decrease in morale, due to the knowledge that the other group was receiving special attention from the master instructor. In determining possible causes of the differences in post-test scores between the groups, the "Hawthorne Effect" must be considered as a possible contributing factor. Ideally, the same instructor should teach both the control and the experimental groups in order to eliminate the chance of the "Hawthorne Effect" coming into play. Unfortunately, this could not be done, due to a time limit.

#### Comparison of Pre and Post-Test Scores Within Each Group

The performances of both groups improved significantly during the

instructional period. The experimental group's average total score improved 129.14 points ( $P < .05$ ). The control groups average score improved 96.04 points ( $P < .05$ ).

### Previous Research

The findings in the present study seem to agree with those of Paben and Rosentsweig (1971) and Benson (1958), who found significant differences in performance and learning in beginning paddle ball hitters and swimmers, respectively, who were in treatment groups that included tension recognition instruction.

## CHAPTER V

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter includes a summary of the study, conclusions drawn from the findings and recommendations for further study.

#### Summary of the Study

The purpose of this study was to determine the effects of tension recognition and control on beginning Taekwon-Do instruction.

Twenty-two male and two female students enrolled in an introductory Taekwon-Do course at the State University College at Brockport participated in the study, which involved randomly separating the subjects into two groups and applying an experimental treatment to only one group, the other group serving as the control. The treatment consisted of a series of ten minute instructional periods in which the experimental group was taught Jacobsonian methods of tension recognition applied to basic Taekwon-Do techniques. Both groups received identical instruction in Taekwon-Do prior to the treatment, and the control group practiced independently during the time the experimental group received the treatment. The experiment occurred over a seven week period.

Performance of Taekwon-Do techniques was measured by two basic patterns in Taekwon-Do, Four Directional Punch and Four Directional Kick. Performance of the patterns was evaluated by five master instructors in Taekwon-Do who were able to view the subjects' performance

on videotape.

Both groups were pre-tested before the treatment began and post-tested six weeks later.

Analysis of variance revealed significant differences between the performances of the two groups in the post-test in favor of the experimental group. (The control group had had a slightly higher level of performance than the experimental group in the pre-test.) The difference was significant at the .05 level. Agreement among the judges was tested and found to be significant at the .001 level, after eliminating one of the judges, who was found to be in disagreement with the other judges in the pre-test.

### Conclusion

Within the scope and the limitations of this study, it is concluded that a ten minute instructional program in Jacobsonian methods of tension recognition, when given simultaneously with instruction in Taekwon-Do, three days per week, for six weeks, resulted in significant improvement in beginners' performance of the beginner patterns Four Directional Punch (Saju Jirugi) and Four Directional Kick (Saju Chagi).

### Recommendations for Further Study

These recommendations for further study are based on the findings of the present investigation.

1. Conduct a similar study, investigating, in depth, which techniques, and which components of techniques, are most affected by tension recognition and control instruction.

2. Conduct a study in which students are taught Jacobson's Pro-

gressive Relaxation to determine the effects of learning complete relaxation upon performance of Taekwon-Do techniques.

3. Conduct a similar study in which electromyography is used to determine, scientifically, the levels of tension present in the muscles of the subjects during the pre and the post-tests.

4. Conduct a study in which both the control and the experimental group are taught by the same instructor at all times during the instructional period (including the treatment), thereby eliminating the "Hawthorne Effect."

5. Conduct longitudinal studies to determine if the differences between students who have learned tension control and students who have not continue to be as significant as the students' progress in Taekwon-Do.

6. Conduct an experiment in which more advanced students are used as subjects, thereby eliminating the poor pre-test scores.

7. It would be useful, in terms of the present study, to examine the extent to which the traditional evaluation in Taekwon-Do of relaxation compares with, for example, electromyographic measures.

## APPENDIX A

## INFORMED CONSENT

I understand that the course PHE 179.01 is also being used for the purposes of research. As a member of this class, I have no objections to participating as a subject.

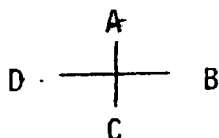
- 1 Paul H. Zyt
- 2 Raymond A. Maggiora
- 3 Hugh Knight
- 4 Kelly P. McConnell
- 5 Peter J. McSweeney
- 6 Larry Domingo
- 7 Keith Moore
- 8 Scott A. Messer
- 9 Greg August
- 10 David Rainardo
- Paul Romano
- Ronnie Gulla
- Chris Kellman
- Red Gohite
- Paul Cull
- Timothy J. Melvin
- John Jankovich
- Bret Paul
- William M. Clancy
- Karen Dailly
- Joseph C. Lasso
- Andrew Dole
- Severin Fealson
- Robert Kovacic

APPENDIX B



Pattern I Low section block and middle section punch

Saju Jirugi (right side)



Students start facing A in ready stance.

1. Move right foot forward to A, forming a right walking stance facing A, while executing a right middle punch.
2. Move right foot to B, forming a left walking stance facing D, while executing a left low section block.
3. Move right foot forward to D, forming a right walking stance facing D, while executing a right middle punch.
4. Move right foot to A, forming a left walking stance facing C, while executing a left low section block.
5. Move right foot forward to C, forming a right walking stance facing C, while executing a right middle punch.
6. Move right foot to D, forming a left walking stance facing B, while executing a left low section block.
7. Move right foot forward to B, forming a right walking stance facing B, while executing a right punch and yell.



a. Ready



b. Execute

Middle section punch



a. Ready

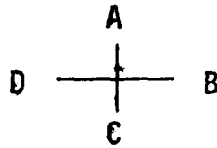


b. Execute

Low section block

Pattern I Low section block and middle section punch

Saju Jirugi (left side)

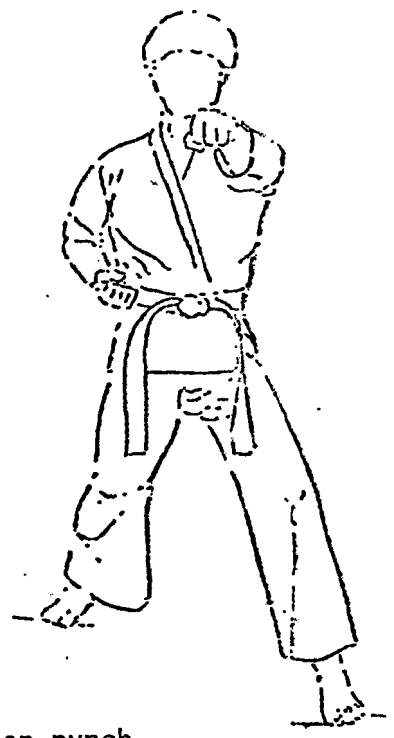


Students start facing A in ready stance.

1. Move left foot to A, forming left walking stance facing A, while executing left middle punch.
2. Move left foot to D, forming right walking stance facing B, while executing right low section block.
3. Move left foot forward to C, forming left walking stance facing C, while executing left middle punch.
4. Move left foot to A, forming right walking stance facing C, while executing right low section block.
5. Move left foot to C, forming right walking stance facing C, while executing left middle punch.
6. Move left foot to B, forming a right walking stance facing D, while executing right low section block.
7. Move left foot to D, forming left walking stance facing D, while executing left middle punch and yell.

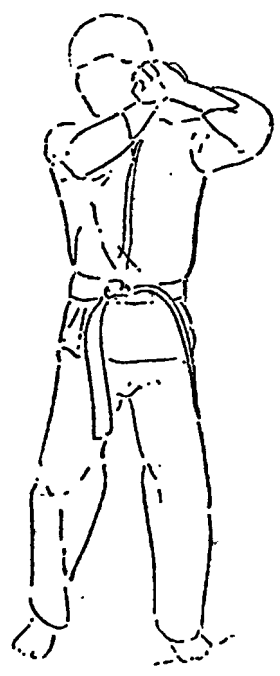


a. Ready

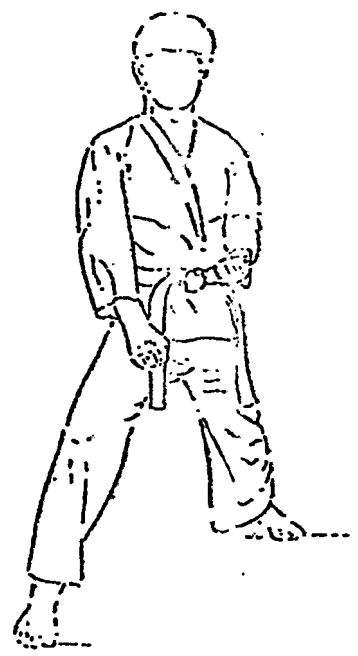


b. Execute

Middle section punch



a. Ready

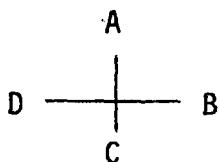


b. Execute

Low section block

Pattern II Middle section side block and middle section punch

Saju Yap Magi (right side)



Students start facing A in ready stance.

1. Move right foot forward to A, forming right walking stance facing A, while executing a right middle section punch.
2. Move right foot to B, forming left L stance facing D, executing left side middle block.
3. Move right foot forward to D, forming a right walking facing D, while executing a right middle punch.
4. Move right foot to A, forming a left L stance facing C, while executing a left side middle block.
5. Move right forward to C, forming a right walking stance facing C, while executing a right middle section punch.
6. Move right foot to D, forming left L stance facing B, while executing left side middle block.
7. Move right foot forward to B, forming right walking stance facing B, while executing a right middle punch and yell.

Pattern II



a. Ready

Middle section punch



a. Execute



a. Ready

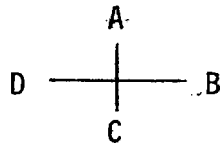
Side middle block



b. Execute

Pattern II Middle section side block and middle section punch

Saju Yap Magi (left side)



Students start facing A in ready stance.

1. Move left foot to A, forming left walking stance facing A, while executing left middle punch.
2. Move left foot to D, forming right L stance facing B, executing a right side middle block.
3. Move left foot forward to C, forming left walking stance facing C, while executing left middle punch.
4. Move left foot to A, forming right L stance facing C, while executing right side middle block.
5. Move left foot to C, forming right walking stance facing C, while executing left middle punch.
6. Move left foot to B, forming a right L stance facing D, while executing a right side middle block.
7. Move left foot to D, forming left walking stance facing D, while executing a left middle punch and yell.

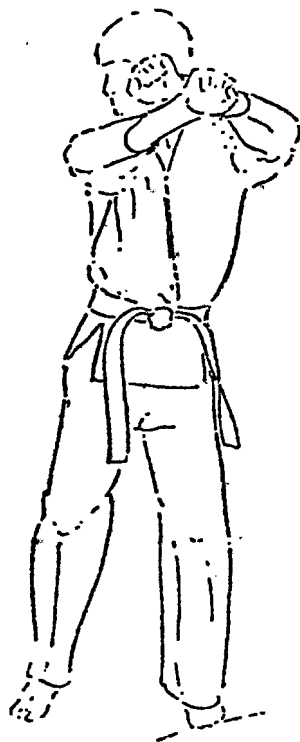


a. Ready



b. Execute

Middle section punch



a. Ready



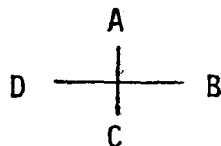
b. Execute

Middle section block



Pattern III Middle section front snap kick and reverse punch

Saju Ap Chagi (right side)



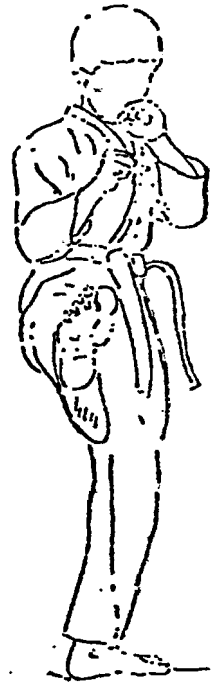
Students start facing A in ready stance,

1. Move right foot back to C, forming left fighting stance facing A.
2. Perform right front snap kick to A, followed by right reverse punch to D while placing right foot to B forming right fighting stance facing D.
3. Perform right front snap kick to D, followed by a right reverse punch to C while placing right foot back to A, forming right fighting stance facing C.
4. Perform a right front snap kick to C, followed by a right reverse punch to B while placing right foot back to D, forming a right fighting stance facing B.
5. Perform right front snap kick to B, followed by reverse punch to A, while placing right foot back to C, forming right fighting stance facing A.



a. Ready

Front snap kick

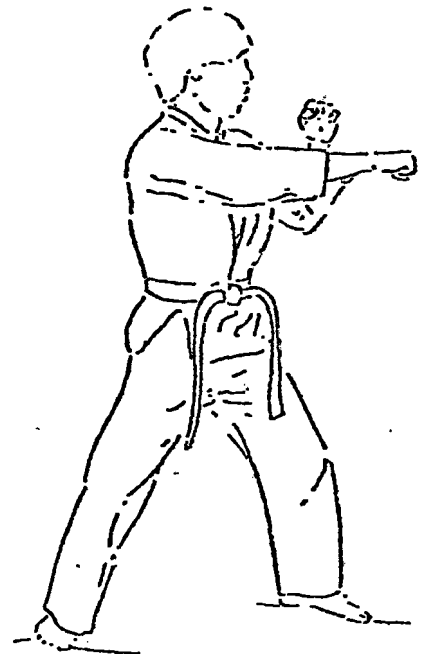


b. Execute



a. Ready

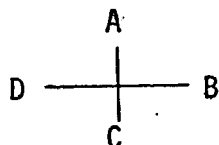
Reverse punch



b. Execute

Pattern III Middle section front snap kick and reverse punch

Saju Ap Chagi (left side)



Students start facing A in ready stance.

1. Move left foot back to C, forming left fighting stance facing A.
2. Perform left front snap kick to A, followed by a left reverse punch to B, while placing left foot back to D, forming left fighting stance facing B.
3. Perform left front snap kick to B, followed by left reverse punch to C, while placing left foot back to A, forming left fighting stance facing C.
4. Perform left front snap kick to C, followed by left reverse punch to D, while placing left foot back to B, forming left fighting stance facing D.
5. Perform left front snap kick to D, followed by left reverse punch to A, while placing left foot back to C, forming left fighting stance facing A.



a. Ready



b. Execute

Front snap kick



a. Ready

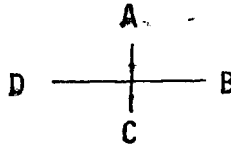


b. Execute

Reverse punch

Pattern IV Middle section side kick and reverse

Saju Yap Chagi (Right side)



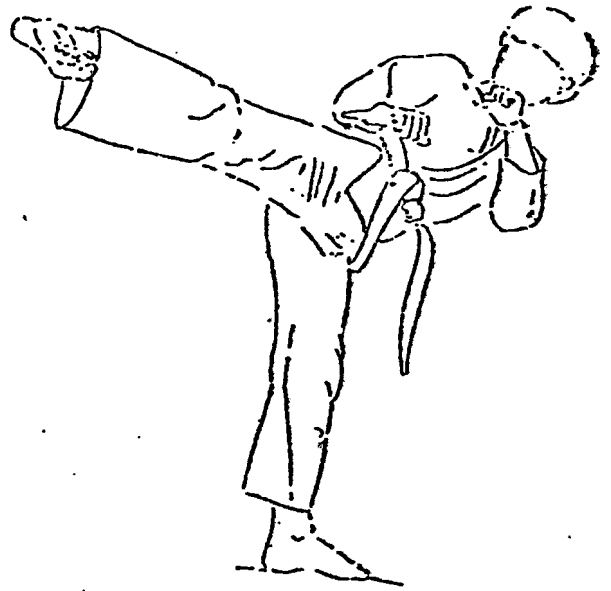
Students start facing A in ready stance.

1. Move right foot back, forming right fighting stance, facing A.
2. Perform right side kick to B, followed by right reverse punch to D while placing right foot to B, forming right fighting stance facing D.
3. Perform right side kick to A, followed by right reverse punch to C while placing right foot to A, forming right fighting stance facing C.
4. Perform right side kick to D, followed by right reverse punch to B while placing right foot to D, forming right fighting stance facing B.
5. Perform right side kick to C, followed by right reverse punch to A while placing right foot to C, forming right fighting stance facing A.



a. Ready

Side kick



b. Execute



a. Ready

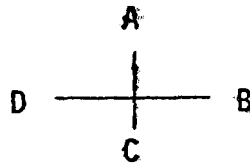
Reverse punch



b. Execute

Pattern IV Middle section side kick and reverse punch

Saju Yap Chagi (left side)



Students start facing A in ready stance.

1. Move left foot back, forming left fighting stance facing A.
2. Perform left side kick to D, followed by left reverse punch to B while placing foot to D, forming left fighting stance facing B.
3. Perform left side kick to A, followed by left reverse punch to C while placing left foot to A, forming left fighting stance facing C.
4. Perform left side kick to B, followed by left reverse punch to D while placing left foot to B, forming left fighting stance facing D.
5. Perform left side kick to C, followed by left reverse punch to A while placing left foot to C, forming left fighting stance facing A.

Pattern IV



a. Ready



b. Execute

Side kick



a. Ready



b. Execute

Reverse punch



APPENDIX C

JUDGES QUALIFICATIONS

| <u>NAME</u>     | <u>LOCATION</u> | <u>RANK(degree)</u> | <u>SIGNATURE</u> |
|-----------------|-----------------|---------------------|------------------|
| Hong, Sung-In   | [REDACTED]      | 8th                 | [REDACTED]       |
| Park, Bu Kwang  | [REDACTED]      | 7th                 | [REDACTED]       |
| Lee Sang Chul   | [REDACTED]      | 7th                 | [REDACTED]       |
| Son Myung Soo*  | [REDACTED]      | 5th                 | [REDACTED]       |
| Hong, Sung-Kwan | [REDACTED]      | 5th                 | [REDACTED]       |

\* was later removed from the study.

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