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The Effects of Selected Football Drills on Agility

Douglas Lee Tschetter

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THE EFFECTS OF SELECTED FOOTBALL
DRILLS ON AGILITY

BY

DOUGLAS LEE TSCHETTER

A thesis submitted
in partial fulfillment of the requirements for the
degree Master of Science, Major in
Physical Education, South Dakota
State University

1965

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Thesis Adviser

Head, Physical Education
Department

Date
THE EFFECTS OF SELECTED FOOTBALL
DRILLS ON AGILITY
Abstract

DOUGLAS LEE TSCHEITZER

Under the supervision of Associate Professor Ervin A. Huether

The purpose of this investigation was to determine if
agility is affected by an agility training program employing an
agility maze, two man sled drills, and reaction drills.

The following procedure was employed. A table of random
numbers was used to assign, seventeen freshman football players, into
the activity group and the control group. The activity group partic­
ipated in a three-week agility training program, in which they met
five times a week. A training session consisted of three drills, the
agility maze, sled drills, and reaction drills. The data that were
collected included scores from the Bass Dynamic Balance Test, times
from the Prone to Standing Movement Test, and times from the Revised
Penny Cup Test.

The data taken during the testing were recorded and analyzed
to determine what effect, if any, the agility training program had
upon the agility measurements. The mean of each group was found. The
differences between the means, standard error of the differences, t
values, and the level of significance were found. The null hypothesis
was applied in each case of statistical work.

As a result of the findings obtained during this study, the
following conclusions appear warranted. The method of agility train­
ing employed in this study is an effective method of increasing
dynamic balance. An agility training program, as performed in this study, had no effect upon speed in changing body directions and quickness in changing body positions.
ACKNOWLEDGEMENTS

The author wishes to express his sincere appreciation to Mr. Glenn E. Robinson and Mr. Ervin A. Huether, for their helpful suggestions and guidance throughout this study; to Dr. M. T. Woodall for his advice on statistical procedures; to Calvin Dahl for his assistance in the construction of training devices; and to the other faculty members of South Dakota State University who contributed many helpful suggestions.

DLT
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Chapter I

INTRODUCTION

Reasons for Study

Modern era football with pursuit defenses and multiple offenses has confronted coaches with the problem of developing agile football players. Complex defensive and offensive patterns demand that a considerable amount of the daily practice time be devoted to the improvement of the agility of the athlete.

A search of the literature reveals that much has been written in coaching magazines and presented in coaching clinic manuals about ameliorating agility. Eaton\(^1\) believes that his squad must react to sight in order to be able to master multiple defenses. The coach is responsible to make certain that his squad members have the physical tools to meet their playing responsibilities. The author further contends that agility is the most important tool a football player must possess. As a result, a great variety of drills designed to improve this skill have been included in the daily football drills.

There remains the question, however, as to agility improvement made by athletes in nontested agility programs. It is the writer's opinion that the majority of coaches have adopted, combined, or created agility drills, but have not objectively tested results to

determine if there has been improvement in agility skills. This study attempted to ascertain by measurement whether a selected agility program does or does not improve agility.

Statement of Problem

The purpose of this study was to determine and evaluate the effects of an agility training program on agility, employing an agility maze, two man sled, and reaction drills.

Limitations of Study

1. No attempt was made to regulate sleep, diet, and regular living habits of the subjects.

2. Length of the agility training program was five times per week for a three week period.

3. Previous experience of the subjects with testing procedures was not considered.

4. The sampling was small due to the limited number of subjects available to the writer.

5. Control over outside physical activities was not entirely limited. Subjects remained in assigned physical education classes and were allowed to complete their present intramural activity.
Definitions

Agility: The author's definition of agility is that quality which allows an individual to maintain balance, change body positions quickly, and have the speed to change body directions.

Multiple Offenses: A number of offensive formations are employed by football teams today. The requirements of multiple formations in modern football demand football players to move in many directions, execute different types of blocks, and run different patterns. These movements require an agile football player.

Pursuit Defenses: Modern defenses in football are influenced by varied types of offenses. In order to meet the multiple offenses, defensive men are required to take care of their own area and pursue the ball carrier on a set angle to retain the perimeter of the defense. Such movements demand an agile football player.

Shiver: A defensive football player's technique of driving his fully extended arms into the offensive blocker, in an attempt to ward off the opponent and tackle the ball carrier.
Chapter II

REVIEW OF RELATED LITERATURE

In reviewing the literature concerning agility training programs the author was unable to find studies pertaining to objectively tested agility programs. The literature did reveal that coaches of football are in agreement as to need of agility drills and that type and design of drills were not too different.

Schmakel\(^2\) indicated that all football coaches are continually seeking better ways to help each lineman become agile and capable of reacting to the many situations in which they are confronted during a football game. Rutgers State University used the following drills to improve players reaction time, speed and agility: wave drill, tackling drill, somersaults, shoulder rolls, and jump drill. The four man sled with shiver, pursuit, and charging drills were also used. The author claims that these drills have been successfully utilized to assist lineman to become quicker and better able to execute various defensive techniques.

The basic drills Eaton\(^3\) uses are: quarter eagle, wave drill,


\(^3\) Eaton, loc. cit.
three man rolls, and the two hand shiver, lift, rollout, defensive pursuit, and slanting on the two man sled.

Keller used 359 athletes in his study to determine

quickness of body movement. He found there is a positive relationship between the ability to move the body quickly and success in athletic activities. He further states, "Men who are not quick enough to achieve proficiency and success in highly competitive team games might excel in individual sports."

Phillips analyzed a series of physical education tests that were administered to 200 college students to determine the traits or factors that were measured by each of the tests. She found that speed is a common factor to agility.

Nelson in discussing the topic of drills to be used in football states that drills have been a controversial issue with coaches for many years. However no one has questioned the value of drills, but has questioned the type to be employed in practice sessions. A successful football coach is like the medicine man who has worked so many cures that everyone wants to try his formula. The
author continued by stating that coaches of one school of thought believe in taking time from the "group work" period for agility drills at the expense of the team type of drills and team preparation. These coaches are convinced that agility of the player is greatly increased by agility drills and that is a valuable practice activity.

Martin⁷ stresses running, body control, and quick movement for his athletic teams. He assumes that a player will not be able to control an opponent unless he is able to control his own body. Martin believes agility drills are beneficial in developing this trait. His agility program consists of a set of drills composed of tumbling, relays, rope jumping, and an agility maze.

---

Chapter III

PROCEDURE FOR OBTAINING DATA

The purpose of this study was to determine the effects of agility training upon the football player's ability to maintain speed in changing body direction, changing body positions quickly, and maintenance of balance. The subjects and procedures that were used in the experiment are described in this chapter.

Subjects

Subjects for the study were seventeen in number and members of the freshman football squad at South Dakota State University. Subjects were volunteers and had participated in freshman football the previous season.

Design of Experiment

The seventeen subjects were, by a table of random numbers, assigned to two groups, with nine subjects in the activity group (Group A) and eight subjects in the control group (Group C). The pre-training-test and the post-training-test experimental design was employed. Group A was given the pre-training-test, the agility training program, and the post-training-test. Group C was given the pre-training-test and the post-training-test. While Group A was in the agility training program, Group C was to participate in normal every day physical activity.
Instruments for Obtaining Information

The Penny Cup Test was revised in order to measure direction change (Figure 1). The Penny Cup Test was converted to an electrically timed test and directional changes were given with a light stimulus controlled by photoelectric cells. In the test administration the subject's performance time was measured by the Hale Reaction Timer and all readings were taken in hundredths of seconds. An auditory stimulus was used to initiate the testing procedure. The auditory stimulus was controlled by pressing a button on the front of the reaction timer, which sounded the buzzer and started the performance time clock simultaneously. Directional lights, controlled by photoelectric cells were placed behind each of three termination pads and signified the direction the performer was to take. The termination pads were located with the center pad twelve feet straight ahead of the light beam and the right and left pads at ninety degree angles to the center pad and eight feet away from center pad. The tester by use of a master control box was able to control the functioning of the directional lights. The subject stood with his heels behind a starting line, facing in the opposite direction. On the sound stimulus from the buzzer the performance turned as quickly as possible and moved in the direction of the photoelectric cells. As
Figure 1. Subject Performing in the Revised Penny Cup Test
the performer passed through the photoelectric cell's light beam, a circuit was completed, turning on one of three directional lights. Once breaking the light beam the performer moved as quickly as possible in the direction of the signified termination pad. The performer ended the trial by stepping on a termination pad, thus stopping the performance clock. The time to complete the test was recorded in hundredths of seconds. The directions of the test were thoroughly explained to each performer and each performer was given as many trials as necessary to master the test. Five trials were given to each subject for score. The arrangement of the trials was assigned by a table of random numbers with each subject having a separate arrangement for the trials.

The test used for measuring speed in changing body positions was the Dale Pennybaker's Prone to Standing Movement Test.9


(Figure 2) The test began with the subject in the prone position on a mat, arms and legs were fully extended with the arms above the head and the toes pointed behind. The performer rested his dominate hand on a micro-switch which when released started the performance clock on the Hale Reaction Timer. Performers were allowed to start the test whenever ready. The subject was restricted in that the first movement of the body was the lifting of the hand from the micro-switch. After removal of the hand from the micro-switch the subject stood up as
Figure 2. Subject Performing the Prone to Standing Movement Test
quickly as possible, ran around a chair, and stopped the performance
clock by stepping on the termination pad. The time to complete the
test was recorded in hundredths of seconds. Subjects were given a
thorough explanation of the test and were allowed as many trials as
necessary to master the test. Three trials for score were given to
each subject.

The Bass Stepping Stone Test \(^{10}\) was employed to test dynamic

\(^{10}\)Ruth I. Bass, "An Analysis of the Component Test of Semi-Circular
Functions of Static and Dynamic Balance," Research Quarterly, May,
1939.

balance (Figure 3). Circles, eleven in number and eight and one-half
inches in diameter, were drawn on the floor in keeping with the test
description. The performer stood with his right foot in the starting
circle, leaped into the first circle with his left foot, into the
second circle with the right foot, and completed the test by alternat-
ing the feet and leaping from circle to circle. The test required the
subject to leave the floor entirely in leaping from one circle to
another, landing upon the ball of the foot and not permitting the heel
to touch the floor. Subjects were to remain in the circle for as long
as he could up to a maximum of five seconds. The tester counted off
the seconds for each circle. The test required that if the performer
leaped into the next circle before the count of five, the count began
again. If the performer remained in the circle more than five seconds,
the extra time was deducted from the total time. Each subject was
Figure 3. Subject Performing the Bass Dynamic Balance Test
given three trials. No practice trials were allowed by the tester.
The score recorded was fifty, plus the number of seconds taken to
negotiate the test, minus three times the "errors". The "errors"
included the following: (1) touching the heel to the floor; (2) mov-
ing the foot while standing in the circle; (3) hopping upon the
supporting foot; (4) touching the floor outside the circle; (5) touch-
ing the floor with the opposite foot; (6) touching the floor with any
other part of the body; (7) not hopping into the next circle. Each
error counted one point. Accumulative errors were computed by the use
of a hand tally register.

Training Program

The author, prior to the beginning of the experiment through
reading and in conference with college and high school coaches,
collected a series of known football agility drills. The drills
selected were a composite of many different agility drills that coaches
are using today.

The activity group (Group A) participated in this training
program for fifteen sessions. The program lasted thirty-five minutes
a day, five days a week (Monday through Friday) for three weeks
(March 15 to April 2, 1965).

To lessen the possibility of injury the subjects warmed up
on their own prior to the agility training program. No specific warm-
up was recommended due to time and scheduling difficulties.
The agility training sessions consisted of sled drills, an agility maze, and reaction drills. The order of completing these drills was kept constant throughout the training program.

A two man sled was mounted on a wall indoors because of winter weather conditions. Each subject participated in the shiver, slide and shiver drill and the shiver, spin, and shiver drill. The shiver-slide-shiver drill consisted of shivering one pad, recovering, moving the feet rapidly and sliding on to the other pad, recovering, and returning to the first pad in the same manner. The shiver-spin-shiver drill consisted of shivering one pad, recovering, pulling back with the outside elbow and spinning on to the second pad, shiver the second pad recovering, and return to the first pad in the same manner. Each drill was repeated twice for a duration of thirty seconds in each session.

An agility maze was employed to make use of several agility stunts. Each performer participated in the maze three times at each training session. The maze consisted of the following stunts in progression: (1) charge to shiver a dummy; (2) two lateral rolls; (3) circle a dummy; (4) two forward rolls; (5) circle a dummy; (6) run tires; (7) cut on dummy; (8) cut on dummy; (9) tackle dummy; (10) run figure eight two times.

In the two bouts of reaction drills the subject mimicked the author. The reaction drills consisted of the following reactions:
1. Knee Drops: Subjects started in the stationary running position and attained a one knee kneeling position on the author’s command. Subjects then recovered to the running position.

2. Quarter Eagle: Subjects assumed a stationary running position and rotated one-quarter turn and returned to the starting position on the author’s hand signal. The feet moved continuously throughout the drill.

3. Air Jump: Subjects ran in place and leaped into the air with the arms extended above the head. Subjects then returned to the stationary running position.

4. Forward Somersault: Subjects from the stationary running position performed a forward somersault and recovered to a football position with the feet moving rapidly.

5. Lateral Rolls: Subjects from running position rolled over on their side and recovered to the running position.

6. Backward Somersault: Subjects performed a backward somersault from the running position and recovered to football position with the feet moving rapidly.

7. Front Drop: Subjects from the running position dropped into a push-up position and caught himself with his arms to break the fall. The subjects then recovered to the running position as quickly as possible.

8. Back Drop: Subjects from the running position dropped onto their hips and back and recovered as quickly as possible to the running position.
9. **Hand and Foot Reaction:** Subjects from the stationary position mimicked the author in a series of hand and foot movements.

10. **Agility Running:** Subjects ran a series of fifteen yard sprints. Two fifteen yard sprints forward, two fifteen yard sprints backward, two sprints sideways facing to the right, and two sprints sideways facing to the left. All sprints originated from the same starting line.
Chapter IV

ANALYSIS OF DATA

Introduction

The purpose of this study was to determine the effects of an agility training program upon speed in changing body direction, changing body position quickly, and maintenance of balance. The relationship of gains and losses of performance times and balance scores between the activity group and the control group was investigated.

Reliability

The writer followed the testing procedures described by the originators of the Bass Dynamic Balance Test and the Prone to Standing Movement Test. A reliability of .95 was reported for the Bass Dynamic Balance Test and a reliability of .87 for the Prone to Standing Movement Test.

Analysis of Data

The mean difference of the initial and final test was found within each group. The difference between the mean gains or losses and standard error of the difference between the mean gains or losses was computed between the activity and the control group for each of the three tests. To determine the critical ratio between the two
groups, the author employed the statistical method as outlined by Garret\textsuperscript{11}. The null hypothesis was rejected if the obtained \( t \) ratio was greater than 2.95. The one per cent level of confidence was chosen and 15 degrees of freedom were present in this investigation.

\textbf{Findings}

\textbf{Revision of Penny Cup Test}

For the activity group no gain or loss of time was found in the change of direction test. A mean gain of .12 seconds was made by the control group. A mean gain indicated a decreased ability for speed in direction changes. The critical ratio of the difference between the activity group and the control group was found to be .07. This critical ratio was not significant at the one per cent level of confidence and the null hypothesis was accepted.

\textbf{Prone to Standing Movement Test}

The mean gain for the time of changing body positions for the activity group was .04 seconds. The mean loss of .01 seconds was made by the control group. A mean gain indicated a decreased ability for speed in changing body positions and a mean loss indicated increased ability for speed in changing body positions. The critical ratio of the difference between the activity group and the control
group was found to be .16. This critical ratio was not significant at the one per cent level of confidence and the null hypothesis was accepted.

**Bass Dynamic Balance Test**

A mean gain for the score of maintaining balance for the activity group was 23.59 points. A mean gain of 12.83 was made by the control group. The critical ratio of the difference between the activity group and the control group was found to be 6.29. This critical ratio was significant at the one per cent level of confidence. The null hypothesis was rejected.

Table I shows the mean gains or losses of the activity group, the control group, and levels of confidence. The raw scores collected in the testing program are found in the Appendix.
### Table I

Mean Gains or Losses of Activity Group, The Control Group, and Levels of Confidence

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<th>Measurements</th>
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<td>- .01</td>
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<td>+12.83</td>
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<td>.01*</td>
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*Significant for this investigation

**Summary of Findings**

Significant gains at the one per cent level of confidence were made by the activity group over the control group in the Bass Dynamic Balance Test. There was no statistically significant difference between the gains or losses made by the activity and control groups in the Prone to Standing Movement Test and the Revised Penny Cup Test.
Chapter V

SUMMARY

Problem

The purpose of this study was to determine and evaluate the effects of an agility training program on agility employing an agility maze, two man sled, and reaction drills.

Data

Subjects in this study were freshman football players at South Dakota State University during the spring of the 1964-1965 school year. The seventeen subjects were assigned to two groups by a table of random numbers. The activity group had a total of nine subjects and eight in the control group. The activity group participated in a three-week agility training program, in which they met five times a week. A training session consisted of three drills; the agility maze, sled drills, and reaction drills.

The Bass Dynamic Balance Test, the Prone to Standing Movement Test, and the Revised Penny Cup Test were administered at the beginning and the end of the three-week training period.

The data taken during the testing were recorded and analyzed to determine what effect, if any, the agility training program had upon the selected agility measurements. The mean difference between the initial and final test was found within each group. The difference between the mean gains or losses was computed between the activity
group and the control group for each of the three tests. The t ratio between the activity group and control group was then found.

**Findings**

Significant gains at the one per cent level of confidence were made by the activity group over the control group in the Bass Dynamic Balance Test. There was no statistically significant difference between the gains or losses made by the activity and control groups in the Prone to Standing Movement Test and the Revised Penny Cup Test.

**Conclusions**

From the findings of this study, the following conclusions are made: The method of agility training employed in this study is as effective method of increasing dynamic balance. An agility training program, as performed in this study, had no effect upon speed in changing body directions and quickness in changing body positions.
REFERENCES CITED


APPENDIX

RAW SCORES FROM INITIAL AND FINAL TEST

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<tr>
<th>Activity Group</th>
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