THE DEVELOPMENT OF A GOLF PUTTING TEST

By

LEA A. LARSON

Bachelor of Science in Education
State College of Arkansas
Conway, Arkansas
1965

Master of Science in Education
State College of Arkansas
Conway, Arkansas
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Thesis Approved:

Dorothy M. Coleman
Thesis Adviser

Alex B. Harrison

John G. Bayless

Ruth Lindsey

John D. Hamilton

N. Durham
Dean of the Graduate College

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ORIENTATION TO THE STUDY

Introduction

Golf instruction is traditionally divided into four major areas (24:189). These "elements of the game" are driving, approaching, putting, and knowledge concerning the game of golf.

Putting scores have been found to contribute to a high percentage of the total score in the game of golf (14:28). For example, the United States Golf Association allots two strokes per hole for putting in their assignment of "pars." To determine par for a given hole, the distance from the teeing area to the hole is measured. If a hole is between 251 and 470 yards long it is designated a men's four par (71:67), indicating that two shots are required for the "expert" male golfer to arrive at the green and two putts are then allotted to strokes on the green. Holes measuring over 471 yards are allocated five shots for a man's "par" (71:67); that is, three strokes are required to reach the green and two putts are allowed for the "expert" golfer to putt the ball into the hole. Therefore, forty per cent of the shots required for a par on a five par hole are putts on the green. Similarly, sixty-six and

two-thirds per cent of the shots required to make a three par are relegated to the putting green. The importance of putting may be further illustrated by considering that an eighteen hole course with a par seventy-two allows fifty per cent of the strokes to be taken on the greens.

Although these facts illustrate the importance of the putting skill to the golf game, no valid, reliable skill test has been reported with which to evaluate putting ability. The absence of such an instrument was brought to the attention of the researcher while another study which required the use of a putting test was being contemplated. Due to the lack of such a putting test, the original study was temporarily postponed. The present study was an attempt to develop an instrument that could accurately evaluate an individual's abilities in the skill of putting. Such a test would not only be useful in future putting research but would serve as an aid to the golf instructor in determining the most effective means of teaching putting skills.

The test developed in this study was designed primarily for the use in a formal class setting involving group instruction. The following criteria were established for insuring the practicality of the test in an actual teaching situation. The putting test must be:

1. Mathematically sound: The test must conform to accepted mathematical theorems and laws used in devising the instrument and in calculating a "meaningful" score.

2. Reliable: The test must be consistent in its measurement of an individual's putting ability (36:430). An absolutely reliable instrument is one which, if given twice under identical circumstances, would provide the same data.
3. Valid: The test must accurately measure an individual's ability to putt (10:25).
4. Objective: Two or more measurements by two different test administrators using the same test will yield the same scores (10:31).
5. Financially feasible: The test must be relatively inexpensive to administer.
6. Economic in time: Efficiency of the test demands that a minimum of class time be used for testing large numbers of students.
7. Adaptable to the available conditions and to the group to be tested.
8. Easy to administer: The test should be simple to administer. A minimum of equipment and preparation should be required for the administration of the test.
9. Diagnostic: The test should provide the instructor and the student with information relative to the nature of errors.
10. Versatile enough to provide immediate feedback to the instructor and the student regarding test results.

11. Structured so that it provides a learning situation for the student.

Purpose of the Study

Statement of the Problem

There is a need for a valid and reliable golf putting test. At the present time, there is no one putting test which can adequately evaluate an individual's ability to putt. The review of literature conducted for this study revealed the absence of such an instrument although there were a few tests which proved to have varying degrees of reliability. Apparently little attempt has been made to develop a valid putting test.

A valid putting test should indicate an individual's proficiency in moving the ball from arbitrarily determined points on a putting green (or artificial surface which is as realistic as possible) towards the hole. If an individual is completely proficient in the putting skill he will hit the ball into the hole each time. If an individual is not proficient in putting, he will be required to strike the ball numerous times to put it into the hole. This study was designed in such a manner that it would identify the multitude of deviations between these two extremes. Identification of such deviations would provide information concerning force errors as well as directional errors. An analysis of such information in relation to the subject's scores might indicate trends in errors which would cause

the subject to miss the putting cup. If specific identifiable trends developed, the student would be able to make conscious allowances to correct the errors.

In addition, the test was designed to measure putting ability from five different distances (four, eight, twelve, sixteen and twenty feet). The force and direction errors for each putt were measured graphically to assure mathematical accuracy for determining the exact distance of the ball from the center of the hole. This study was an attempt to develop a putting test which is a reliable and valid measure of an individual's ability to putt. It was hypothesized that the scores for the subjects would show a significant positive relationship between the performance on the Putting Grid Test and performance on the Practice Putting Green Test.

Definition of Terms

1. Beginning Golfer: (Group I); an individual who has never played golf or had any formal golf instruction.
2. Combined Group: All of the beginners (Group I) and intermediates (Group II) who completed the study.
3. Directional Deviation: An error causing the ball to go to the left or right of the target.
4. Force Deviation: An error causing the ball to stop short of or beyond the target.

5. Grid: Graph; linear indication of directional (horizontal) deviation and force (vertical) deviation.
6. Intermediate Golfer: (Group II); an individual with a skill proficiency in golf beyond the elementary or introductory level, but who is not a member of the Oklahoma State University varsity golf team.
7. Practice Putting Green Test: A test in which the subject strikes the ball from predetermined positions on a grass, outdoor green to specific holes. The subject continues to strike the ball until it is holed.
8. Putting Accuracy: Ability to strike the golf ball from anywhere on the green to the proximity of the putting cup. The closer the golf ball is to the hole when it stops, the more accurate the putt. The ultimate in putting accuracy is to strike the ball into the putting cup.
9. Putting Grid Test: A test in which the subject strikes the ball toward a grid, imposed upon a strip of G-50 Astro Turf, which measures directional and force deviations of putts from four, eight, twelve, sixteen and twenty feet.

10. Putting Skill: Golf skill required to strike the ball in such a manner as to cause the ball to go into the hole from anywhere on the green.
11. Putting Unit: The first five sessions in putting. These sessions preceded the putting grid test and/or the practice putting green test.
12. Random Assignment: Assignment by random method for equalization of groups. Each subject in the experimental population has an equal chance of being placed in any of the groups or subgroups (36:60-61).
13. Subgroup A: Those subjects who began their testing with the Putting Grid Test and finished with the Practice Putting Green Test.
14. Subgroup B: Those subjects who began their testing with the Practice Putting Green Test and finished with the Putting Grid Test.
15. Target: Putting cup; a hole on the putting green with an opening 4 1/4 inches in diameter; the center origin (0,0) of the grid.
16. Test Days: The beginners (Group I) were tested two times each week for six weeks, on Mondays and Wednesdays; the intermediates

(Group II) were tested two times each week for six weeks, on Tuesdays and Thursdays.

17. Trial: An attempt to fairly strike the ball.
18. Unit of Measure: The measure employed in the study; the space between the grid lines (4 1/4 inches); derived to assure that any two lines above and below the target would simultaneously be parallel to each other and tangent to the target.

Delimitations

The population for the study was divided into two distinct groups of golfers: intermediate and beginning. The Intermediate Group was composed of twenty-six students enrolled in Intermediate Golf at Oklahoma State University. The Beginning Group was comprised of forty-two students enrolled in Beginning Golf at Oklahoma State University.

The putting test took place on a 24 X 5 foot strip of G-50 Astro Turf mounted on a raised plywood platform. The test was administered indoors.

Limitations of the Study

The study was limited by the following factors:

1. It was assumed that the three-week (one day the first and two days for the second and third weeks--one hour per day) instructional unit on putting (outlined in Appendix A,

Page 160) diminished the amount of learning which occurred during the actual testing.

2. The skill levels used in the study were arbitrarily determined and only two gradations were utilized (beginning and intermediate). If handicaps had been available further subdividing would have been possible. At the same time, if students had played enough rounds of golf to establish handicaps the true "beginner" classification would have been obliterated.
3. The check for validity of the grid test was not necessarily a real indication of how many putts would be required by the student in an actual game of golf. If the total number of putts required for a nine-hole round had been used as the validating criterion, there is reason to believe that such factors as approaching ability, variable terrain, and variable distances of the original putts would have distorted the data. The Practice Putting Green Test was chosen to provide a constant distance and terrain for each of the holes for each of the subjects.
4. If for any reason subjects could not take the test during their assigned period, they fulfilled the requirement as soon as possible

after the assigned period. There were times when subjects took two putting grid tests in one day because they had missed the previous test.

5. All of the subjects were right handed.

CHAPTER II

SURVEY OF RELATED LITERATURE

Although tests have been designed to evaluate an individual's putting ability, a review of the literature revealed that only three investigators, Autrey (2), Cochrane (13), and Lumpkin (43), made any attempt to establish the validity or reliability of their tests.

Clevett (11) proposed a battery of four golf skill tests: brassie (2-wood), mid-iron (2-iron), mashie (5-iron) and putter. He used a putting carpet for the putting test and administered the test indoors. The target (painted on the carpet) was a circle the size of a regulation hole. Clevett designated values for each of forty-eight scoring areas. These areas were nine-inch squares. He valued the area past the hole considerably higher than the area short of the hole. His reasoning was "that on a regular green, a ball that seems to be rolling too far frequently rolls into the hole, whereas a ball that is too short never goes into the hole." The ball was scored where it stopped. Ten trials were given for a possible 100 points. His test carpet is shown in the diagram on the following page (Figure 1):

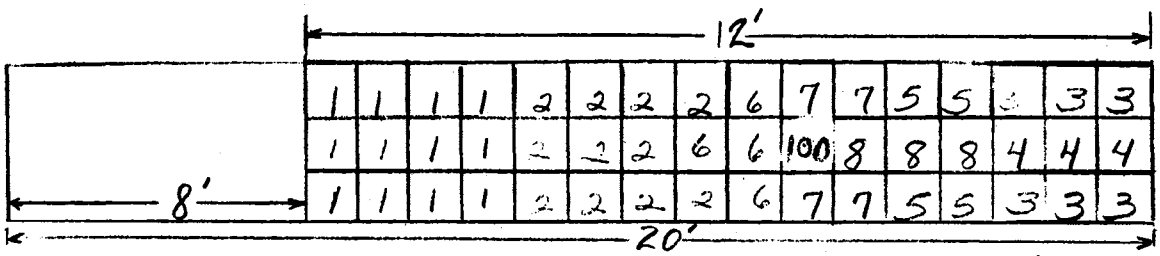


Figure 1. Clevett Putting Test Carpet

As illustrated by the diagram, equal values were given in squares unequally distant from the hole. One point was awarded if the ball stopped in any of twelve different squares. Two points were given if the ball stopped in any of eleven different squares. Three points were given for six different squares. Four points were given in three different squares, five points in four squares, six points in four squares, seven points in four squares, eight points in three squares, and ten points in the square representing the hole or the target square. Clevett developed the test battery but did not evaluate the tests. No recognition was given in this or other studies of a phenomenon which this researcher encountered in the present study and of which Clevett was apparently unaware in his proposed test, that is, the failure of the target to fill the square. Clevett used nine-inch squares. Presumably he used the center of the square as the center of the "regulation hole" which measured 4 1/4 inches in diameter. (The resulting figure appears in Figure 2.) The area of the circle can be

calculated to be 13 5/8 inches and the area of the square is 81 inches. That allows an area of 67 and 3/8 inches in the shaded area. The entire square was allotted a value of ten. In reality then, the target area was equivalent to almost six regulation holes.

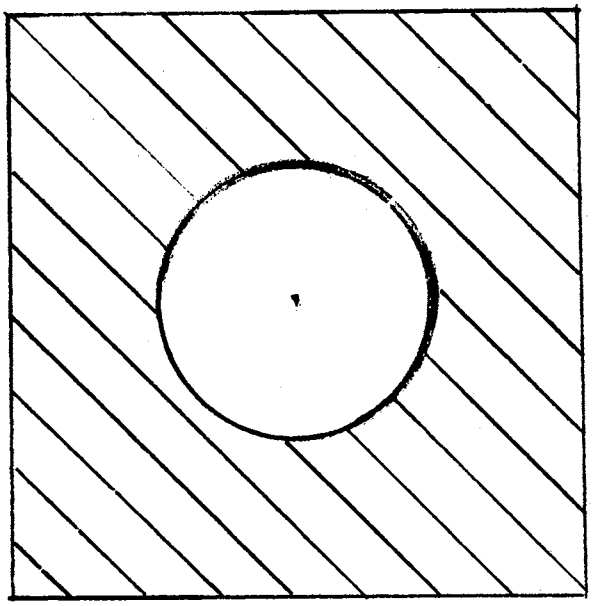


Figure 2. Close-Up of Target Square in Clevett Putting Test

No reliability or validity coefficients were provided by the author. Although articles within the related literature refer to the "Clevett Putting Test," this researcher was unable to find evidence that the test had ever been analyzed with respect to its validity or reliability.

Autrey's (2) study agreed with Clevett's supposition that the ball which went past the hole was more desirable than the ball which stopped short of the hole. She stated that in the situation when a ball stops short of the cup and "does not receive a direction value, its force is squared" (2:62).

Autrey combined a measure of force and direction in her putting test. The force values were multiplied by the direction value (2:62). Nine concentric circles were used. The circumference of the first circle was six inches from the outer edge of the hole. Thereafter, each circle's radius was increased by six inches. Half circles between the golfer and the cup were numbered, from the cup out, with a value of ten for the cup, nine for the next circle, and so on, to one for the outer circle. The first three half circles beyond the cup were given values of ten, the fourth half circle beyond the cup was given nine, et cetera, to four for the outer circle. Lines were drawn parallel to the edge of the putting board's length. The first line was drawn two inches from the edge of the cup. Seven other lines were drawn on each side of the cup, each two inches from the preceding line. These spaces were lettered A through H. The force values were numbers, and the direction letters were converted to numbers by the assignment of the cup = 10, A = 9, B = 8, et cetera (Figure 3).

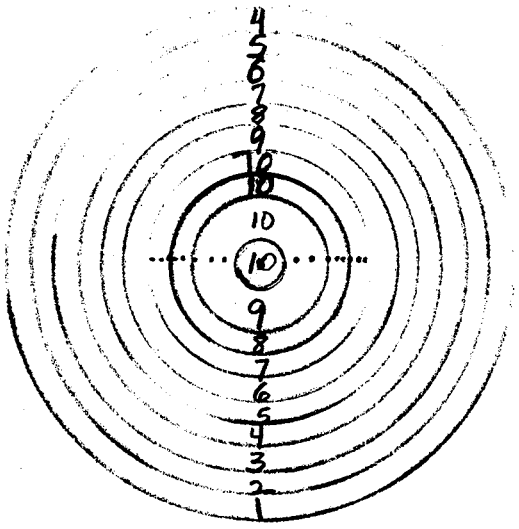


Figure 3. Autrey Test Station
[Diagram as illustrated by Autrey (11:61)]

Forty-two subjects participated in the study. "Several" (2:61) practice putts were given the subject, and then thirty trials were taken from a distance of ten feet. A reliability of 0.51 $\pm$ 0.078 was found using the test-retest statistical treatment. Using an unidentified predictive test she calculated that reliability of 0.85 could have been reached with 158 trials.

Autrey failed to provide any mathematical support for her reason for multiplying "the force by the direction value" (F x D) (2:62).

Both Autrey and Clevett painted holes on the putting surfaces, thus eliminating the possibility of the ball dropping into the hole. An attempt to compensate for the inability of the ball to drop into the hole was made as they assigned greater value to those balls which stopped

past the hole. No concern was given to the fact that if the ball stopped six inches from the hole, either short of or beyond the hole, a six-inch putt remained. Had the original putt been an uphill putt, the putt which went past the hole would have left a rather undesirable "downhill" putt coming back. Since the object of the game of golf is to strike the ball into the hole in the fewest number of strokes, the direction is irrelevant. Whether the first putt stops six inches to the left, right, short or past the hole, the fact remains that the next putt is six inches long. Terrain may affect subsequent putts; however, neither Clevett nor Autrey made any attempt to study the effect of terrain upon the putt.

Rehling (59) constructed a battery of tests designed to evaluate various golf skills. The golf skills included in the battery were chip shot, pitch shot, short-iron shot, wood shot, and putting. The putting test determined how many times a student could two-putt from a distance of twenty-five feet in five trials. If a student holed out from the distance of twenty-five feet in two strokes he was awarded two points, since this constituted a two-putt. If three putts were required to hole the ball from the distance of twenty-five feet, one point was awarded. No provision was made for the student who holed the putt in one trial from twenty-five feet. Rehling indicated that the student

"should have a five score on this part [putting] for a passing average" for the five trials recommended for the test.

No reliability or validity coefficients accompanied the explanation of this test nor was the type of terrain over which the test was administered indicated. The single distance of twenty-five feet, apparently arbitrary, was utilized throughout the test. The subject was tested from the same spot for each trial. Such a practice might have allowed learning to take place from the previous trials.

Rollo (60) compared two methods of teaching selected golf strokes to beginners. The skill tests used were the driving test, the five-iron approach test, the eight-iron approach test, and the putting test. The methods of teaching were irrelevant to the present study, so consideration of the report will be confined to the putting test. Prior to the putting test, the subject was allowed several practice swings. The subject then putted "two or three balls for warm-up." Fifteen trials were taken from five yards, and fifteen trials were taken from ten yards. These putts were made on the same green from the same position. The test was scored with "zeroes" and "ones." A zero was given if the original putt was not holed and a one was awarded if the original putt was holed. The total for the thirty trials constituted the subject's score for the test. There was no significant difference, at the two per cent level of confidence, between the subject's scores at five

yards and the subjects' scores at ten yards. Close examination of the study by this investigator revealed that only two scoring deviations in the study were inadequate, and consequently both groups appeared to score poorly. There was no way of knowing whether the subjects putted more balls close to the hole from a distance of five yards than they did from the distance of ten yards.

Cochrane (13) developed a battery of golf skill tests to be administered indoors. The battery consisted of a drive test, mashie test, short approach test, and putting test. The dimensions of the putting carpet were fifteen feet by three feet. The last five feet was gradually elevated to a height of two inches off the ground. A hole four inches in diameter was cut into the target face. The subject stood on a 20" x 24" platform in order that his feet would be level with the elevated target face. One practice stroke was required. The subject was required to play the ball from the edge of the carpet to insure a uniform putting distance. He took as many trials as were needed to hole the ball; however, "a maximum of five putts per round or a total of ten putts for two rounds was allowed." Cochrane's statement lacks clarity; a great deal of room for speculation is present as to whether the student continued to putt the ball even though he had taken his five putts for that round or whether he picked up the ball after the fifth trial. When the ball went off the carpet it was counted as a trial and the ball was aligned

again. Cochrane did not specify where the ball was to be realigned. The subject's score was the average for the two "rounds."

Cochrane (13:53) examined the relationship between "handicap and average score for the individual tests" and found a negative correlation of 0.105 between the putting test and the handicap. She also arrived at a negative value for the reliability coefficient (-0.020). She hypothesized that this might "have been due in part to the fact that a uniform number of putts was not established for this test."

The present investigator questions the use of handicaps for grouping purposes in putting studies. The handicap should indicate the golfer's total ability to play golf. While putting is an important aspect of this game, there is no reason to suspect that a measure of the total game would indicate specific ability in a particular skill.

Kelliher devised two putting tests while analyzing the croquet and the conventional styles of putting. He called these the "alignment ability test" and the "alignment ability plus distance judgment test." The alignment ability test disregarded the distance the ball traveled. If the ball rolled over the hole it was considered "in"; if it deviated vertically it was measured in inches and recorded. "If the ball was too short to extend the line or roll to the hole accurately, the ball was reputted." The "alignment ability plus distance judgment test" was used to indicate

how far from the hole the ball stopped. After the subject's trial, the distance from the ball to the hole was measured in inches. Concentric circles of twelve, twenty-four, thirty-six, and forty-eight feet were used to facilitate scoring. Each putt was plotted upon a scoresheet to indicate the development of pattern trends. No validity or reliability measures were furnished with this study.

Bowen (5) sought to determine whether errors made by beginning golfers would tend to follow a characteristic pattern. His study involved putts from various distances over varying terrains. Each of the one hundred subjects took twenty-five shots from the distances of fifteen, twenty-five, and thirty-five feet on a level surface, an uphill-sidehill surface, a downhill-sidehill surface, and on an undulating surface. All subjects used the same rotation from short to long distances and from one terrain to another. Distance errors and directional errors were recorded for each trial. The distance errors were recorded in inches and the directional errors were recorded in quadrants. Quadrant I indicated long-right; Quadrant II, long-left; Quadrant III, short-left; and Quadrant IV, short-right. The records for the sidehill tests indicated whether the ball was above or below the hole as it passed the hole.

An interesting conclusion was drawn by the author--a conclusion which is examined in the present investigation: "For shorter putts the beginner errs by overputting." Bowen apparently considered "short putts" as those from

fifteen feet since that was the shortest distance measured. He also concluded: "putting short of the hole generally makes the second putt shorter, and therefore, easier. Increasing distance tends to negate this characteristic." This researcher fails to follow Bowen's line of thinking concerning how a putt "short of the hole generally makes the second putt shorter." There is no way a putt six inches short of the hole is any shorter than a putt six inches past the hole. Therefore, such a statement appears to be unrealistic.

Lumpkin (43) also devised a putting test which consisted of putting sixteen balls at each of the four distances of five, ten, twenty, and thirty feet. Two "applications" of the test were used. Each application consisted of "putting eight balls at each of four distances." the test began from a distance of five feet and progressed through the increasing distances. The score was ascertained by totaling the number of putts required to hole the ball from each of the distances. The subjects took the tests at all distances for one application during one test period. The second application followed the first test, seventeen days later for the beginner group and fourteen days later for the advanced group. The students were asked not to practice putting between applications. Lumpkin determined reliability by "correlating the sum of scores on alternate balls from both applications of the test. . . ." This measure was taken to minimize the effect of the interval

between the applications. Sixteen subjects made up the advanced group, and forty-two subjects, the beginning group. The beginners and advanced groups used two separate greens.

The green used for the advanced group had only one cup, but the beginner's green had four cups. The advanced group putted along four different paths for the four different distances. The beginners played four different "times." The only mention of terrain was, ". . .the two most nearly level greens were selected. . . ." Lumpkin allowed the beginners to take two practice putts at any of the four cups, but did not allow them to take these practice putts from any of the test markers.

The reliability coefficient for the beginning group on the putting test, as determined by the Spearman-Brown formula, was 0.74. The reliability coefficient for the advanced group was 0.31. Lumpkin (43:27) hypothesized that the homogeneity of the group contributed significantly to the low correlation coefficient for the advanced group. No measures to determine the validity of the test were reported. Some "logical validity" can be claimed on the premise that the total number of putts from a specific distance or a series of specific distances provides a valid measure of putting ability for the specific distance or specific distances.

Hodge (28) adapted Clevett's test during her study of putting techniques for beginning women golfers. She used

Clevett's original test to measure the putt from fifteen feet, but she felt that more distances needed to be measured for the purpose of her study. A measure of the subject's putting ability from five and ten feet was sought. For these tests the Clevett grid was scaled down proportionately from fifteen feet to five and ten feet. The point value used by Clevett was retained by Hodge. No reliability or validity coefficients were provided.

From the review of the available literature concerning putting tests it appears that putting tests need to be improved. It would seem possible to alleviate many of the problems encountered in previous putting tests; for example, Hodge (28:57) recommends that further research dealing with putting ". . .should be replicated using a single, easily understood testing device, preferably a putting grid."

The following chapter outlines the procedures used in developing this study. The attempt was to develop a putting test which would eliminate most of the weaknesses found in previous studies and to provide a reliable, valid and objective instrument to be used in measuring putting ability.

CHAPTER III

PROCEDURES

This chapter presents information concerning the subjects who participated in the study, test descriptions, the hypotheses examined, and the statistical treatment used to convert the raw data into meaningful terms.

Subjects

The putting tests were administered to two distinct groups of subjects: a Beginning Group (Group I), and an Intermediate Group (Group II).

Beginners (Group I)

The beginning group was composed of those individuals enrolled in two of the classes of Beginning Golf at Oklahoma State University during the 1971 spring semester. Beginning golfers, as defined on page 5, are individuals who had never played golf nor had any formal instruction prior to enrolling in the class. There were twenty-two such students tested in one class and twenty beginning golfers tested in the other class. The total number of beginning golfers tested was forty-two. The beginning subjects were assigned "subject identification numbers" between 001 and 055.

Intermediates (Group II)

The intermediate group was composed of twenty-six individuals enrolled in the two classes of Intermediate Golf at Oklahoma State University during the 1971 spring semester. An intermediate golfer as defined on page 6 is an individual who has a skill proficiency in golf beyond the elementary or introductory level, but is not a member of the Oklahoma State University varsity golf team. The intermediate subjects were assigned "subject identification numbers" between 056 and 094.

Subgroups

Both Groups I and II were divided into Subgroup A and Subgroup B to pick up any differences in learning which may have occurred because of the practice gained while taking the putting tests. Subgroup A began the putting grid test on the sixth day of the putting unit from a distance of four feet. Subgroup A's second test was a retest from four feet. The retest was given to determine the reliability of the putting grid. Each test for Subgroup A thereafter was a progression through the distances of eight, twelve, sixteen and twenty feet. Each test was followed by a retest at the same distance on the next test day. Subgroup A took the practice putting green test after all the ten putting grid tests and retests had been administered.

Subgroup B was tested on the practice putting green first. Subgroup B then began the test-retest progression

on the putting grid test beginning from a distance of four feet and advancing through the distance of twenty feet.

Beginners in Subgroup A were numbered 001 to 028. Intermediates in Subgroup A were numbered 056 to 071. Beginners in Subgroup B were numbered 029 to 055. Intermediates in Subgroup B were numbered 074 to 094.

Each member of Group I and Group II was arranged in alphabetical order within their group and randomly assigned, as defined on page 7, to Subgroup A or B.

Absenteeism

All of the subjects included in the analysis were present for all of the instruction prior to testing.

If for any reason subjects could not take the test during their assigned period, they fulfilled the requirement as soon as possible after the assigned period. There were times when subjects took two putting grid tests in one day because they had missed the previous test. When this occurred, the subject was not allowed to take the second test before fifteen minutes had elapsed following the first test. This measure was taken in an attempt to reduce the fatigue factor.

Because of inclement weather the beginners were unable to meet class on Monday, February 22; for the same reason the intermediate group was unable to meet class on Tuesday, February 23. Classes which met Wednesday, February 24 and Thursday, February 25 were tested in the same way that they

would have been tested Monday and Tuesday of that week. A complete list of the dates the tests were administered appears in Appendix C and Appendix D, pages 166 and 167.

Subject Mortality

Fifty-five beginning subjects and thirty-six intermediate subjects began the study. Thirteen beginning subjects and ten intermediate subjects were eliminated from the study because they dropped the class, failed to attend the instructional classes preceding the testing, did not meet the qualifications for the group as defined by the operational definitions, failed to take the test in the proper sequence, or failed to follow the proper testing schedule. There were twenty-two beginning golfers tested in one class and twenty tested in the other class. The total number of beginning golfers completing the tests was forty-two. Out of the two classes of intermediate golf at Oklahoma State University twenty-six students completed the tests. One class had eight students and the other class had eighteen students.

At the time the study was proposed an advanced group was to be included. This group was made up entirely of volunteer subjects; because of the inconsistent participation of the advanced group these individuals had to be dropped from the study.

Putting Instruction

The testing was preceded by a concentrated five day putting unit. The putting unit included the basic skill fundamentals, time for student experimentation, discussion of extraneous factors involved in acquiring putting proficiency, and a delineation of the subject's responsibilities throughout the course of the study. A detailed outline of the putting unit appears in Appendix A, pages 160 to 163.

Test Administrators

Putting Grid Test

For efficiency of time and accuracy, six people were needed to aid in the administration of the putting grid test. Six students who were enrolled in the experimental beginning golf classes and who did not qualify as subjects for the study served as the nucleus of the assistant group. The group of assistants was supplemented with fifteen student volunteers having a general interest in golf and serving as assistants to the investigation in the administration of the tests included in this study.

The assistants had two instructional sessions in which they were trained with respect to their duties and responsibilities, particularly in regard to the purpose of the study and the test which was to be administered. During the instruction session a test was set up for the assistants to administer to each other. After each assistant performed

their assigned duties during this session an opportunity was provided to answer any questions and solve any problems which became apparent during the training period. Due to the length of the testing period, several groups of assistants were required for each function. During each test session:

1. One person was responsible for placing one golf ball upon the restraining line in position for the subject to strike.
2. One assistant called out the graphic position of the putt as quickly as the ball stopped rolling, retrieved the ball, and placed it in a box. This graphic position was called in exactly the same order every time. The red value (horizontal deviation) was the first number called, and the green value (vertical deviation) was the second number called.
3. One assistant recorded the graphic position of the ball on a score sheet.
4. Another assistant recorded the score exactly as it was called out. He made certain that the green and red values were placed in the appropriate boxes with the minus sign in front of the score if the value was negative.
5. One assistant was instructed to signal the new subject to begin as quickly as the present

subject concluded his test. He met with the subject upon the subject's arrival and outlined the testing procedure to be followed.

The researcher kept a score sheet (as illustrated on page 36) for each subject which indicated graphical position and numerical value of each putt as a further check to assure that the recorded score was accurate. This was a method of verifying and correcting any discrepancies which might have occurred during the course of the test.

Practice Putting Green Test

One assistant was required for each subject for the practice putting green test. This assistant was responsible for pulling the flag from the hole after the subject had identified his next target. As soon as the subject had holed his putt, the assistant replaced the flag and assumed the same function at the next hole.

The researcher kept a tally of the strokes required on each of the holes. Following the testing session, an analysis of distance scores and terrain scores was made.

Putting Grid Test

Description of the Test

Since the object of putting is to get the ball in the hole using the fewest number of strokes, the putting test was developed in accordance with this premise. It may be further assumed that as the distance of the putt increases,

the possibility of making a putt diminishes. It was decided that a grid would provide the most accurate measure of deviations since it would simultaneously indicate distance and directional deviations. The grid as illustrated in Figures 4, 5, and 6, page 33, 7, and 8, page 34, was designed for the use of this study. Thirteen deviation units (4 1/4") were provided horizontally, and thirteen deviation units vertically. Each of the deviational units was 4 1/4 inches square. This dimension was chosen because of the official putting cup is 4 1/4 inches in diameter (see Figure 7). Six of the horizontal deviations and six of the vertical deviations were designated negative. There was no horizontal deviation within the area denoted by the red 0 (Figure 9) since the deviation was a force error rather than a directional error. There was no vertical deviation within the area denoted by the green 0 since the error was a direction error.

The putting grid test station consisted of one strip of G-50 Astro Turf mounted on a raised plywood platform. It was required that the entire platform be raised at least four inches to allow a cup to be placed below the hole and simultaneously provide a level putt. This procedure allowed balls to fall and stay in the hole just as they would on an actual green. The hole was placed within a six inch square of styrofoam to provide an area above and around the cup similar to soil. This precaution was taken to alleviate the chance of a properly stroked ball striking the plywood

and bouncing out of the hole. The grid was marked on the artificial grass by the use of a carpenter's chalk string. This indoor test station was located in the club house at Lakeside Golf Course because of its proximity to the outdoor practice putting green. The test station allowed each subject to putt twenty trials from each of the five distances; four, eight, twelve, sixteen, and twenty feet (see Figure 4).

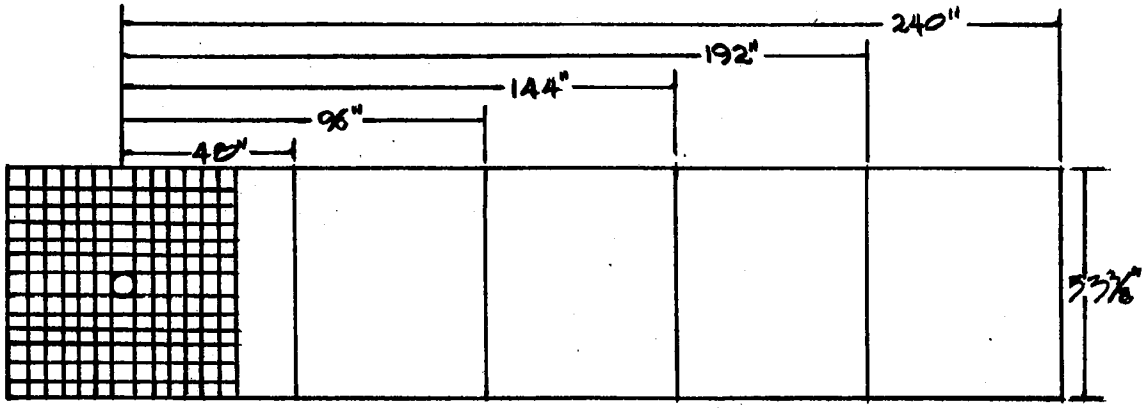


Figure 4. Top View of the Putting Grid Test Station

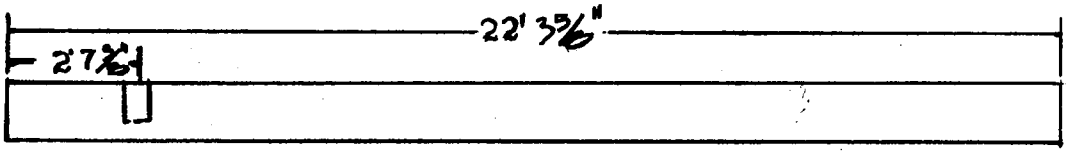


Figure 5. Side View of the Putting Grid Test Station

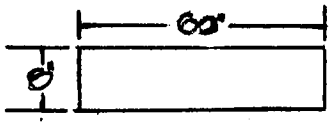


Figure 6. Front View of the Putting Grid Test Station

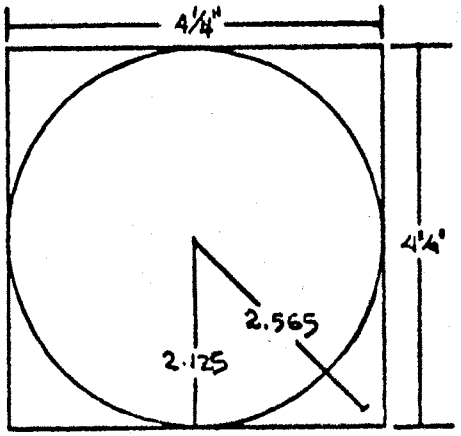


Figure 7. Close-up of Target Square in the Putting Grid Test

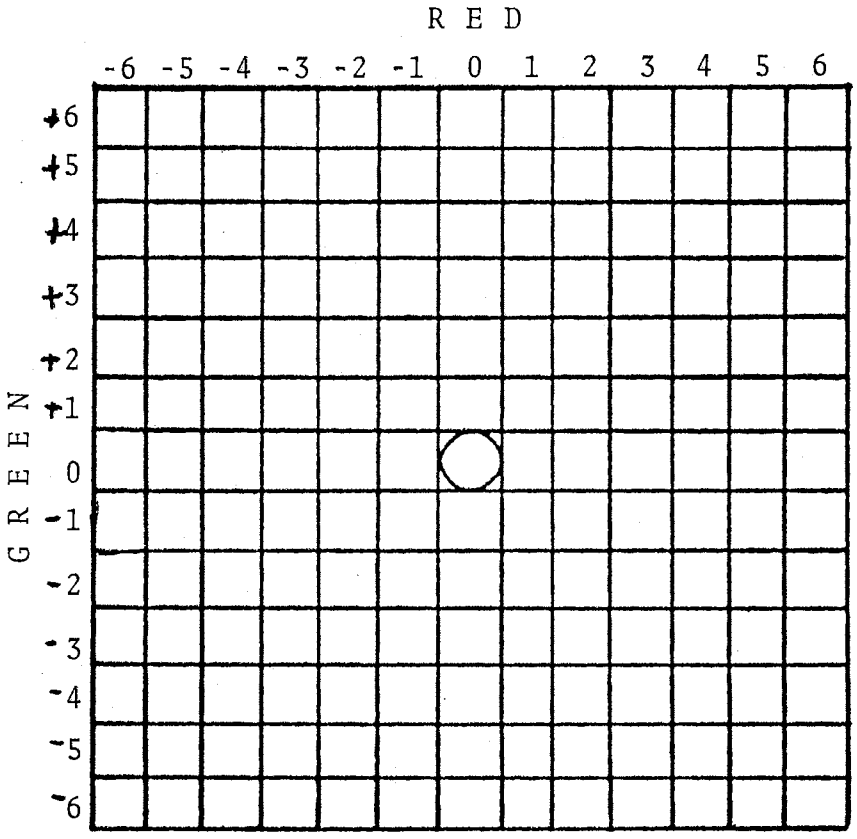
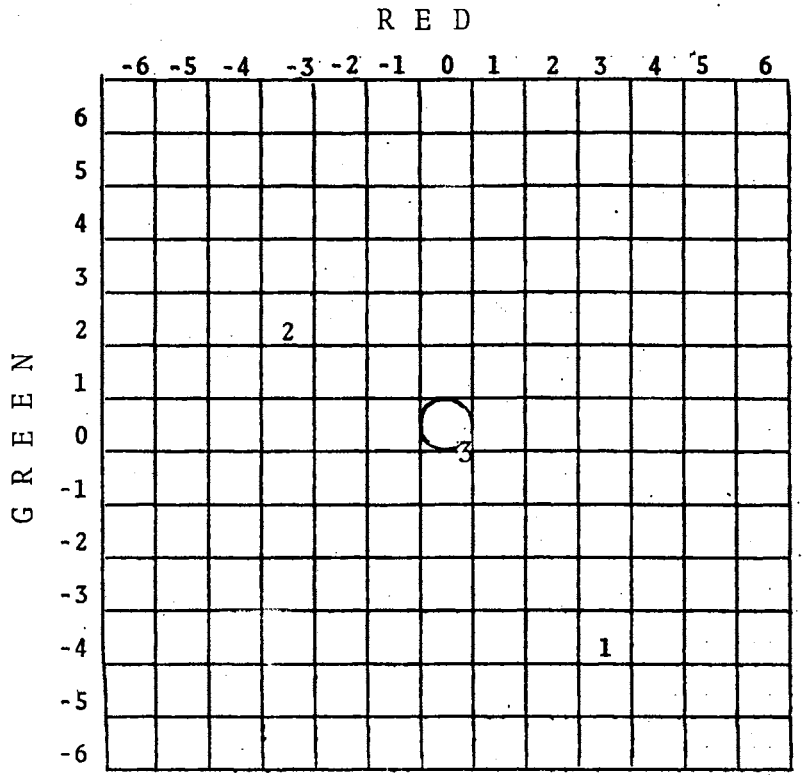


Figure 8. Close-up of Grid Area Illustrating the Possible Horizontal and Vertical Deviations in the Putting Grid Test

Scoring the Putting Grid Test

To facilitate scoring, green numbers were placed on cardboard indicators outside the right edge of the grid and red numbers were placed on cardboard indicators outside the back edge of the grid. The deviation numbers were drawn on cards and attached to the plywood frame in such a manner that they were clearly visible to both the individuals administering the test and those taking it. The red score indicated the horizontal deviations from the cup, and the green score indicated the vertical deviations from the cup.

The position where the ball stopped was noted upon a score card (Figure 9, page 36) by a trained assistant. For example, the first ball stopped in the position where the number one is indicated; therefore, a score of red, 3, and green, -4, was recorded on the two bottom lines of the score card. The second ball stopped in the position indicated by the number two. This denotes a score of red, -3, and green, +2. It was possible for a ball to stop in the corner of the red, 0, green, 0, box without falling into the hole, (such a case is indicated under the numeral 3 on the sample score sheet, page 36). If this happened, a score of red, 0, green, 0 was given, but an "X" was placed on the score sheet in that trial box. This differentiation was needed to assure an accurate count of actual "hits" and to provide an additional bonus for putting the ball in the cup. When the total scores were determined, the 0,0 was zero inches from the cup but the 0,0 with an X



Distance _____

Name _____

Group: __ Beginner Subgroup __

__ Intermediate

__ Advanced 1st Test Sur.__

Date _____ No. of Hits ___

Total Score _____

Right _____ Left _____

Short _____ Long _____

Trial	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Red	3	-3	x 0																	
Green	-4	2	0																	

Figure 9. Sample Putting Grid Score Card

was 2.565 inches from the center of the hole (see Figure 7). When a ball stopped on a line, it was awarded the higher of the two values. A ball stopping outside the grid was awarded a score of red, 7, and green, 7 (recorded as 7,7 on Table I, page 41). No positive or negative signs were used for the (7,7) score. A ball going into the cup was awarded a score of red, 0, and green, 0.

To assure accuracy in the collection of the data during the study there were three score cards for each subject for each distance. Each subject's score was recorded by three different individuals. One trained assistant recorded the numerical score for each trial while a second assistant recorded the graphic position of each trial and the researcher recorded both the numerical score and the graphic position for each trial.

Converting the Raw Scores to Usable Scores

All distance calculations were made from the center of the square in which the ball stopped, to the center of the cup. This procedure was followed on the same basis that the mean is a representative score for a group (35:166-167). Even though all of the trials did not stop in the center of the hole, the center of the square represented the position of all the trials which stopped in that particular square.

In a grid with thirteen horizontal divisions and thirteen vertical divisions there are 169 possible

horizontal-vertical or vertical-horizontal points on the grid; however, since many of these points are the same distance from the cup (0,0), there are actually only twenty-eight unique distances. This is illustrated in Figure 10. For example, the points (4,5), (4,-5), (-4,5), (-4,-5), (5,4), (5,-4), (-5,-4), and (-5,4) are all 6.403 units or 27.21 inches from the center of the cup (Table I). All of these points form the hypotenuse of a right triangle when the point is connected to the origin. The other two sides of the triangle are the lines drawn parallel to the x and y axis. Because a right triangle is involved, the Pythagorean Theorem (3:387) was used to determine the length of the hypotenuse. The Pythagorean Theorem states that the sum of the squares of the two legs is equal to the square of the hypotenuse ($a^2 + b^2 = c^2$). The legs may be interchanged because of the additive inverse law (3:30) ($a + b = b + a$) or ($4^2 + 5^2 = 5^2 + 4^2$). The signs may be disregarded in this operation since a number squared is always positive regardless of its original sign (3:106). Any or all of the points (4,5), (4,-5), (-4,5), (4,-5), (5,4), (5,-4), (-5,-4), or (-5,4) may be substituted into the Pythagorean equation and the following calculations will evolve:

$$a^2 + b^2 = c^2$$
$$4^2 + 5^2 = c^2$$
$$16 + 25 = c^2$$
$$41 = c^2$$

$$\sqrt{41} = c$$

$$6.403 \text{ units} = c$$

This unit figure of 6.403 may then be converted to inches by multiplying by 4.25 (the number of inches in each unit). In the example given above, the ball was 27.21 inches from the center of the hole for each of the possible combinations of points illustrated. Table I indicates how many inches each point is from the center of the hole. To determine how far a given point, for example (5,3), is from the center of the hole, the reader chooses the number with the smallest numerical value--in this case 3--and find the points on Table I where 3 is the first number in the pair. The other number in this case is 5; therefore, the distance value for "3,5" is read as 24.78 inches.

There is the possibility that the ball may stop in the area designated 0,0 and not fall in the hole. This occurrence was given the value 2.565 inches, that is, the center of this area is 2.565 inches from the hole (Figure 7).

Appendix G, pages 173 to 186, illustrates the subject's raw scores exactly as they were recorded by the trained assistants and the researcher on the score card during the testing sessions. The converted data for each subject in this study is found in Appendices H, I, and J, pages 187 to 194.

The converted scores which appear in Appendix H indicate the total distance that the twenty trials, at each designated distance, stopped from the hole. The

converted scores which appear in Appendixes I and J indicate the total distance that the first ten trials and the first fifteen trials, respectively, at each designated distance, stopped from the hole.

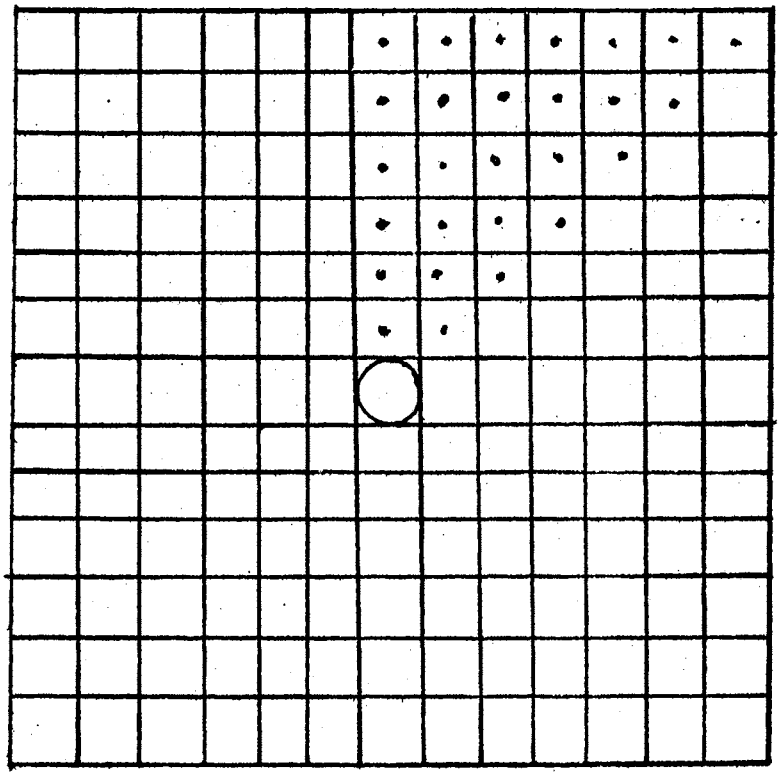


Figure 10. Close-Up of Grid Area Illustrating the Possible Horizontal and Vertical Deviations in the Putting Grid Test.

TABLE I

SUMMARY OF THE NUMBER OF UNITS AND THE DISTANCE (TO THE NEAREST ONE HUNDREDTH OF AN INCH) THAT ALL OF THE POSSIBLE POINTS ON THE GRID LIE FROM THE CENTER OF THE HOLE

Points a,b	C (units) $C=\sqrt{a^2+b^2}$	4 1/4 C	Points a,b	C (units) $C=\sqrt{a^2+b^2}$	4 1/4 C
0,0*	0	0	2,3	3.606	15.32
0,0**		2.56	2,4	4.472	19.01
0,1	1	4.25	2,5	5.385	22.89
0,2	2	8.50	2,6	6.325	26.88
0,3	3	12.75	3,3	4.243	18.03
0,4	4	17.00	3,4	5.000	21.25
0,5	5	21.25	3,5	5.831	24.78
0,6	6	25.50	3,6	6.708	28.51
1,1	1.414	6.01	4,4	5.657	24.04
1,2	2.236	9.50	4,5	6.403	27.21
1,3	3.162	13.44	4,6	7.211	30.65
1,4	4.123	17.52	5,5	7.071	30.05
1,5	5.099	21.67	5,6	7.810	33.19
1,6	6.083	25.85	6,6	8.485	36.06
2,2	2.828	12.02	7,7	9.899	42.07

*Went into the cup.

**Went into the 0,0 square, but did not go into the cup.

Use of Positive and Negative Signs in the Putting Grid Test

Positive and negative signs were used in the test to determine trend developments in the direction and force. When a large number of the same signs preceded one of the numbers used to indicate horizontal or vertical deviations, a trend could be recognized. The grid was marked like a graph, green minus indicated a trial stopped short of the cup, green plus indicated a trial stopped beyond the cup, red minus indicated a trial stopped to the left of the cup and red plus indicated a trial stopped to the right of the cup. For example, if a student consistently scored negative red (horizontal deviations) this would indicate that he had a tendency to strike the ball to the left of the target. Such information would aid the instructor and the student in diagnosing putting faults. An analysis of the trends of the group was also made possible by the use of the signs.

Number of Trials

Scott (66:18) advises that "the number of trials should be sufficient to eliminate chance deviations." Although she does not give a specific number of trials which should be administered in a test she suggests that a "representative score" may be determined by "experimentation."

Reese (58:24) reviewed the literature and concluded that to establish reliability in a golf test twenty trials were necessary. Therefore, this figure was adopted as a

foundation for determining the "ideal number" of trials required for an accurate measure of putting ability.

Practice Putting Green Test

Description of the Practice Putting Green Test

A Practice Putting Green Test was devised in order to provide a relative measure of the subject's putting ability. The Practice Putting Green Test was administered at Lakeside Golf Course. The test was administered to Group A on Monday, March 15 and Tuesday, March 16 and to Group B on Wednesday, February 10 and Thursday, February 11.

The course included twenty holes which were laid out to provide three putts from each of the five specified distances--four, eight, twelve, sixteen, and twenty feet--and one putt from each of five randomly chosen distances--three, seven, eleven, and eighteen feet. The length of the putt was measured by calculating the distance from the center of the hole to the tip of an arrow marker. The arrow markers were used to indicate where the subject was to "tee off" on each hole. Terrain was previously determined so that four putts were uphill, four were downhill, four were sidehill with a break to the right, four broke to the left due to sidehill placement, and four were on relatively level ground. The break for the longer putts (twelve, sixteen, and twenty) was determined by the way in which the ball would break during the last three to five feet. Figure 11 illustrates the layout of the "course." There

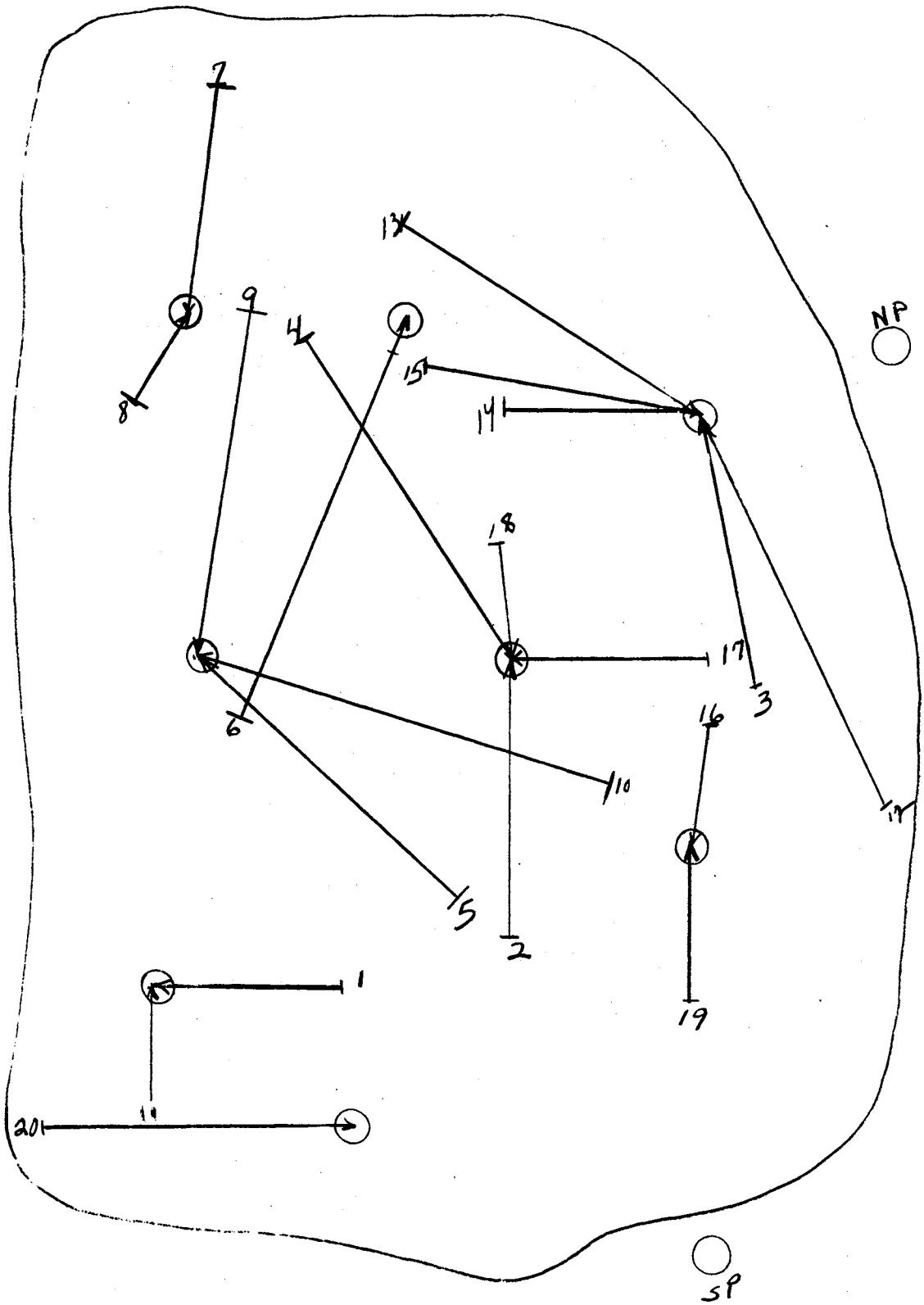


Figure 11. Top View of the Practice Putting Green Station

were five terrains--uphill, downhill, sidehill-left, sidehill-right, and level. By combining the terrain and distance variables the following arrangement of twenty holes constituted the Practice Putting Green Test:

1. Eight feet - uphill.
2. Twelve feet - sidehill-left.
3. Twelve feet - sidehill-right.
4. Eighteen feet - sidehill-left.
5. Sixteen feet - uphill.
6. Twenty feet - level.
7. Eleven feet - sidehill-left.
8. Three feet - sidehill-right.
9. Sixteen feet - sidehill-left.
10. Twenty feet - uphill.
11. Four feet - sidehill-right.
12. Twenty feet - level.
13. Sixteen feet - downhill.
14. Eight feet - downhill.
15. Twelve feet - downhill.
16. Four feet - level.
17. Eight feet - uphill.
18. Four feet - level.
19. Seven feet - sidehill-right.
20. Fifteen feet - downhill.

The Practice Putting Green course was not laid out with any consideration as to subjects' shadows being over the "putting line." It was not possible to alleviate this variable since testing took place at various times between 7:30 a.m. and 5:00 p.m.

Testing Procedures

Since this practice putting green test was administered several times, measures were taken to insure identical test stations during each testing situation. No problem was encountered between Wednesday, February 10 and Thursday, February 11 since the greenskeeper was merely instructed not to reset the cups until the testing for the two days had been completed.

In order to duplicate the test for Subgroup A on Monday, March 15 and Tuesday, March 16 the geometric theorem which states, "Two triangles are congruent if three sides of one are equal respectively to three sides of the others," (48:25) was utilized. Two telephone poles were used for the base line. Measurements were then taken from the center of the hole to a stationary spot on each of the telephone poles to the nearest inch. This measurement was recorded. The same procedure was followed for the positioning of the arrow marker. This measure was taken from the same stationary spots on the telephone poles to the tip of the arrow. This measurement was also recorded.

When preparing the test for Subgroup B two steel tape measures were used. Each tape measure was reeled out the specific distance from the same stationary mark on the telephone pole and the tape measures were brought to a point. A wooden tee was placed in the green at this point. A white tee was placed in the ground if the spot was to be an arrow marker and a red tee was placed in the ground if the point was to be the center of a cup. The greenskeeper cut the holes using the red tee as the center of the cup.

The subjects arrived at Lakeside Golf Course on or prior to their test time and were instructed to remain in the clubhouse away from the testing area until they were summoned to the test station. While waiting to be tested the subjects completed the name, date, group and subgroup lines on three score cards (see Figure 12) which they brought with them to the test station and gave to the administrator of the test.

The procedure for the Practice Putting Green Test was uniformly simple. The test administrator first indicated the arrow marker where the subject was to place the ball in order to begin the test then he removed the dowel marking the target hole and stepped to the side of the hole, opposite from the side on which the subject was putting. All administrators were instructed not to allow any part of their shadow to cover any of the area between the subject

Name _____ Date _____

Group: __ Beginner Subgroup _____

__ Intermediate Total _____

__ Advanced

1

No.	D-T	Tallies	Tot.
1	8U		
2	12SL		
3	12SR		
4	18SL		
5	16U		
6	20L		
7	11SL		
8	3SR		
9	16SL		
10	20U		

No.	D-T	Tallies	Tot.
11	4SR		
12	20L		
13	16D		
14	8D		
15	12D		
16	4L		
17	8U		
18	4L		
19	7SR		
20	15D		

Distance

4		11		16		18	
8		1		14		17	
12		2		3		15	
16		5		9		13	
20		6		10		12	

Direction

U		1		5		10		17	
D		13		14		15		20	
SL		2		4		7		9	
SR		3		8		11		19	
L		6		12		16		18	

Figure 12. Practice Putting Green Test Score Sheet

and the hole and to remain quiet, without moving, from the time the subject assumed his stance until he struck the ball.

Since all of the subjects were right-handed, each putted the original ball from a position to the left and behind the point of the arrow indicating in which direction the target hole was positioned. If the first attempt did not go into the hole, the subject took his next trial from the spot where the ball stopped and continued putting the ball until it was in the hole. The arrows used to indicate the "teeing area" were placed in such a way that they would not interfere with the intended line of the putts on the course. If the player's ball struck one of the markers they were considered part of the course and therefore the players were not given a retrial (71:6-7). If, however, a subsequent trial would have been affected by the positioning of one of the markers, the marker was temporarily removed in accordance with the official golf rules for a movable obstruction (71:35). Each trial was recorded in the tally column on the subject's score card (see Figure 12). After each hole was completed the total number of trials required to putt the ball in the hole was recorded.

In order to provide the correct terrain with the correct distance, it was not possible to arrange holes consecutively; therefore, it was often necessary to move across the green to the next test station (see Figure 12).

It was possible to administer the test to more than one subject concurrently. When more than one subject was being tested the additional administrators required their subjects to space themselves over the course in order to prevent waiting and/or rushing. Three subjects were the maximum number tested during the Practice Putting Green Test.

Scoring the Practice Putting Green Test

The total score for the putting green test was the sum of the trials required for the twenty hole course. Subtotals for the distances of four, eight, twelve, sixteen and twenty feet were also recorded. Subtotals for the uphill, downhill, sidehill-left break, sidehill-right break, and level putt were recorded (Appendix G, Line 11 for each subject, page 173).

Hypotheses of the Study

The following hypotheses were developed in an attempt to evaluate the ability of the proposed skill test to determine putting ability:

H_1 The scores for the subjects in the beginning group (Group I) will show a significant positive relationship between performance on the putting grid test at a distance of four feet and total performance on the practice putting green test.

H_2 The scores for the subjects in the beginning group (Group I) will show a significant positive relationship between performance on the putting grid test at a distance of eight feet and total performance on the practice putting green test.

H_3 The scores for the subjects in the beginning group (Group I) will show a significant positive relationship between performance on the putting grid test at a distance of twelve feet and total performance on the practice putting green test.

H_4 The scores for the subjects in the beginning group (Group I) will show a significant positive relationship between performance on the putting grid test at a distance of sixteen feet and total performance on the practice putting green test.

H_5 The scores for the subjects in the beginning group (Group I) will show a significant positive relationship between performance on the putting grid test at a distance of twenty feet and total performance on the practice putting green test.

H_6 The scores for the subjects in the beginning group (Group I) will show a significant positive relationship between the total performance on the putting grid test and the total performance on the practice putting green test.

H_7 The scores for the subjects in the intermediate group (Group II) will show a significant positive relationship between performance on the putting grid test at a distance of four feet and total performance on the practice putting green test.

H_8 The scores for the subjects in the intermediate group (Group II) will show a significant positive relationship between performance on the putting grid test at a distance of eight feet and total performance on the practice putting green test.

H_9 The scores for the subjects in the intermediate group (Group II) will show a significant positive relationship between performance on the putting grid test at a distance of twelve feet and total performance on the practice putting green test.

H_{10} The scores for the subjects in the intermediate group (Group II) will show a significant positive relationship between performance on the putting grid test at a distance of sixteen feet and total performance on the practice putting green test.

H_{11} The scores for the subjects in the intermediate group (Group II) will show a significant positive relationship between performance on the putting grid test at a distance of twenty feet and total performance on the practice putting green test.

H_{12} The scores for the subjects in the intermediate group (Group II) will show a significant positive relationship between the total performance on the putting grid test and the total performance on the practice putting green test.

H_{13} The scores for the subjects in the Combined Group will show a significant positive relationship between performance on the putting grid test at a distance of four feet and total performance on the practice putting green test.

H_{14} The scores for the subjects in the Combined Group will show a significant positive relationship between performance on the

putting grid test at a distance of eight feet and total performance on the practice putting green test.

H_{15} The scores for the subjects in the Combined Group will show a significant positive relationship between performance on the putting grid test at a distance of twelve feet and total performance on the practice putting green test.

H_{16} The scores for the subjects in the Combined Group will show a significant positive relationship between performance on the putting grid test at a distance of sixteen feet and total performance on the practice putting green test.

H_{17} The scores for the subjects in the Combined Group will show a significant positive relationship between performance on the practice putting green test at a distance of twenty feet and total performance on the putting grid test.

H_{18} The scores for the subjects in the Combined Group will show a significant positive relationship between the total performance on the putting grid test and the total performance on the putting green test.

Treatment of the Data

Level of Confidence

The 0.05 level of confidence was used throughout the study.

Test to Determine r

All of the correlations in the study were determined through the use of the Pearson Product-Moment formula. The correlations for all of the possible test combinations required a transgeneration formula. Since the "BMDO2D Correlation with Transgeneration Program" (revised May 5, 1969) provided both the needed correlation and the transgeneration required for a portion of the study the BMDO2D program was utilized throughout the study for calculating correlations. The "BMDO2D Correlation with Transgeneration Program" (revised May 5, 1969) was developed by the Health Sciences Computing Facility at the University of California at Los Angeles and is available on the tape file at the Oklahoma State University Computer Center.

Test to Determine a Significant Difference Between Subgroup A and Subgroup B

The data from the Practice Putting Green Test were analyzed by means of "The t-test for a Difference Between Two Independent Means" (8:9-12). The t-test was used to determine whether there was any significant difference

between the total scores on the Practice Putting Green Test for Subgroup A and Subgroup B. Subgroups were compared in the Beginners, Intermediate, and Combination of Beginning and Intermediate.

Testing the Hypotheses of the Study

The validity of each test distance on the putting grid was determined by comparing the performance scores of each subject on the putting grid test from each of five distances (four, eight, twelve, sixteen, and twenty feet) to the total performance on the practice putting green test. The statistical procedure utilized was the "BMDO2D Correlation with Transgeneration Program."

The formula used to check all eighteen hypotheses was the Pearson Product-Moment Correlation formula contained within the "BMDO2D Correlation with Transgeneration Program." The formula was:

$$r = \frac{N\,[\Sigma XY - (\Sigma X)\,(\Sigma Y)]}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2]\,[N\Sigma Y^2 - (\Sigma Y)^2]}}$$

The coefficients of correlation were tested for significance with the formula (Roscoe: 206):

$$t_{calculated} = r\sqrt{\frac{N - 2}{1 - r^2}}$$

Appendix K, page 195, illustrates the calculations made in determining the t required for significance when the degrees of freedom were forty, twenty-four, and sixty-six.

Reliability of the Putting Grid Test

The reliability for each test distance of the Putting Grid Test was determined by the test-retest method (20:352-355).

To ascertain whether a positive relationship existed between the subject's score on the first putting grid test from a particular distance with the subject's score on the second putting grid test at the same distance, the Pearson Product-Moment Correlation formula illustrated by Bruning and Kintz (8:153) was used.

The subject's "converted score" for each test, not the "raw score," was the figure used in calculating all of the correlations with the "BMDO2D Correlation with Trans-generation Program" (revised May 5, 1969). Reliability coefficients were determined for each of the tests which were administered from distances of four, eight, twelve, sixteen, and twenty feet. Reliability coefficients for the beginning group, the Intermediate Group, and the Combined Group were determined by using this same program.

Subproblems

The "BMDO2D Correlation with Transgeneration Program" was utilized in determining the correlation coefficient in each of the subproblems which required such a calculation.

One of the problems encountered in the study was the length of time required to administer twenty trials to each subject for each of the five putting grid tests.

To diminish those problems in future studies several subproblems were devised: (1) validating all of the possible test combinations; (2) testing the validity of the ten trial total; (3) testing the validity of the fifteen trial total; (4) testing the reliability of the ten trial total; and (5) testing the reliability of the fifteen trial total.

Trend Analysis

The current study sought to determine trends in the position where the ball stopped on the putting grid test. A count was taken to analyze whether there was a tendency for the subjects to strike the ball to the left, right, short, or beyond the hole.

A chart was made concerning each trial in terms of the place the ball stopped in relation to the cup (right, left, short, or long). This position analysis was used to determine whether any force or directional trends existed for the Beginning Group (Group I) or the Intermediate Group (Group II) and the Combined Group. The raw scores (see Appendix G, page 173) were charted on a grid which was divided into four quadrants with two "neutral areas" (Figure 13).

The quadrants were designated as Quadrant I, the area above and to the right of the hole; Quadrant II, the area above and to the left of the hole; Quadrant III, the area below and to the left of the hole; and Quadrant IV, the area below and to the right of the hole (see Figure 13).

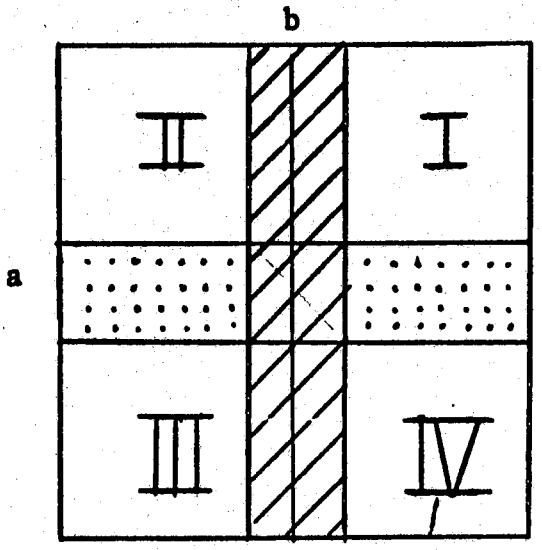


Figure 13. Putting Grid Divided into Four Quadrants and Two Neutral Areas

The dotted area represents the neutral area "a". This area was designed to isolate the trials which stopped to the left or to the right of the hole but did not deviate more than one-half unit (2 1/8 inches) beyond or short of the center of the hole. The neutral area "b" ran the length of the grid. The area marked with diagonal lines represents neutral area "b". This area was designed to isolate the trials which stopped short of or beyond the cup but did not deviate more than one-half unit (2 1/8 inches) to the left or right of the center of the hole.

The number of trials that went into the hole is indicated by (0,0), the number of trials which went completely off the grid is indicated by (7,7) and the number of trials that stopped within the square which

included the cup but did not fall into the hole is indicated by (x0,0). Those balls which stopped in Quadrant I or Quadrant II were tabulated in the "long" column, those balls which stopped in Quadrant III or Quadrant IV were tabulated in the "short" column, those balls which stopped in Quadrant I or Quadrant IV were tabulated in the "right" column, those balls which stopped in Quadrant II or Quadrant III were tabulated in the "left" column.

CHAPTER IV

RESULTS

This chapter presents the results of the statistical treatment of the data. The formulas and the procedures which were employed in calculating the results have been described in Chapter III.

Test to Determine a Significant Difference Between Subgroup A and Subgroup B

The "t test for significant difference" was utilized to ascertain whether order of testing affected the total score on the practice putting green test of the subjects in Subgroup A and Subgroup B.

The t of 0.3516, with forty degrees of freedom, indicates that there was no significant difference in the total performance on the practice putting green test for the subjects in Subgroup A and the subjects in Subgroup B in Group I. See Table II on the following page.

TABLE II

t FOR SUBGROUP A AND SUBGROUP B

GROUP I

Variable	N	$\bar{X}$	σ	df	t	t required for sig.
Subgroup A	22	46.22	6.44	40	0.3516 <	2.021
Subgroup B	20	44.10	5.53			

The t of 0.6940, with twenty-four degrees of freedom, indicates that there was no significant difference in the total performance on the practice putting green test for the subjects in Subgroup A and the subjects in Subgroup B in Group II. See Table III below:

TABLE III

t FOR SUBGROUP A AND SUBGROUP B

GROUP II

Variable	N	$\bar{X}$	σ	df	t	t required for sig.
Subgroup A	12	39.11	3.49	24	0.6940 <	2.064
Subgroup B	14	38.21	3.30			

The t of 0.4018, with sixty-six degrees of freedom, indicates that there was no significant difference in the total performance on the practice putting green test for all subjects in Subgroup A and all subjects in Subgroup B when the beginners were combined with the intermediates. See Table IV below:

TABLE IV

t FOR ALL SUBJECTS IN SUBGROUP A AND SUBGROUP B

Variables	N	$\bar{X}$	σ	df	t	t required for sig.
Subgroup A	34	43.73	6.53	66	1.4018	2.004
Subgroup B	34	41.67	5.53			

Testing the Hypotheses

Each of the hypotheses stated in Chapter III is restated below for the convenience of the reader.

H_1 The score for the subjects in the beginning group (Group I) will show a significant positive relationship between performance on the putting grid test at a distance of four feet and total performance on the practice putting green test. Rejected.

With forty degrees of freedom a correlation coefficient of 0.3044 was required for significance. The correlation coefficient was 0.2779 which indicates there was no significant positive relationship between the performance on the putting grid test at four feet and the total performance on the putting green test for Group I. See Table V below.

P.G. is used throughout the tables to indicate the putting grid test. P.P.G. is used throughout the tables to indicate the practice putting green test.

TABLE V

r FOR THE PUTTING GRID TEST AT FOUR FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP I

Variables	Mean	σ	df	Calculated r		r required for sig.
4' P.G.	53.90	38.99	40	0.2779	<	0.3044
P.P.G.	45.21	6.05				

H_2 The scores for the subjects in the beginning group (Group I) will show a significant positive relationship between performance on the putting grid test at a distance of eight feet and total performance on the practice putting green test. Accepted.

With forty degrees of freedom a correlation coefficient of 0.3044 was required for significance. The correlation coefficient was 0.3058 which indicates there was a significantly positive relationship between the performance on the putting grid test at eight feet and the total performance on the putting green test for Group I. See Table VI.

TABLE VI

r FOR THE PUTTING GRID TEST AT EIGHT FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP I

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
8' P.G.	133.44	75.99	40	0.3058	>	0.3044
P.P.G.	45.21	6.05				

H_3 The scores for the subjects in the beginning group (Group I) will show a significant positive relationship between performance on the putting grid test at a distance of twelve feet and total performance on the practice putting green test. Accepted.

With forty degrees of freedom a correlation coefficient of 0.3044 was required for significance. The correlation coefficient was 0.4529 which indicates there was a significantly positive relationship between the performance on the putting grid test at twelve feet and the total performance on the putting green test for Group I. See Table VII.

TABLE VII

r FOR THE PUTTING GRID TEST AT TWELVE FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP I

Variables	X		df	Calculated r		r required for sig.
12' P.G.	220.02	92.50	40	0.4529	>	0.3044
P.P.G.	45.21	6.05				

H_4 The scores for the subjects in the beginning group (Group I) will show a significant positive relationship between performance on the putting grid test at a distance of sixteen feet and total performance on the practice putting green test. Accepted.

With forty degrees of freedom a correlation coefficient of 0.3044 was required for significance. The correlation coefficient was 0.3170 which indicates there was a significantly positive relationship between the performance on the putting grid test at sixteen feet and the total performance on the putting green test for Group I. See Table VIII.

TABLE VIII

r FOR THE PUTTING GRID TEST AT SIXTEEN FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP I

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
16' P.G.	318.38	113.06	40	0.3170	>	0.3044
P.P.G.	45.21	6.05				

H_5 The scores for the subjects in the beginning group (Group I) will show significant positive relationship between performance on the putting grid test at a distance of twenty feet and total performance on the practice putting green test. Accepted.

With forty degrees of freedom a correlation coefficient of 0.3044 was required for significance. The correlation coefficient was 0.3644 which indicates there was a significantly positive relationship between the performance on the putting grid test at twenty feet and the total performance on the putting green test for Group I. See Table IX.

TABLE IX

r FOR THE PUTTING GREEN TEST AT TWENTY FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP I

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
20' P.G.	326.58	94.86	40	0.3644	>	0.3044
P.P.G.	45.21	6.05				

H_6 The scores for the subjects in the beginning group (Group I) will show a significant positive relationship between total performance on the putting grid test and total performance on the practice putting green test. Accepted.

With forty degrees of freedom a correlation coefficient of 0.3044 was required for significance. The correlation coefficient was 0.4800 which indicates there was a significantly positive relationship between the total performance on the putting grid test and the total performance on the putting green test for Group I. See Table X.

TABLE X

r FOR THE TOTAL PERFORMANCE ON THE PUTTING GRID TEST AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP I

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
Total P.G.	1052.34	304.96	40	0.4800	>	0.3044
Total P.P.G.	45.21	6.05				

H_7 The scores for the subjects in the intermediate group (Group II) will show a significant positive relationship between the total performance on the putting grid test at a distance of four feet and total performance on the practice putting green test. Rejected.

With twenty-four degrees of freedom a correlation coefficient of 0.3882 was required for significance. The correlation coefficient was 0.3461 which indicates there was no significant positive relationship between the performance on the putting grid test at four feet and the total performance on the putting green test for Group II. See Table XI.

TABLE XI

r FOR THE PUTTING GRID TEST AT FOUR FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP II

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
4' P.G.	30.94	41.76	24	0.3461	<	0.3882
P.P.G.	38.65	3.45				

H_8 The scores for the subjects in the intermediate group (Group II) will show a significant positive relationship between performance on the putting grid test at a distance of eight feet and total performance on the practice putting green test. Accepted.

With twenty-four degrees of freedom a correlation coefficient of 0.3882 was required for significance. The correlation coefficient was 0.4583 which indicates there was a significantly positive relationship between the performance on the putting grid test at eight feet and the total performance on the putting green test for Group II. See Table XII.

TABLE XII

r FOR THE PUTTING GRID TEST AT EIGHT FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP II

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
8' P.G.	93.25	59.52	24	0.4583	>	0.3882
P.P.G.	38.65	3.45				

H_9 The scores for the subjects in the intermediate group (Group II) will show a significant positive relationship between performance on the putting grid test at a distance of twelve feet and total performance on the practice putting green test. Accepted.

With twenty-four degrees of freedom a correlation coefficient of 0.3882 was required for significance. The correlation coefficient was 0.4449 which indicates there was a significantly positive relationship between the performance on the putting grid test at twelve feet and the total performance on the putting green test for Group II. See Table XIII.

TABLE XIII

r FOR THE PUTTING GRID TEST AT TWELVE FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP II

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
12' P.G.	186.12	96.55	24	0.4449	>	0.3882
P.P.G.	38.65	3.45				

H_{10} The scores for the subjects in the intermediate group (Group II) will show a significant positive relationship between performance on the putting grid test at a distance of sixteen feet and total performance on the practice putting green test. Rejected.

With twenty-four degrees of freedom a correlation coefficient of 0.3882 was required for significance. The correlation coefficient was -0.1327 which indicates there was no significant positive relationship between the performance on the putting grid test at sixteen feet and the total performance on the putting green test for Group II. See Table XIV.

TABLE XIV

r FOR THE PUTTING GRID TEST AT SIXTEEN FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP II

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
16' P.G.	253.87	107.03	24	-0.1327	<	0.3882
P.P.G.	38.65	3.45				

H_{11} The scores for the subjects in the intermediate group (Group II) will show a significant positive relationship between performance on the putting grid test at a distance of twenty feet and total performance on the practice putting green test. Rejected.

With twenty-four degrees of freedom a correlation coefficient of 0.3882 was required for significance. The correlation coefficient was 0.3535 which indicates there was no significant positive relationship between the performance on the putting grid test at twenty feet and the total performance on the putting green test for Group II. See Table XV.

TABLE XV

r FOR THE PUTTING GRID TEST AT TWENTY FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP II

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
20' P.G.	304.55	104.93	24	0.3535	<	0.3882
P.P.G.	38.65	3.45				

H_{12} The scores for the subjects in the intermediate group (Group II) will show a significant positive relationship between total performance on the putting grid test and total performance on the practice putting green test. Rejected.

With twenty-four degrees of freedom a correlation coefficient of 0.3882 was required for significance. The correlation coefficient was 0.3436 which indicates there was no significant positive relationship between the total performance on the putting grid test and the total performance on the putting green test for Group II. See Table XVI.

TABLE XVI

r FOR THE TOTAL PERFORMANCE ON THE PUTTING GRID TEST AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP II

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
Total P.G.	868.73	309.05	24	0.3436	<	0.3882
P.P.G.	38.65	3.45				

H_{13} The scores for the subjects in the Combined Group will show a significant positive relationship between performance on the putting grid test at a distance of four feet and total performance on the practice putting green test. Accepted.

With sixty-six degrees of freedom a correlation coefficient of 0.2390 was required for significance. The correlation coefficient was 0.3765 which indicates there was a significantly positive relationship between the performance on the puttting grid test at four feet and the total performance on the putting green test for the combined group of beginners and intermediates. See Table XVII.

TABLE XVII

r FOR THE PUTTING GRID TEST AT FOUR FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR THE COMBINED GROUP

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
4' P.G.	45.12	41.32	66	0.3765	>	0.2390
P.P.G.	42.71	6.10				

H_{14} The scores for the subjects in the Combined Group will show a significant positive relationship between performance on the putting grid test at a distance of eight feet and total performance on the practice putting green test. Accepted.

With sixty-six degrees of freedom a correlation coefficient of 0.2390 was required for significance. The correlation coefficient was 0.4189 which indicates there was a significantly positive relationship between the performance on the putting grid test at eight feet and the total performance on the putting green test for the combined group of beginners and intermediates. See Table XVIII.

TABLE XVIII

r FOR THE PUTTING GRID TEST AT EIGHT FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR THE COMBINED GROUP

Variables		σ	df	Calculated r		r required for sig.
8' P.G.	118.08	71.50	66	0.4189	>	0.2390
P.P.G.	42.71	6.10				

H_{15} The scores for the subjects in the Combined Group will show a significant positive relationship between performance on the putting grid test at a distance of twelve feet and total performance on the practice putting green test. Accepted.

With sixty-six degrees of freedom a correlation coefficient of 0.2390 was required for significance. The correlation coefficient was 0.4563 which indicates there was a significantly positive relationship between the performance on the putting grid test at twelve feet and the total performance on the putting green test for the combined group of beginners and intermediates. See Table XIX.

TABLE XIX

r FOR THE PUTTING GRID TEST AT TWELVE FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR THE COMBINED GROUP

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
12' P.G.	207.06	94.81	66	0.4563	>	0.2390
P.P.G.	42.71	6.10				

H_{16} The scores for the subjects in the Combined Group will show a significant positive relationship between performance on the putting grid test at a distance of sixteen feet and total performance on the practice putting green test. Accepted.

With sixty-six degrees of freedom a correlation coefficient of 0.2390 was required for significance. The correlation coefficient was 0.3094 which indicates there was a significantly positive relationship between the performance on the putting grid test at sixteen feet and the total performance on the putting green test for the combined group of beginners and intermediates. See Table XX.

TABLE XX

r FOR THE PUTTING GRID TEST AT SIXTEEN FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR THE COMBINED GROUP

Variables	X	σ	df	Calculated r		r required for sig.
16' P.G.	293.71	114.43	66	0.3094	>	0.2390
P.P.G.	42.71	6.10				

H_{17} The scores for the subjects in the Combined Group will show a significant positive relationship between performance on the practice putting green test at a distance of twenty feet and total performance on the putting grid test. Accepted.

With sixty-six degrees of freedom a correlation coefficient of 0.2390 was required for significance. The correlation coefficient was 0.3499 which indicates there was a significantly positive relationship between the performance on the putting grid test at twenty feet and the total performance on the putting green test for the combined group of beginners and intermediates. See Table XXI.

TABLE XXI

r FOR THE PUTTING GRID TEST AT TWENTY FEET AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR THE COMBINED GROUP

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
20' P.G.	318.16	98.64	66	0.3499	>	0.2390
P.P.G.	42.71	6.10				

H_{18} All scores for the subjects in the Combined Group will show a significant positive relationship between total performance on the putting grid test and total performance on the putting green test. Accepted.

With sixty-six degrees of freedom a correlation coefficient of 0.2390 was required for significance. The correlation coefficient was 0.5003 which indicates there was a significantly positive relationship between the total performance on the putting grid test and the total performance on the putting green test for the combined group of beginners and intermediates. See Table XXII.

TABLE XXII

r FOR THE TOTAL PERFORMANCE ON THE PUTTING GRID TEST AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR THE COMBINED GROUP

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
Total P.G.	982.13	317.22	66	0.5003	>	0.2390
P.P.G.	42.71	6.10				

The Reliability of the Putting Grid Test

The reliability was determined by the test-retest method.

Beginners (Group I)

For the beginning group (Group I), with forty degrees of freedom, a correlation coefficient of 0.3044 was required for significance. The putting grid test from a distance of four feet had a correlation coefficient of 0.1599; therefore, it was not significantly reliable for Group I.

The putting grid test form a distance of eight feet had a correlation coefficient of 0.5481; therefore, it was significantly reliable for Group I.

The putting grid test from a distance of twelve feet had a correlation coefficient of 0.5824; therefore, it was significantly reliable for Group I.

The putting grid test from a distance of sixteen feet had a correlation coefficient of 0.3835; therefore, it was significantly reliable for Group I.

The putting grid test from a distance of twenty feet had a correlation coefficient of 0.3432; therefore, it was significantly reliable for Group I (see Table XXIII).

TABLE XXIII

r's FOR THE PUTTING GRID TESTS AND THE PUTTING GRID RETESTS FROM THE FIVE DISTANCES FOR GROUP I

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
4' Test	53.90	38.99	40	0.1599	<	0.3044
4' Retest	52.20	36.36				
8' Test	133.45	75.99		0.5481	>	
8' Retest	141.53	88.23				
12' Test	220.02	92.50		0.5824	>	
12' Retest	226.23	88.01				
16' Test	318.38	113.06		0.3835	>	
16' Retest	301.78	106.26				
20' Test	326.58	94.86		0.3432	>	
20' Retest	339.01	99.00				

Intermediates (Group II)

For the Intermediate Group (Group II), with forty degrees of freedom, a correlation coefficient of 0.3882 was required for significance.

The correlation coefficient of the putting grid test from a distance of four feet was 0.1792; therefore, it was not significantly reliable for Group II.

The correlation coefficient of the putting grid test from a distance of eight feet was 0.5983; therefore, it was significantly reliable for Group II.

The correlation coefficient of the putting grid test from a distance of twelve feet was 0.3090; therefore, it was not significantly reliable for Group II.

The correlation coefficient of the putting grid test from a distance of sixteen feet was 0.2676; therefore, it was not significantly reliable for Group II.

The correlation coefficient of the putting grid test from a distance of twenty feet was 0.5844; therefore, it was significantly reliable for Group II (see Table XXIV).

TABLE XXIV

r's FOR THE PUTTING GRID TESTS AND THE PUTTING GRID RETESTS FROM THE FIVE DISTANCES FOR GROUP II

Variables	$\bar{X}$	σ	df	Calculated r		r required for sig.
4' Test	30.94	41.76	24	0.1792	<	0.3882
4' Retest	17.87	23.39				
8' Test	93.25	56.52		0.5983	>	
8' Retest	86.80	72.07				
12' Test	186.12	96.55		0.3090	<	
12' Retest	182.11	72.77				
16' Test	253.87	107.03		0.2676	<	
16' Retest	254.09	102.47				
20' Test	304.55	104.93		0.5844	>	
20' Retest	264.60	123.85				

Beginners and Intermediates (Combined Group)

When the beginners and intermediates were combined, a total of sixty-eight subjects comprised Group III. With sixty-six degrees of freedom a correlation coefficient of 0.2390 was required for significance.

The correlation coefficient of the putting grid test from a distance of four feet was 0.2642; therefore, it was significantly reliable for the combined group of beginners and intermediates.

The correlation coefficient of the putting grid test from a distance of eight feet was 0.5984; therefore, it was significantly reliable for the combined group of beginners and intermediates.

The correlation coefficient of the putting grid test from a distance of twelve feet was 0.3832; therefore, it was significantly reliable for the combined group of beginners and intermediates.

The correlation coefficient of the putting grid test from a distance of sixteen feet was 0.5010; therefore, it was significantly reliable for the combined group of beginners and intermediates.

The correlation coefficient of the putting grid test from a distance of twenty feet was 0.4614; therefore, it was significantly reliable for the combined group of beginners and intermediates (see Table XXV on the following page).

TABLE XXV

r's FOR THE PUTTING GRID TESTS AND THE PUTTING GRID RETEST FROM THE FIVE DISTANCES FOR THE COMBINED GROUP

Variables	$\bar{X}$		df	Calculated r		r required for sig.
4' Test	45.12	41.32	66	0.2642	>	0.2390
4' Retest	39.07	35.99				
8' Test	118.08	71.50		0.5984	>	
8' Retest	120.61	86.14				
12' Test	207.06	94.81		0.3832	>	
12' Retest	209.36	84.75				
16' Test	293.71	114.43		0.5010	>	
16' Retest	283.54	106.65				
20' Test	318.16	98.64		0.4614	>	
20' Retest	310.56	114.23				

Subproblems

Test Combinations

To ascertain which combinations of putting grid tests at specific distances were valid measures of putting ability the total score for each combination was compared to the total performance on the practice putting green test. All of the possible combinations of the putting grid test from

the five test distances--four, eight, twelve, sixteen, and twenty feet--were correlated with the total practice putting green test score.

Beginners (Group I)--A correlation coefficient of 0.3044 was required for significance with Group I. It was interesting to note that Group I had significant correlations with every distance combination of putting grid tests. The highest correlation coefficient for any of the test combinations was for the three test combinations consisting of putting grid tests from four, twelve, and twenty feet. The validity coefficient for that combination of tests was 0.5020. All of the possible two, three and four test combinations for the Beginning Group appear in Table XXVI on the following page.

TABLE XXVI

r's FOR THE PERFORMANCE ON ALL OF THE POSSIBLE PUTTING GRID TEST COMBINATIONS AND THE TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP I (40 df)

Variables	X	r	Calculated r		r required for sig.
4'+8'	187.35	95.56	0.3566	>	
4'+12'	273.92	110.70	0.4764	>	
4'+16'	372.28	135.08	0.3456	>	
4'+20'	380.48	114.83	0.3953	>	
8'+12'	353.47	140.36	0.4641	>	
8'+16'	451.82	168.12	0.3514	>	
8'+20'	460.03	148.36	0.3896	>	
12'+16'	538.40	174.03	0.4467	>	
12'+20'	546.61	154.52	0.4948	>	
16'+20'	644.96	170.11	0.4139	>	
4'+8'+12'	407.37	158.86	0.4782	>	
4'+8'+16'	505.73	188.58	0.3708	>	
4'+8'+20'	513.93	167.45	0.4099	>	0.3044
4'+12'+16'	592.30	194.75	0.4548	>	
4'+12'+20'	600.51	173.91	0.5020	>	
4'+16'+20'	698.87	192.53	0.4220	>	
8'+12'+16'	671.85	226.13	0.4466	>	
8'+12'+20'	680.05	205.58	0.4850	>	
8'+16'+20'	778.41	227.28	0.4120	>	
12'+16'+20'	864.99	229.70	0.4889	>	
4'+8'+12'+16'	725.75	246.20	0.4542	>	
4'+8'+12'+20'	733.96	244.65	0.4920	>	
8'+12'+16'+20'	998.43	284.34	0.4767	>	
4'+12'+16'+20'	918.89	251.14	0.4903	>	
4'+8'+12'+16'+20'	1052.34	304.96	0.4800	>	

Intermediates (Group II)--Not all of the two, three, four and the five test combinations were significant for Group II. The reader is referred to Table XXVII, page 91 for a tabulation of each of the twenty-five correlation coefficients which evolved in this phase of the subproblem. It is worthy of notation to point out that Group II's greatest correlation coefficient for a: (1) "two test combination" was for the putting grid tests from distances of eight and twelve feet; (2) "three test combination" was the putting grid tests from distances of four, eight, twelve and twenty feet. The highest correlation coefficient for any of the test combinations was for the three test combination consisting of putting grid tests from four, eight, and twelve feet. The validity coefficient for that combination of tests was 0.4896.

TABLE XXVII

r's FOR THE PERFORMANCE ON ALL POSSIBLE PUTTING GRID TEST COMBINATIONS AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP II (22 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4'+8'	124.19	86.51	0.4665	>	
4'+12'	217.06	125.87	0.4561	>	
4'+16'	284.81	122.02	0.0020	<	
4'+20'	335.49	131.07	0.3933	>	
8'+12'	279.37	141.00	0.4883	>	
8'+16'	347.12	132.38	0.0883	<	
8'+20'	397.80	143.09	0.4402	>	
12'+16'	439.98	182.29	0.1577	<	
12'+20'	490.67	180.28	0.4440	>	
16'+20'	558.42	163.36	0.1401	<	
4'+8'+12'	310.31	170.13	0.4896	>	
4'+8'+16'	378.06	153.30	0.1706	<	
4'+8'+20'	428.75	170.85	0.4533	>	0.3882
4'+12'+16'	470.93	203.57	0.2122	<	
4'+12'+20'	521.61	208.44	0.4533	>	
4'+16'+20'	589.36	185.57	0.2009	<	
8'+12'+16'	533.24	216.01	0.2530	<	
8'+12'+20'	583.92	222.10	0.4770	>	
8'+16'+20'	651.67	197.54	0.2470	<	
12'+16'+20'	744.54	246.23	0.2674	<	
4'+8'+12'+16'	564.18	239.62	0.2884	<	
4'+8'+12'+20'	614.86	250.64	0.4804	>	
8'+12'+16'+20'	837.79	283.43	0.3237	<	
4'+12'+16'+20'	775.48	270.68	0.2966	<	
4'+8'+12'+16'+20'	868.73	309.05	0.3436	<	

Beginners and Intermediates (Combined Group)--All of the possible combinations of the putting grid test from the five test distances--four, eight, twelve, sixteen, and twenty feet--had significant coefficients of correlation when the beginners and the intermediates were combined into one group. The highest correlation coefficient for any of the test combinations was for the three test combination consisting of putting grid tests from four, eight, and twelve feet. The validity coefficient for that combination of tests was 0.5258. See Table XXVIII.

TABLE XXVIII

r's FOR THE PERFORMANCE ON ALL POSSIBLE PUTTING GRID TEST COMBINATIONS AND TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR THE COMBINED GROUP (66 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4'+8'	163.20	96.63	0.4710	>	
4'+12'	252.18	119.10	0.4939	>	
4'+16'	228.84	136.22	0.3741	>	
4'+20'	363.28	122.33	0.4093	>	
8'+12'	325.13	144.19	0.5078	>	
8'+16'	411.79	162.67	0.4018	>	
8'+20'	436.24	148.45	0.4342	>	
12'+16'	500.77	182.35	0.4314	>	
12'+20'	525.22	165.80	0.4691	>	
16'+20'	611.87	171.64	0.4074	>	
4'+8'+12'	370.26	168.83	0.5258	>	
4'+8'+16'	456.91	185.58	0.4360	>	
4'+8'+20'	481.36	172.59	0.4636	>	0.2390
4'+12'+16'	545.89	205.43	0.4587	>	
4'+12'+20'	570.34	190.29	0.4905	>	
4'+16'+20'	657.00	196.08	0.4359	>	
8'+12'+16'	618.86	230.88	0.4705	>	
8'+12'+20'	643.30	215.60	0.4997	>	
8'+16'+20'	729.95	223.65	0.4465	>	
12'+16'+20'	818.93	241.63	0.4684	>	
4'+8'+12'+16'	663.97	254.51	0.4879	>	
4'+8'+12'+20'	688.42	240.26	0.5131	>	
8'+12'+16'+20'	937.01	292.64	0.4891	>	
4'+12'+16'+20'	864.06	266.20	0.4836	>	
4'+8' 12'+16'+20'	982.13	317.22	0.5003	>	

Validity of the First Ten Trials of the Putting Grid Tests

A further subproblem of the study was to determine the validity of the first ten trials on the putting grid test at distances of four, eight, twelve, sixteen, and twenty feet as a measure of putting ability. The validating criterion was the subject's total score on the practice putting green test. A correlation was used to test the relationship between the subject's score for the first ten trials and the total score for the practice putting green test. The results of these calculations appear in Table XXIX, page 96.

Beginners (Group I)--With forty degrees of freedom a correlation coefficient of 0.3044 was required for significance. The correlation coefficient of 0.1596 indicates that there was no significant positive relationship between the performance on the first ten trials on the putting grid test at four feet and the total performance on the putting green test for Group I.

The correlation coefficient of 0.2792 indicates there was no significant positive relationship between the performance on the first ten trials of the putting grid test at eight feet and the total performance on the putting green test for Group I.

The correlation coefficient of 0.4135 indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test

at twelve feet and the total performance on the putting green test for Group I.

The correlation coefficient of 0.1448 indicates there was no significant positive relationship between the performance on the first ten trials of the putting grid test at sixteen feet and the total performance on the putting green test for Group I.

The correlation coefficient of 0.1884 indicates there was no significant positive relationship between the performance on the first ten trials of the putting grid test at twenty feet and the total performance on the putting green test for Group I.

TABLE XXIX

r's FOR THE TOTAL PERFORMANCE ON THE FIRST TEN TRIALS ON THE PUTTING GRID TEST FOR THE FIVE DISTANCES AND THE TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP I (40 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4' 10 Trials	33.31	26.74	0.1596	<	0.3044
Practice P.G.	45.21	6.05			
8' 10 Trials	75.58	46.59	0.2792	<	
Practice P.G.	45.21	6.05			
12' 10 Trials	118.70	59.42	0.4135	>	
Practice P.G.	45.21	6.05			
16' 10 Trials	168.04	68.79	0.1448	<	
Practice P.G.	45.21	6.05			
20' 10 Trials	168.40	58.01	0.1884	<	
Practice P.G.	45.21	6.05			

Intermediates (Group II).--With twenty-four degrees of freedom a correlation coefficient of 0.3882 was required for significance. The correlation coefficient was 0.2093 which indicates there was no significant positive relationship between the performance on the first ten trials of the putting grid test at four feet and the total performance on the putting green test for Group II.

The correlation coefficient was 0.4157 which indicates there was a significantly positive relationship between the

performance on the first ten trials of the putting grid test at twelve feet and the total performance on the putting green test for Group II.

The correlation coefficient was 0.3780 which indicates there was no significant positive relationship between the performance on the first ten trials of the putting grid test at twelve feet and the total performance on the putting green test for Group II.

The correlation coefficient was -0.0934 which indicates there was no significant positive relationship between the performance on the first ten trials of the putting grid test at sixteen feet and the total performance on the putting green test for Group II.

The correlation coefficient was 0.2505 which indicates there was no significant positive relationship between the performance on the first ten trials of the putting grid test at twenty feet and the total performance on the putting green test for Group II. See Table XXX on the following page.

TABLE XXX

r's FOR THE TOTAL PERFORMANCE ON THE FIRST TEN TRIALS ON THE PUTTING GRID TEST FOR THE FIVE DISTANCES AND THE TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP II (24 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4' 10 Trials	19.48	29.24	0.2093	<	0.3882
Practice P.G.	38.65	3.45			
8' 10 Trials	53.09	31.43	0.4157	>	
Practice P.G.	38.65	3.45			
12' 10 Trials	100.80	57.33	0.3780	<	
Practice P.G.	38.65	3.45			
16' 10 Trials	130.97	71.45	-0.0934	<	
Practice P.G.	38.65	3.45			
20' 10 Trials	153.52	53.84	0.2505	<	
Practice P.G.	38.65	3.45			

Beginners and Intermediates (Combined Group).--With sixty-six degrees of freedom a correlation coefficient of 0.2390 was required for significance. The correlation coefficient was 0.2629 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test at four feet and the total performance on the putting green test for the Combined Group.

The correlation coefficient was 0.3860 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test at eight feet and the total performance on the putting green test for the Combined Group.

The correlation coefficient was 0.4097 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test at twelve feet and the total performance on the putting green test for the Combined Group.

The correlation coefficient was 0.1983 which indicates there was no significant positive relationship between the performance on the first ten trials of the putting grid test at sixteen feet and the total performance on the putting green test for the Combined Group.

The correlation coefficient was 0.2357 which indicates there was no significant positive relationship between the performance on the first ten trials of the putting grid test at twenty feet and the total performance on the putting green test for the Combined Group.

TABLE XXXI

r's FOR THE TOTAL PERFORMANCE ON THE FIRST TEN TRIALS ON THE PUTTING GRID TEST FOR THE FIVE DISTANCES AND THE TOTAL PERFORMANCE FOR THE COMBINED GROUP (66 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4' 10 Trials	28.02	28.32	0.2629	>	0.2390
Practice P.G.	42.71	6.10			
8' 10 Trials	66.98	42.64	0.3860	>	
Practice P.G.	42.71	6.10			
12' 10 Trials	111.85	58.85	0.4097	>	
Practice P.G.	42.71	6.10			
16' 10 Trials	153.87	71.62	0.1983	<	
Practice P.G.	42.71	6.10			
20' 10 Trials	162.71	56.51	0.2357	<	
Practice P.G.	42.71	6.10			

Validity of First Fifteen Trials of Putting Grid Tests

A further subproblem of the study was to determine the validity of the first fifteen trials on the putting grid test at distances of four, eight, twelve, sixteen, and twenty feet as a measure of putting ability. The validating criterion was the subject's total score on the practice putting green test. A correlation was used to test the relationship between the subject's score for the first fifteen trials and his total score for the practice putting

green test. The results of these calculations appear in Table XXXII.

Beginners (Group I).--With forty degrees of freedom a correlation coefficient of 0.3044 was required for significance.

The correlation coefficient was 0.2839 which indicates there was no significant positive relationship between the performance on the first fifteen trials of the putting grid test at four feet and the total performance on the putting green test for Group I.

The correlation coefficient was 0.3823 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test at eight feet and the total performance on the putting green test for Group I.

The correlation coefficient was 0.4692 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test at twelve feet and the total performance on the putting green test for Group I.

The correlation coefficient was 0.2383 which indicates there was no significant positive relationship between the performance on the first fifteen trials of the putting grid test at sixteen feet and the total performance on the putting green test for Group I.

The correlation coefficient was 0.2858 which indicates there was no significant positive relationship between the performance on the first fifteen trials of the putting grid test at twenty feet and the total performance on the putting green test for Group I.

TABLE XXXII

r's FOR THE TOTAL PERFORMANCE ON THE FIRST FIFTEEN TRIALS ON THE PUTTING GRID TEST FOR THE FIVE DISTANCES AND THE TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP I (40 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4' 15 Trials	44.03	34.02	0.2839	<	0.3044
Practice P.G.	45.21	6.05			
8' 15 Trials	104.56	60.55	0.3823	>	
Practice P.G.	45.21	6.05			
12' 15 Trials	165.09	77.79	0.4692	>	
Practice P.G.	45.21	6.05			
16' 15 Trials	244.78	96.91	0.2383	<	
Practice P.G.	45.21	6.05			
20' 15 Trials	237.57	77.46	0.2858	<	
Practice P.G.	45.21	6.05			

Intermediates (Group II).--With twenty-four degrees of freedom a correlation coefficient of 0.3882 was required for significance. The correlation coefficient was 0.2917 which indicates there was no significant positive relationship between the performance on the first fifteen trials of the putting grid test at four feet and the total performance on the putting green test for Group II.

The correlation coefficient was 0.4360 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test at eight feet and the total performance on the putting green test for Group II.

The correlation coefficient was 0.4073 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid at twelve feet and the total performance on the putting green test for Group II.

The correlation coefficient was 0.2335 which indicates there was no significant positive relationship between the performance on the first fifteen trials of the putting grid test at sixteen feet and the total performance on the putting green test for Group II.

The correlation coefficient was 0.3483 which indicates there was no significant positive relationship between the performance on the first fifteen trials of the putting grid test at twenty feet and the total performance on the putting green test for Group II. See Table XXXIII, page 104.

TABLE XXXIII

r's FOR THE TOTAL PERFORMANCE ON THE FIRST FIFTEEN TRIALS ON THE PUTTING GRID TEST FOR THE FIVE DISTANCES AND THE TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR GROUP II (24 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4' 15 Trials	25.88	35.14	0.2917	<	0.3882
Practice P.G.	38.65	3.45			
8' 15 Trials	71.42	41.41	0.4360	>	
Practice P.G.	38.65	3.45			
12' 15 Trials	146.04	82.10	0.4073	>	
Practice P.G.	38.65	3.45			
16' 15 Trials	194.60	89.80	0.2335	<	
Practice P.G.	38.65	3.45			
20' 15 Trials	225.54	71.89	0.3483	<	
Practice P.G.	38.65	3.45			

Beginners and Intermediates (Combined Group).--With sixty-six degrees of freedom a correlation coefficient of 0.2390 was required for significance. The correlation coefficient was 0.3596 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test at four feet and the total performance on the practice putting green test for the combined group of beginners and intermediates.

The correlation coefficient was 0.4710 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test at eight feet and the total performance on the practice putting green test for the combined group of beginners and intermediates.

The correlation coefficient was 0.4300 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test at twelve feet and the total performance on the practice putting green test for the combined group of beginners and intermediates.

The correlation coefficient was 0.2330 which indicates there was no significant positive relationship between the performance on the first fifteen trials of the putting grid test at sixteen feet and the total performance on the practice putting green test for the combined group of beginners and intermediates.

The correlation coefficient was 0.2910 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test at twenty feet and the total performance on the practice putting green test for the combined group of beginners and intermediates.

The correlation coefficient was 0.2910 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test at twenty feet and the total performance on the practice putting green test for the combined group of beginners and intermedates.

TABLE XXXIV

r's FOR THE TOTAL PERFORMANCE ON THE FIRST FIFTEEN TRIALS ON THE PUTTING GRID TEST FOR THE FIVE DISTANCES AND THE TOTAL PERFORMANCE ON THE PRACTICE PUTTING GREEN TEST FOR COMBINED GROUP (66 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4' 15 Trials	37.09	35.33	0.3596	>	0.2390
Practice P.G.	42.71	6.10			
8' 15 Trials	91.89	56.10	0.4710	>	
Practice P.G.	42.71	6.10			
12' 15 Trials	157.81	79.40	0.4300	>	
Practice P.G.	42.71	6.10			
16' 15 Trials	225.59	96.74	0.2330	<	
Practice P.G.	42.71	6.10			
20' 15 Trials	232.97	75.06	0.2910	>	
Practice P.G.	42.71	6.10			

The Reliability of the First Ten Trials of the Putting Grid Test

The reliability of the first ten trials was determined by comparing the total for the first ten trials of the putting grid test to the total score for the first ten trials of the putting grid retest from the same distance.

Beginners (Group I).--With forty degrees of freedom a correlation coefficient of 0.3044 was required for significance.

The correlation coefficient was 0.7327 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at four feet for Group I.

The correlation coefficient was 0.5928 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at eight feet for Group I.

The correlation coefficient was 0.6255 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at twelve feet for Group I.

The correlation coefficient was 0.4407 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest for Group I.

The correlation coefficient was 0.3532 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at twenty feet for Group I. See Table XXXV below.

TABLE XXXV

r's FOR THE TOTAL PERFORMANCE ON THE FIRST TEN TRIALS FOR THE FIVE DISTANCES AND THE TOTAL PERFORMANCE ON THE FIRST TEN TRIALS ON THE PUTTING GRID RETEST FROM THE SAME DISTANCE FOR GROUP I (40 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4' Test	62.47	50.47	0.7327	>	0.3044
4' Retest	34.95	27.99			
8' Test	125.07	79.26	0.5928	>	
8' Retest	81.86	51.75			
12' Test	212.54	97.25	0.6255	>	
12' Retest	125.29	65.10			
16' Test	304.77	117.74	0.4407	>	
16' Retest	177.73	86.70			
20' Test	316.91	97.52	0.3532	>	
20' Retest	175.49	74.75			

Intermediates (Group II).--With twenty-four degrees of freedom a correlation coefficient of 0.3882 was required for significance. The correlation coefficient was 0.6357 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at four feet for Group II.

The correlation coefficient was 0.3542 which indicates there was no significant positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at eight feet for Group II.

The correlation coefficient was 0.7725 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at twelve feet for Group II.

The correlation coefficient was 0.7274 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at sixteen feet for Group II.

The correlation coefficient was 0.6320 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at twenty feet for Group II. See Table XXXVI.

TABLE XXXVI

r's FOR THE TOTAL PERFORMANCE ON THE FIRST TEN TRIALS FOR THE FIVE DISTANCES AND THE TOTAL PERFORMANCE ON THE FIRST TEN TRIALS ON THE PUTTING GRID RETEST FROM THE SAME DISTANCE FOR GROUP II (24 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4' Test	42.86	56.03	0.6357	>	0.3882
4' Retest	19.65	29.22			
8' Test	83.20	57.78	0.3542	<	
8' Retest	56.80	40.03			
12' Test	180.79	102.66	0.7725	>	
12' Retest	104.44	56.85			
16' Test	248.44	113.41	0.7274	>	
16' Retest	135.27	71.95			
20' Test	298.07	114.25	0.6320	>	
20' Retest	157.81	55.67			

Beginners and Intermediates (Combined Group).--With sixty-six degrees of freedom a correlation coefficient of 0.2390 was required for significance. The correlation coefficient was 0.7044 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at four feet for the combined group of beginners and intermediates.

The correlation coefficient was 0.5638 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at eight feet for the combined group of beginners and intermediates.

The correlation coefficient was 0.6338 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at twelve feet for the combined group of beginners and intermediates.

The correlation coefficient was 0.5603 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at sixteen feet for the combined group of beginners and intermediates.

The correlation coefficient was 0.4457 which indicates there was a significantly positive relationship between the performance on the first ten trials of the putting grid test and the first ten trials of the putting grid retest at twenty feet for the combined group of beginners and intermediates. See Table XXXVII on the following page.

TABLE XXXVII

r's FOR THE TOTAL PERFORMANCE ON THE FIRST TEN TRIALS FOR THE FIVE DISTANCES AND THE TOTAL PERFORMANCE ON THE FIRST TEN TRIALS ON THE PUTTING GRID RETEST FROM THE SAME DISTANCE FOR THE COMBINED GROUP (66 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4' Test	54.97	53.12	0.7044	>	0.2390
4' Retest	29.10	29.23			
8' Test	109.06	74.23	0.5638	>	
8' Retest	72.28	48.81			
12' Test	200.40	99.81	0.6338	>	
12' Retest	117.32	62.48			
16' Test	283.23	118.50	0.5603	>	
16' Retest	161.49	83.45			
20' Test	309.71	103.80	0.4457	>	
20' Retest	168.73	68.20			

The Reliability of the First Fifteen Trials of the Putting Grid Test

The reliability of the first fifteen trials was determined by comparing the total score for the first fifteen trials of the putting grid test to the total score for the first fifteen trials of the putting grid retest from the same distance.

Beginners (Group I).--With forty degrees of freedom a correlation coefficient of 0.3044 was required for significance. The correlation coefficient was 0.6920 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at four feet for Group I.

The correlation coefficient was 0.6372 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at eight feet for Group I.

The correlation coefficient was 0.3556 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at twelve feet for Group I.

The correlation coefficient was 0.6956 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at sixteen feet for Group I.

The correlation coefficient was 0.4459 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at twenty feet for Group I.

TABLE XXXVIII

r's FOR THE TOTAL PERFORMANCE ON THE FIRST FIFTEEN TRIALS FOR THE FIVE DISTANCES AND THE TOTAL PERFORMANCE ON THE FIRST FIFTEEN TRIALS ON THE PUTTING GRID RETEST FROM THE SAME DISTANCE FOR GROUP I (40 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4' Test	49.12	35.51	0.6920	>	0.3044
4' Retest	33.18	27.98			
8' Test	132.08	87.91	0.6372	>	
8' Retest	87.38	61.61			
12' Test	216.61	86.68	0.3556	>	
12' Retest	124.67	70.89			
16' Test	295.85	105.64	0.6956	>	
16' Retest	174.85	85.86			
20' Test	332.02	101.72	0.4459	>	
20' Retest	184.28	71.57			

Intermediates (Group II).--With twenty-four degrees of freedom a correlation coefficient of 0.3882 was required for significance. The correlation coefficient was 0.9107 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at four feet for Group II.

The correlation coefficient was 0.5944 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at eight feet for Group II.

The correlation coefficient was 0.6610 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at twelve feet for Group II.

The correlation coefficient was 0.7161 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at sixteen feet for Group II.

The correlation coefficient was 0.7840 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at twenty for Group II.

TABLE XXXIX

r's FOR THE TOTAL PERFORMANCE ON THE FIRST FIFTEEN TRIALS FOR THE FIVE DISTANCES AND THE TOTAL PERFORMANCE ON THE FIRST FIFTEEN TRIALS ON THE PUTTING GRID RETEST FROM THE SAME DISTANCE FOR GROUP II (24 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4' Test	17.42	23.51	0.9107	>	0.3882
4' Retest	12.54	18.64			
8' Test	84.07	64.45	0.5944	>	
8' Retest	50.62	48.46			
12' Test	180.12	75.75	0.6610	>	
12' Retest	92.17	49.94			
16' Test	250.30	106.90	0.7161	>	
16' Retest	123.31	60.64			
20' Test	260.87	126.69	0.7840	>	
20' Retest	134.70	64.90			

Beginners and Intermediates (Combined Group).--With sixty-six degrees of 0.2390 was required for significance. The correlation coefficient was 0.7805 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at four feet for the combined group of beginners and intermediates.

The correlation coefficient was 0.6579 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at eight feet for the Combined Group.

The correlation coefficient was 0.4659 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at twelve feet for the Combined Group.

The correlation coefficient was 0.7081 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at sixteen feet for the Combined Group.

The correlation coefficient was 0.6186 which indicates there was a significantly positive relationship between the performance on the first fifteen trials of the putting grid test and the first fifteen trials of the putting grid retest at twenty feet for the Combined Group.

TABLE XL

r's FOR THE TOTAL PERFORMANCE ON THE FIRST FIFTEEN TRIALS FOR THE FIVE DISTANCES AND THE TOTAL PERFORMANCE ON THE FIRST FIFTEEN TRIALS ON THE PUTTING GRID RETEST FROM THE SAME DISTANCE FOR THE COMBINED GROUP (66 df)

Variables	$\bar{X}$	σ	Calculated r		r required for sig.
4' Test	37.00	34.91	0.7805	>	0.2390
4' Retest	25.29	26.66			
8' Test	113.72	82.66	0.6579	>	
8' Retest	73.33	59.35			
12' Test	202.66	84.01	0.4659	>	
12' Retest	112.25	65.26			
16' Test	278.43	107.66	0.7081	>	
16' Retest	155.14	80.74			
20' Test	304.81	116.33	0.6186	>	
20' Retest	165.32	72.77			

Trend Analysis

There was a tendency for the members of all groups to strike the ball in such a manner so that the trial stopped to the right of the hole and past the hole. The number of hits (0,0) decreased as the distance of the putting grid test was increased. The number of trials that went off the grid increased as the distance of the putting grid test was increased. It is interesting to note that more than twice

as many trials stopped in the hole than stopped in any other classification (off the grid, left, right, short, or long). See Table XLI on the following page.

TABLE XLI

ANALYSIS OF POSITION EACH TRIAL STOPS FOLLOWING EACH TRIAL IN THE PUTTING GRID TEST

	Distance	Hits (0,0)	Off the Grid (7,7)	In (0,0) Square Did not Go In Hole (0,0)	*Left	*Right	*Short	*Long
Group I	4'	653	7	2	21	97	68	106
	8'	499	51	3	94	104	134	142
	12'	383	110	5	113	154	141	191
	16'	264	165	3	115	209	185	208
	20'	277	197	0	109	186	185	175
	Total	2076	530	13	452	740	703	842
Group II	4'	450	4	2	12	17	22	39
	8'	353	13	1	32	85	30	108
	12'	270	46	0	83	74	59	137
	16'	206	76	1	64	132	65	147
	20'	152	89	1	112	105	115	144
	Total	1431	228	5	303	393	281	575
Combined Group	4'	1084	11	4	33	113	90	145
	8'	835	64	4	125	168	164	247
	12'	640	156	5	195	228	188	333
	16'	461	238	4	176	336	250	347
	20'	424	284	1	216	278	286	320
	Total	3444	753	18	745	1152	978	1391

*Excludes (7,7)

Chapter IV has presented an itemization of the statistical results of the study in detailed form. Chapter V provides discussion based upon the results presented in Chapter IV.

CHAPTER V

DISCUSSION OF RESULTS

Test for Significant Difference Between Members of Subgroup A and Subgroup B

The results of the t-test with Group I, Group II, and the Combined Group indicated that there was no significant difference between the total practice putting green test scores of the subjects in Subgroup A, who started the testing with the putting grid test, and those subjects in Subgroup B, who began the testing with the practice putting green test.

Consideration of the Combined Group

The writer would like to point out that the Combined Group was not the result of any predetermined ratio of beginners to intermediates, nor was it the result of randomness of subjects enrolling in the same golf class. This fact is pointed out because of the situation found at Oklahoma State University. Even though a course is "catalogued" as Beginning Golf or Intermediate Golf, there is usually an overlap in skill proficiency in these two classes. It seems likely that an instructor of such a

class might misinterpret the results of the present study, concerning the Combined Group, and place too much value on those results when deciding upon a test of putting ability. Such action would not be justified because the Combined Group was not tested as a separate group, the data for the Beginning Group and the Intermediate Group was simply combined.

Validating the Putting Grid Tests

The reader is reminded that all of the putting grid tests were validated with the total performance score on the practice putting green test. At the time the study was designed, the practice putting green test was considered to be a valid measure of putting ability. The researcher now believes that the practice putting green test was not a valid measure of putting ability. A truly valid measure of putting ability should have included more trials at each of the distances considered.

It should be noted that even though the validity coefficients are significant, the validity of the tests are so low that they would have little use in a future testing situation; however, they are the best tests available at this time.

Beginners (Group I).--The results of the study indicate that the twenty trial totals on the putting grid tests from eight, twelve, sixteen and twenty feet were significantly valid. The most valid twenty trial test was the test from twelve feet.

The results of the study indicate that the fifteen trial totals on the putting grid tests from eight and twelve feet were significantly valid. The fifteen trial putting grid tests from eight and twelve feet had higher validity coefficients, 0.3823 and 0.4692 respectively, than the twenty trial tests from the same distance.

The ten trial tests from eight and twelve feet were significantly valid. The validity coefficients were not as high for the ten trials as they were for the fifteen trial total.

In summary, the most valid test of putting ability for the Beginners was the fifteen trial test from twelve feet.

Intermediates (Group II).--The twenty trial tests from eight and twelve feet were significantly valid measures of putting ability. The putting grid test from eight feet provided the highest validity coefficient, 0.4583, for the Intermediates.

The fifteen trial tests from eight and twelve feet were significantly valid. Neither test had a validity coefficient as high as the same test had with twenty trials.

The ten trial test from eight feet was significantly valid. The validity coefficient, 0.4157, was not as large as the validity coefficient provided by the twenty trial test.

In summary, the most valid test of putting ability for the Intermediates was the twenty trial test from eight feet.

Combined Group.--All of the twenty trial putting grid tests were significantly valid measures of putting ability for the Combined Group. The putting grid test from twelve feet provided the highest validity coefficient, 0.4563, for the Combined Group.

The fifteen trial putting grid test from sixteen feet was not significantly valid, but the other four putting grid tests were significantly valid. The fifteen trial putting grid test from eight feet provided a higher validity coefficient, 0.4710, than the twenty trial putting grid test from eight feet, 0.4189.

The ten trial putting grid tests from four, eight and twelve feet were significantly valid tests. The validity coefficients for the ten trial tests were not as high as those for the twenty trial tests from the same distance.

It must be noted that there were more subjects in the Combined Group, sixty-eight, than there were in Group I, forty-two, or Group II, twenty-six. Consequently, a lower validity coefficient was required for significance for the Combined Group than for either Group I or Group II. When this fact is considered, it is apparent that more tests will be significantly valid for the Combined Group than for Group I or Group II.

A summary of the validity coefficients for the ten, fifteen and twenty trial putting grid tests at each of the five distances--four, eight, twelve, sixteen, and twenty feet--appears in Table XLII, page 126.

TABLE XLII

COEFFICIENTS OF CORRELATION BETWEEN THE PUTTING GRID TESTS AND THE PRACTICE PUTTING GREEN TEST FOR GROUPS I, II, AND THE COMBINED GROUP OF BEGINNERS AND INTERMEDIATES ON THE TEN, FIFTEEN, AND TWENTY TRIALS

	Number of Trials	4'	8'	12'	16'	20'	r required for sig.
Group I	10	0.1596	0.3792	0.4135	0.1448	0.1884	0.3044
	15	0.2336	0.3823	0.4692	0.2382	0.2858	0.3044
	20	0.2779	0.3058	0.4529	0.3170	0.3644	0.3044
Group II	10	0.2093	0.4157	0.3780	-0.0934	0.2505	0.3882
	15	0.2917	0.4360	0.4073	-0.2335	0.3483	0.3882
	20	0.3451	0.4583	0.4449	-0.1327	0.3535	0.3882
Combined Group	10	0.2629	0.3860	0.4097	0.1983	0.2357	0.2390
	15	0.3596	0.4710	0.4300	0.2330	0.2910	0.2390
	20	0.3765	0.4189	0.4563	0.3094	0.3499	0.2390

Reliability of the Putting Grid

The reliability for each of the putting grid tests was determined by the test-retest method. It should be noted that even though some of the tests have reliability coefficients high enough to warrant their use on the basis of reliability, these same tests did not have high enough validity coefficients to justify such use in practical situations. It is interesting to note that, for the Beginning Group and for the Intermediate Group, four of the five putting grid tests provided higher reliability coefficients for fifteen trials than for twenty trials.

Beginners (Group I).--The twenty trial putting grid test from four feet, with a reliability of 0.1599, was the only test which did not provide a significant reliability for the Beginners. All of the other fifteen and ten trial putting grid tests provided significant reliabilities. The most reliable putting grid test for the Beginners was the ten trial test from four feet, with a reliability of 0.7327. The fifteen trial tests from sixteen, four, and eight feet had reliabilities of 0.6956, 0.6920, and 0.6372 respectively.

It is interesting to note that the putting grid test from four feet provided the two extremes in reliability.

coefficients for the Beginning Group. The twenty trial test was the least reliable, in fact it was the only test which did not reach the level required for significance; but, the ten trial test was the most reliable test. The researcher hypothesizes that the student may have become bored with such a simple test sometime between the tenth and twentieth trial. It is also hypothesized that fatigue may have been a detrimental factor in the putting grid test. This opinion is supported by the fact that four out of five of the Beginner's fifteen trial tests provided higher reliability coefficients than were provided by the twenty trial test. The only exception to this observation is the putting grid test from twelve feet.

Intermediates (Group II).--The twenty trial putting grid tests from four, twelve, and sixteen feet and the ten trial test from eight feet failed to provide significant reliabilities for the Intermediate Group. All of the other putting grid tests were significantly reliable. The fifteen trial putting grid test from four feet had the highest reliability, 0.9107. None of the other tests had a reliability greater than 0.8000. It is interesting to note that the fifteen trial test from twenty feet had a reliability of 0.7840 and the ten trial test from twelve feet had a reliability of 0.7725.

It appears that fatigue may have been a factor for Intermediates. The fifteen trial tests were more reliable than the twenty trial tests with the exception of the

putting grid test from eight feet. The reliability of the twenty trial test was 0.5983 and the reliability of the fifteen trial test was 0.5944.

Combined Group.--All of the reliability coefficients for the Combined Group were significant.

Again, it should be noted that there were more subjects in the Combined Group than there were in Group I or Group II. Consequently, a lower reliability coefficient was required for significance for the Combined Group than for either Group I or Group II.

The fifteen trial putting grid test from four feet had a reliability of 0.7805 and the fifteen trial putting grid test from sixteen feet had a reliability of 0.7081. These tests had the highest reliability for the Combined Group.

A summary of the reliability coefficients for the ten, fifteen, and twenty trial putting grid tests at each of the five distances--four, eight, twelve, sixteen, and twenty feet--appears in Table XLIII, page 130.

Validity and Reliability of the Putting Grid Tests

Meyers and Blech (47:62) states, "A test must be reliable in order to be valid..." Meyers and Blech illustrate that a test must be reliable to be of value. The present researcher could find no means of determining the reliability and the validity of a test. The researcher hypothesized that the reliability coefficient for each

TABLE XLIII

COEFFICIENTS OF CORRELATION BETWEEN THE PUTTING GRID TESTS AND THE PUTTING GRID RETESTS FOR GROUPS I, II, AND THE COMBINED GROUP OF BEGINNERS AND INTERMEDIATES ON THE TEN, FIFTEEN AND TWENTY TRIALS

	Number of Trials	4'	8'	12'	16'	20'	r required for sig.
Group I	10	0.7327	0.5928	0.6255	0.4407	0.3532	0.3044
	15	0.6920	0.6372	0.3556	0.6956	0.4459	0.3044
	20	0.1599	0.5481	0.3835	0.5824	0.3432	0.3044
Group II	10	0.6357	0.3542	0.7725	0.7274	0.6320	0.3882
	15	0.9107	0.5944	0.6610	0.7161	0.7840	0.3882
	20	0.1792	0.5983	0.3090	0.2676	0.5844	0.3882
Combined Group	10	0.7044	0.5638	0.6838	0.5603	0.4457	0.2390
	15	0.7805	0.6579	0.4659	0.7081	0.6186	0.2390
	20	0.2642	0.5984	0.3832	0.5010	0.4614	0.2390

TABLE XLIV

COEFFICIENTS OF CORRELATION BETWEEN THE PUTTING GRID TESTS AND THE PRACTICE PUTTING GREEN TEST FOR GROUPS I, II, AND THE COMBINED GROUP OF BEGINNERS AND INTERMEDIATES ON THE TEN, FIFTEEN, AND TWENTY TRIALS

(Number in parentheses indicates rank within the group)

	Number of Trials	4'	8'	12'	16'	20'	r required for sig.
Group I	10	0.1596	(5) 0.3792	(3) 0.4135	0.1448	0.1884	0.3044
	15	0.2336	(4) 0.3823	(1) 0.4692	0.2382	0.2858	0.3044
	20	0.2779	(8) 0.3058	(2) 0.4529	(7) 0.3170	(6) 0.3644	0.3044
Group II	10	0.2093	(4) 0.4157	(6) 0.3780	-0.0934	0.2505	0.3882
	15	0.2917	(3) 0.4360	(5) 0.4073	-0.2335	(8) 0.3483	0.3882
	20	0.3451	(1) 0.4583	(2) 0.4449	-0.1327	(7) 0.3535	0.3882
Combined Group	10	0.2629	0.3860	0.4097	0.1983	0.2357	0.2390
	15	0.3596	0.4710	0.4300	0.2330	0.2910	0.2390
	20	0.3765	0.4189	0.4563	0.3094	0.3499	0.2390

TABLE XLV

COEFFICIENTS OF CORRELATION BETWEEN THE PUTTING GRID TESTS AND THE PUTTING GRID RETESTS FOR GROUPS I, II, AND THE COMBINED GROUP OF BEGINNERS AND INTERMEDIATES ON THE TEN, FIFTEEN AND TWENTY TRIALS

(Number in parentheses indicates rank within the group)

	Number of Trials	4'	8'	12'	16'	20'	r required for sig.
Group I	10	(1) 0.7327	(6) 0.5928	(5) 0.6255	(10) 0.4407	0.3532	0.3044
	15	(3) 0.6920	(4) 0.6372	0.3556	(2) 0.6956	(9) 0.4459	0.3044
	20	0.1599	(8) 0.5481	0.3835	(7) 0.5824	0.3432	0.3044
Group II	10	(7) 0.6357	0.3542	(3) 0.7725	(4) 0.7274	(8) 0.6320	0.3882
	15	(1) 0.9107	(10) 0.5944	(6) 0.6610	(5) 0.7161	(2) 0.7840	0.3882
	20	0.1792	(9) 0.5983	0.3090	0.2676	0.5844	0.3882
Combined Group	10	0.7044	0.5638	0.6838	0.5603	0.4457	0.2390
	15	0.7805	0.6579	0.4659	0.7081	0.6186	0.2390
	20	0.2642	0.5984	0.3832	0.5010	0.4614	0.2390

test could be ranked. In addition, the validity coefficient for each test could be ranked. To determine which test was the most reliable and valid, the summation of the rankings for each particular test was ascertained. The resulting sums indicated that the fifteen trial putting grid test from eight feet was the most reliable and valid test for the Beginning Group. The resulting sums indicated that the twenty trial putting grid test from eight feet was the most reliable and valid test for the Intermediate Group. The resulting sums indicated that the fifteen trial putting grid test from eight feet was the most reliable and valid test for the Combined Group of beginners and intermediates.

Subproblems

Test Combination

The putting grid tests were given in the following order: four, eight, twelve, sixteen and twenty feet. At the conclusion of the study the researcher determined the validity for each of the possible test combinations. The total score for the practice putting green test was again used as the validating criteria. The tests were not administered in combinations. The results of each of the tests, which were administered separately, were simply combined in the various arrangements which constitute the combinations.

Even though the results of the study indicate that the majority of the test combinations produced significantly

valid tests, the reader is cautioned that there are few validities which are high enough to consider using them in practical situations. The reader is referred to Tables XXVI, XXVII, and XXVIII on pages 89, 91, and 93 respectively.

Beginning Group (Group I).--The validity of the test combination of four, twelve, and twenty feet provided the highest validity, 0.5020, of any single test or any of the possible test combinations for the Beginning Group.

The researcher feels that a future study should reconsider the putting grid tests from four, twelve, and twenty feet. Should such a study accrue, only these tests should be administered. If the future study yields results similar to those found in the present study, this researcher would recommend that the putting grid test combination of four, twelve, and twenty feet be used instead of any of the single putting grid tests to test putting ability.

Intermediate Group (Group II).--The results of the combination of tests for the Intermediate Group indicate that five of the test combinations provided higher validities than any single test. The most valid test combination consisted of the putting grid tests from four, eight, and twelve feet. The validity of the test combination was 0.4896.

Again the researcher recommends that the putting grid tests from four, eight, and twelve feet be administered in succession. Even though the present study

followed this succession of distances, the reader is reminded that a retest was administered prior to proceeding to the next test.

Combined Group.--All of the test combinations were significantly valid for the Combined Group. Ten of the test combinations provided higher validities than any single test. The most valid test combination included the putting grid tests from four, eight, and twelve feet. That combination had a validity of 0.5258.

Trend Analysis

An item count was used to ascertain how many trials were short, long, right, or left of the hole. The item count also included how many trials went in the hole and how many failed to stop on the grid. When this item count was analyzed it was found that more trials stopped beyond the hole than stopped short of it and that more trials stopped to the right of the hole than to the left of the hole.

Another observation which the researcher made during the course of the study should be mentioned at this time. Although all of the trials which failed to stop on the grid were noted by (7,7) and no directional or distance error was specified, almost all of the trials which did not stop on the grid went off the back edge of the grid.

It should be mentioned that all of the subjects in the present study were right handed. The researcher

believes it would be interesting to see if similar results would occur with a group of left handed putters.

Consideration of the Validity of the Putting Grid Test from Sixteen Feet

The researcher observed that the putting grid test from sixteen feet yielded some unusual results. Some of these "unconventional" results were:

1. The twenty trial putting grid test from sixteen feet was significantly valid for the Beginning Group and for the Combined Group, but not for the Intermediate Group.
2. The fifteen trial putting grid test from sixteen feet was not significantly valid for any of the three groups (Beginners, Intermediates or the Combined Group).
3. The ten trial putting grid test from sixteen feet was not significantly valid for any of the three groups (Beginners, Intermediates or the Combined Group).
4. The putting grid test from sixteen feet was the only test which yielded a negative correlation coefficient. Negative correlations resulted when the ten, fifteen, and twenty trial putting grid tests from sixteen feet were validated for the Intermediate Group. None of the validities reached the level of 0.3882 required for

significance, but the fact that they were negative warrents notation.

5. The putting grid test from sixteen feet was not included in any of the "best" two, three, or four test combinations.

There is no know reason why the putting grid test from sixteen feet should yield such poor correlation coefficients when compared to the results of the practice putting green test. The researcher hypothesizes that the test from sixteen feet is a test of a "long" putt, whereas the tests from four, eight, and twelve feet were tests of a "short" putt. The only plausible explanation for the fact that the correlation coefficients increased for the putting grid test from twenty feet is that the subject had become accustomed to the long putt by the time they were tested from that distance.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

The purpose of this study was to develop a valid and reliable indoor golf putting test. Subjects of two skill levels were examined throughout the study; beginning golfers made up Group I and intermediate golfers made up Group II. Two subgroups existed within each group. These subgroups were used to ascertain whether order of testing affected the results on the practice putting green test. The subjects were randomly assigned to either subgroup A or B. Each subgroup was randomly assigned to one sequence of testing. The subjects in subgroup A took the putting grid tests and retests before taking the practice putting green test. There were twenty-two beginners and twelve intermediates in Subgroup A. The subjects in subgroup B took the practice putting green test before taking the putting grid tests and retests. There were twenty beginners and fourteen intermediates in Subgroup B.

The putting grid test consisted of each subject taking twenty trials from each of the five predetermined distances to a cup imbedded below the surface of a strip of Astro Turf. The distances from which the subjects putted were

four, eight, twelve, sixteen, and twenty feet respectively. Reliability was established by the test-retest method. Each trial was recorded both graphically and by stating the numerical name (the name assigned to each square was a pair of numbers) of the square that each trial stopped on the subject's score card. Following the testing session the pairs of numbers were translated to what was known as a "converted score." The converted score for each trial was the distance from the center of the square in which the ball stopped to the center of the hole. The "test converted score" was the total of the twenty converted trial scores for each test distance.

The practice putting green test consisted of twenty predetermined holes on the practice putting green at Lakeside Golf Course. The subject's score for each hole was indicated by the number of strokes required to putt the ball into the hole. The total number of putts required for all twenty holes composed the subject's practice putting green test score.

It was important to this study to determine whether members of Subgroup A (those subjects who began their testing on the putting grid test) differed significantly in their putting ability from the members of Subgroup B (those subjects who began their testing on the practice putting grid test). The subject's total score on the practice putting green test was used as the criterion for this measure. There was no significant difference in the

putting green test score between Subgroup A and Subgroup B. On the strength of this finding it would appear that the order of testing did not affect the test results.

Conclusions

The researcher itemized eleven basic criteria for a test in Chapter I. The researcher feels that it is important in the complete evaluation of the putting grid test to reconsider each of these criteria while drawing conclusions concerning the putting grid test. The original criteria are listed as sub-headings below.

Mathematically Sound

The distance from the center of each square to the center of the hole was calculated by the Pythagorean Theorem. Similarly, the distance from the center of the "Target Square" (0,0) corners was also calculated with the Pythagorean Theorem. Since this theorem has been proven to be mathematically correct it may be concluded that the use of the Pythagorean Theorem throughout the study provides accurate results.

Reliable

Twenty Trials--Using the test-retest method the putting grid tests from distances of eight, twelve, sixteen, and twenty feet were significantly reliable for the Beginning Group (Group I).

The putting grid tests from the distances of eight and twenty feet were significantly reliable for the Intermediate Group (Group II).

The putting grid tests from the distances of four, eight, twelve, sixteen, and twenty feet were significantly reliable when the beginners and intermediates were combined.

Fifteen Trials--The putting grid tests from all five distances were significantly reliable for the Beginning Group (Group I), the Intermediate Group (Group II), and the Combined Group.

Ten Trials--When ten trials were considered, the putting grid tests from all five distances were significantly reliable for the Beginning Group (Group I).

The putting grid tests from distances of four, twelve, sixteen, and twenty feet were significantly reliable for the Intermediate Group (Group II).

The putting grid tests from all five distances were significantly reliable for the Combined Group.

Valid

Twenty Trials--The putting grid tests from distances of eight, twelve, sixteen, and twenty feet were significantly valid measures of putting ability for the Beginning Group (Group I).

The putting grid tests from distances of eight and twelve feet were significantly valid measures of putting ability for the Intermediate Group (Group II).

The putting grid tests from all five distances were significantly valid measures of putting ability for the Combined Group.

Fifteen Trials--The putting grid tests from distances of eight and twelve feet were significantly valid measures for the Beginning Group (Group I).

The putting grid tests from distances of eight and twelve feet were significantly valid measures of putting ability for the Intermediate Group (Group II).

The putting grid tests from distances of four, eight, twelve, and twenty feet were significantly valid measures of putting ability for the Combined Group of beginners and intermediates.

Ten Trials--The putting grid test from a distance of twelve feet was significantly valid measure of putting ability for the Beginning Group (Group I).

The putting grid test from a distance of eight feet was a significantly valid measure of putting ability for the Intermediate Group (Group II).

The putting grid tests from distances of four, eight, and twelve feet were valid measures of putting ability for the combined group of beginners and intermediates.

Combinations of the Putting Grid Tests--All of the possible combinations of putting grid tests were valid measures of putting ability for the Beginning Group (Group I). The best "test combination" was the four, twelve, and twenty feet test.

The best "test combination" for the Intermediate Group (Group II) was the four, eight, and twelve feet test.

All of the possible combinations of the putting grid tests were valid measures of putting ability for the Combined Group. The best "test combination" was the four, eight, and twelve feet test.

Objective

The grid test was designed in the most objective manner possible. The one possible discrepancy which might occur between two test administrators is when a ball is actually on a line. This problem is not very grave and according to the design of this study it was predetermined that the subject would be awarded the value of the square closest to the hole.

The table used to convert the raw data to usable scores probides constant numbers. This conversion table can be read identically by all test administrators.

Financially Feasible

The total cost of the putting grid test was $252.80. The individual expenses were:

24' x 5' strip of G50 Astro Turf	$170.00
Lumber and building supplies	63.58
Labor	15.00
Putting Cup	2.50
Chalk string and carton of chalk	1.72

Economic in Time

Each subject was allotted five minutes to take the twenty trials. With a class of thirty subjects, two and one-half hours would be required to test each of the five distances.

Even though five minutes were allotted for each subject, the researcher observed that the average time required for the test was approximately four minutes.

In order to reduce the student and/or instructor time involvement a subproblem evolved from the study. The subproblem consisted of determining the reliability and the validity of the first ten trials and of the first fifteen trials of the putting grid test.

The results of the study do not indicate that the ten trial total is a more valid measure of putting ability than the twenty trial total. However, for Group I, the validity of the ten trial total was higher than the validity of the twenty trial total at a distance of eight feet.

The results of the study do not indicate that the fifteen trial total is a more valid measure of putting ability than the twenty trial total. However, for Group I, the validity of the fifteen trial total was higher than the validity of the twenty trial total at distances of eight and twelve feet. When the groups were combined, the fifteen trial total proved to be a more valid measure of putting ability than the twenty trial total.

The results of the study indicate that the ten trial total is a more reliable measure of putting ability than the twenty trial total. However, the reliability of the ten trial total was lower than the reliability of the twenty trial total for Group I on the putting grid test from a distance of sixteen feet. The reliability of the ten trial total was also lower than the reliability of the twenty trial total for Group II and the Combined Group on the putting grid test from a distance of eight feet.

The fifteen trial total was a more reliable measure than the twenty trial total in all cases except for two. The twenty trial total provided more reliable results than the fifteen trial total for Group I on the putting grid test from twelve feet and for Group II on the putting grid test from eight feet.

Adaptable to the Available Conditions and to The Group to be Tested

The subjects considered in the present study were college students enrolled in Golf Service Classes at Oklahoma State University. The researcher is only able to generalize to the population considered in the present study. However, the researcher suggests that other golf instructors might benefit from the results of this study and conduct further research in this area using the same procedures, but adjusting to the new situation. The researcher feels that other golf instructors will encounter

no difficulty in adapting the Putting Grid Test to their individual situation.

Easy to Administer

Six people were used to administer the putting grid test to each subject during the present study in an attempt to insure the accuracy of the data which was recorded. However, the test could be adequately administered with three people. The researcher recommends that one assistant place the ball in position for the subject to strike and a second assistant picks up each trial as soon as it stops and calls out the graphic position of the trial. The instructor can place the numerical score at the bottom of the score card and plot the graphic position of the trial at the top of the score card. Following the completion of the study, the researcher feels that the Putting Grid Test is very easy to administer.

Learning Situation

The researcher feels that the subjects participating in the study increased their putting skill as they advanced through the tests.

If desired, the instructor might record only the numerical value on the score card and allow the student to plot the graph; thus providing him with slightly delayed feedback of his performance, but at the same time allowing

him to investigate possible trends which might have developed during the course of the test.

Diagnostic

The graphic illustration of where each trial stops provides the instructor and the student with a means of determining whether the putting errors are consistent or sporadic. Should the errors be consistent the individual can make the necessary alterations in his putting stroke.

Immediate Feedback

Immediate feedback occurred during the test itself. As soon as the ball stopped and the subject could see whether the trial was short or long, right or left, or in the target. The subject had previous instruction about how to make corrections on subsequent trials so it is assumed the subject was attempting to make such modifications.

Important Points

On the basis of the findings of the present study the following conclusions have been drawn:

1. The most reliable and valid test of putting ability for the Beginning Group was the fifteen trial putting grid test from a distance of eight feet.
2. The most reliable and valid test of putting ability for the Intermediate Group was the

twenty trial putting grid test from a distance of eight feet.

3. The most reliable and valid test of putting ability for the combined group of beginners and intermediates was the fifteen trial putting grid test from a distance of eight feet.
4. The best two, three or four test combinations provided greater validity coefficients than the single putting grid tests recommended above.
   A. The best test combination for Group I was the "three test combination" from distances of four, twelve, and twenty feet.
   B. The best test combination for Group II was the "three test combination" from distances of four, eight, and twelve feet.
   C. The best test combination for the Combined Group was the "three test combination" from distances of four, eight, and twelve feet.

Recommendations for Further Study

The investigator's recommendations for future studies are:

1. Design a putting green test which provides more attempts at each specific distance to allow comparison of each distance on the putting grid test to the total practice putting green test from the same distance.

The researcher recommends that at least ten trials be given at each distance.

2. Putts of varying terrains (uphill, downhill, left break, and right break) should be included at each distance in the practice putting green test.
3. Reduce extended period of time required for the subjects to take the test. It seems very likely that testing might provide better results if the testing sessions were daily for a twelve day period instead of twice weekly for a six-week period. However, such an arrangement would not be similar to an actual class situation.
4. Compare the results of this study to one which superimposed the putting grid over each of the holes in the practice putting green test and compare the grid score to the number of trials required for the subject to strike the ball into the cup from each distance.
5. Another possibility for determining the validity of the putting grid test would be to design a study subdividing the subjects into two groups. On the first day the members of Subgroup A would take the practice putting green test for a specified number of holes from one distance. Upon completion of the

practice putting green test they would be given a short rest period, to decrease the possibility of fatigue occurring. They would then take the putting grid test from the same distance on the same putting surface, but not on the practice putting green "course." Members of Subgroup B would take the putting grid test first, rest, and then take the practice green test from the same distance. On each subsequent day of testing the order would be reversed.

Such a design would increase the chances of the researcher testing the isolated skill of putting, but not necessarily the student's putting ability. Putting ability contains many facets--the putting stroke as well as the ability to adjust to the varying conditions which might be encountered on the putting green, such as the grain, terrain, type of grass, texture of the green, moisture present, and height of the grass. Since the condition of the green would remain constant the variable under consideration would be putting skill rather than putting ability.

6. Develop a more permanent method of marking the lines for the grid could be designed, but those permanent markings must not influence

the roll of the ball on the putting surface. It might be possible to have a grid reproduced on a 35 mm slide and position a projector overhead so that the image of the grid could be seen well enough on the putting surface to eliminate marking the grid.

7. Develop a series of putting grid tests at different distances than those used in the current study. Should a study be designed in the future using the "putting grid" special consideration must be given to the anomalous results obtained during the present study on the putting grid test from sixteen feet. It would be interesting to ascertain whether intermittent distances such as thirteen, fourteen or fifteen feet provide results similar to those found in the present study for the putting grid test from twelve feet or from sixteen feet.
8. Reduce the fatigue factor by reducing the number of trials to fifteen instead of twenty.
9. Design a study to test the reliability and validity of specific putting grid test combinations. This study should be designed in such a way that the subjects take only the tests which make up the

test combination. The present study considered all of the possible test combinations from the five distances; but, for example, the putting grid test combination of eight and sixteen feet was not administered as an entity in itself. Rather the putting grid test from twelve feet was given between the time the tests from eight feet and sixteen feet were given.

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APPENDIX A

PUTTING UNIT

First Day.

1. Importance of putting in the game of golf.
2. Putting as an individualistic skill.
   a. Putt the way which provides you with the most success.
3. Grip.
   a. Club crosses the two pads on the left hand.
   b. Fingers wrap around the club with the left thumb pointing down the shaft.
   c. Right hand covers the thumb (indentation) fingers wrap around the shaft--right thumb points down the shaft.
   d. Two hands work as one unit (must be close together).
   e. Variations of the ten-finger, standard, or baseball grip.
      (1) Crosshand.
      (2) Overlap.
      (3) Reverse-Overlap.
   f. Left hand on end of shaft, right hand below left hand for the right handed golfers.
4. Stance.
   a. Feet shoulder width apart.

b. Find a comfortable way to adjust your weight over the base.

c. Bend knees slightly.

5. Bent elbows.

6. Bent wrists.

7. Head.

a. Center of a pendulum (fulcrum).

b. Directly over the ball.

8. Students Practice.

a. Carpet.

b. Astro Turf.

9. Students Experiment.

a. Left hand on top end of grip--right hand on bottom of grip so right index finger is on metal of shaft.

(1) Discovered hands work in opposition to each other.

(2) Keep hands together to allow joint effort by the two hands.

b. Cross hand.

(1) Left hand in a stronger position.

(2) Allows the clubhead to stay in a straight line rather than "gateing" the stroke.

c. Both hands at top of the shaft--both hands at bottom of the shaft.

(1) More control when hands are closer to the clubhead.

d. "Is your head over the ball?"

(1) "Assume your address position over the ball. While retaining that position, bring the grip end of the putter to a position between the eyes and resting on the bridge of the nose. When you look at the putter blade, is it crossing the center of the ball?"

Second Day.

1. Reviewed Basics.
   a. Grip.
   b. Stance.
   c. Bent elbows.
   d. Bent wrists.
   e. Head directly over the ball.
   f. Smooth stroke.
      (1) Railroad track.
2. Putted twenty minutes on Astro Turf, twenty minutes on practice putting green.

Third Day.

1. Stressed putting with the head still.
2. Putter follows the path of a railroad track. Ball resting on the track and is hit. Hit through the ball rather than at the ball.
3. Practiced twenty minutes on Astro Turf and twenty minutes on practice putting green.

Fourth Day.

1. Discussion about extraneous factors of the putting game.
   a. Effect of terrain.
   b. Grain of the green.
   c. Length of the grass.
   d. Types of grass.
   e. Water on the grass.
2. Practiced twenty minutes on Astro Turf and twenty minutes on practice putting green.

Fifth Day.

1. Students practiced putting. Due to inclement weather they were forced to confine their practice to the indoor carpet and the Astro Turf.
2. Assignments to two groups for the study.
3. Stressed importance of full subject participation.
4. Passed out Subject Information Sheet (Appendix B).
5. Students read Subject Information Sheet.
6. Allowed time for questions.
7. Students signed up for test time for next class meeting.

APPENDIX B

SUBJECT INFORMATION SHEET

This study will test your ability to putt a golf ball accurately. The test will be given on two putting surfaces located at Lakeside Golf Course:

1. Artificial surface.
2. Practice green.

The study will take approximately six weeks. One week will be devoted to testing from each of five distances and one week will be used for testing on the practice putting green course. One test will be given during each testing session.

It should take approximately five minutes for each of the sessions. You will be assigned a test time.

Participation in this study should benefit your putting ability. You will be putting on varied surfaces and on various terrains from several distances. The object of the test is to strike the ball into the cup. Points will also be awarded in relation to how close you come to achieving this goal. The closer your ball comes to the hole, the more points you will be awarded.

You are encouraged to practice putting during any time in the course of the testing period. Mental practice, is generally thought to provide some positive influence on motor learning; therefore, it is encouraged during the course of the study.

Upon agreeing to participate as a subject you are accepting the responsibility to be available at your designated test time. Upon your arrival at the golf course report directly to the East Room at Lakeside Golf Course. You will be met by an assistant who will explain the days procedure and provide you with three score sheets.

No one will be allowed in the vicinity of the testing area except the assistants and the subject who is being tested.

PROCEDURES:

Artificial putting surface:

1. Your name will be called by one of the assistants.
2. Advance to the testing station with your putter.
3. Assume your normal stance at the testing position.
4. A ball will be placed on the chalk line for you.
5. Relax.
6. Strike the putt, attempting to putt the ball in or as close as possible to the hole.
7. Wait for that ball to be picked up and scored.
8. Another ball will be placed in position for you to strike.
9. Continue this procedure until you are notified that you have completed twenty trials.
10. Step away from the testing area.
11. Check to see what time your succeeding test will be given.

Practice Putting Green Test:

1. Your name will be called by one of the assistants.
2. Advance to the testing station with your putter.
3. The assistant in charge of this test will direct you to the "tee" for the first hole on the putting course.
4. He will then walk to your target hole and remove the marker indicating which hole is being played.
5. After he has removed the marker you may shoot at the hole, attempting to putt the ball in or as close as possible to the hole.
6. If the ball stops outside the hole, advance to the ball and putt it at the hole, attempting to putt the ball in or as close as possible to the hole.
7. If the ball went in the hole with the first attempt, remove the ball from the hole and advance to the next "tee." Again the assistant will remove the marker from the next hole.
8. Continue attempting to putt the ball in or as close as possible to the hole until the ball is hole.
9. It is important that a diligent attempt is made with each stroke.
10. There are no "gimme's." ALL PUTTS MUST BE HOLED prior to advancing to the next "tee."
11. Continue this procedure until the assistant notifies you that your "round" has been completed.
12. Step away from the testing area.
13. Check to see what time your succeeding test will be given.

APPENDIX C

OUTLINE OF TESTING SCHEDULE FOR SUBGROUP A

TEST	BEGINNERS	INTERMEDIATES
4' Putting Grid Test	February 8, 1971	February 9, 1971
4' Putting Grid Retest	February 10, 1971	February 11, 1971
8' Putting Grid Test	February 15, 1971	February 16, 1971
8' Putting Grid Retest	February 17, 1971	February 18, 1971
12' Putting Grid Test	February 24, 1971	February 25, 1971
12' Putting Grid Retest	March 1, 1971	March 1, 1971
16' Putting Grid Test	March 3, 1971	March 2, 1971
16' Putting Grid Retest	March 4, 1971	March 4, 1971
20' Putting Grid Test	March 8, 1971	March 9, 1971
20' Putting Grid Retest	March 10, 1971	March 11, 1971
Practice Putting Green Test	March 15, 1971	March 16, 1971

APPENDIX D

OUTLINE OF TESTING SCHEDULE FOR SUBGROUP B

TEST	BEGINNERS	INTERMEDIATES
Practice Putting Green Test	February 10, 1971	February 11, 1971
4' Putting Grid Test	February 15, 1971	February 16, 1971
4' Putting Grid Retest	February 17, 1971	February 18, 1971
8' Putting Grid Test	February 24, 1971	February 25, 1971
8' Putting Grid Retest	March 1, 1971	March 1, 1971
12' Putting Grid Test	March 3, 1971	March 2, 1971
12' Putting Grid Retest	March 4, 1971	March 4, 1971
16' Putting Grid Test	March 8, 1971	March 9, 1971
16' Putting Grid Retest	March 10, 1971	March 11, 1971
20' Putting Grid Test	March 15, 1971	March 16, 1971
20' Putting Grid Retest	March 17, 1971	March 18, 1971

APPENDIX E

ASSISTANT REMINDER FORM

This is to remind you that you have signed up to assist in the golf study at Lakeside Golf Course on:

Monday _____

Tuesday _____

Wednesday _____

Thursday _____

Thank you for your assistance in this project.

APPENDIX F

METHOD OF READING RAW SCORES

Explanation of "Raw Scores" Appendix:

The first seven digits which appear in the left hand column are identification numbers.
Example: 1080104

The first three digits (108) are the subjects identification numbers.
Subjects in Group I (Beginners) are numbered 001-005.
Beginners in Subgroup A are numbered 001-028.
Beginners in Subgroup B are numbered 029-055.

Subjects in Group II (Intermediates) are numbered 056-094.
Intermediates in Subgroup A are numbered 056-094.
Intermediates in Subgroup B are numbered 074-094.

The fourth and fifth digit (01) indicate the card number, all of the data listed come from the subject's first card.

The sixth and seventh digits (04) indicate the test number. The tests were numbered:

01	Four Feet Putting Grid Test
02	Four Feet Putting Grid Retest
03	Eight Feet Putting Grid Test
04	Eight Feet Putting Grid Retest
05	Twelve Feet Putting Grid Test
06	Twelve Feet Putting Grid Retest
07	Sixteen Feet Putting Grid Test
08	Sixteen Feet Putting Grid Retest
09	Twenty Feet Putting Grid Test
10	Twenty Feet Putting Grid Retest

Each subject who participated in the study is included according to the numerical order of his subject identification number. All eleven of the test scores are included for each subject.

The eighth and tenth columns, and every alternate column thereafter, may contain either a minus sign, an x, or a space. The plus sign is not included and a number which is not preceded by the minus sign is understood to be a positive number.

The ninth and eleventh column denote the number pair for trial number one's raw score. The trial numbers and the columns which indicate the "raw score number pair" are:

Trial	Columns
1	9 and 11
2	12 and 15
3	17 and 19
4	21 and 23
5	25 and 27
6	29 and 31
7	33 and 35
8	37 and 39
9	41 and 43
10	45 and 47
11	49 and 51
12	53 and 55
13	57 and 59
14	61 and 63
15	65 and 67
16	69 and 71
17	73 and 75
18	77 and 79
19	81 and 83
20	85 and 87

Example: The first line of subject number one's scores appear in Appendix G, page 171 in this form:

0010101-2 6 0 0 3 0 0-1 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 1 3 0 0 0 0 0 0

The 001 indicates that this is subject number one.
The 01 indicates that this is card number one.
The 01 indicates that this is test one or the putting grid test from four feet.
The -2 6 indicates that the number pair for the first trial was -2,6.
The succeeding trials and their raw score pairs were:

Trial	Raw Score
2	0,0
3	3,0
4	0,-1
5	0,0
6	0,0
7	0,0
8	0,0
9	0,0
10	0,0
11	0,0
12	0,0
13	0,0
14	0,0
15	0,0
16	0,0
17	1,3
18	0,0
19	0,0
20	0,0

Subject one's raw score for the first trial on the putting grid test from four feet was -2,6. This score indicated that the trial stopped two units (4 1/4 inches x 2 or 8 1/2 inches) to the left and six units (4 1/4 x 6 or 25 1/2 inches) beyond the hole. To calculated the distance the ball stopped from the hole the Pythagorean Theorem was used ($a^2 + b^2 = c^2$). In this case:

$$a^2 + b^2 = c^2$$

$$a = -2 \text{ units}$$

$$b = 6 \text{ units}$$

$$a^2 = 4 \text{ units}$$

$$b^2 = 36 \text{ units}$$

$$4 \text{ units} + 36 \text{ units} = c^2$$

$$40 \text{ units} = c^2$$

$$40 \text{ units} = c^2$$

$$6.325 \text{ units} = c$$

$$1 \text{ unit} = 4.25 \text{ inches; therefore,}$$

$$c = 6.325 \times 4.25$$

$$c = 26.88 \text{ inches}$$

The total converted score for subject one, test one (putting grid test from four feet) appears in Appendix G, page 173. The total converted score for the first ten trials appears in Appendix H, page 187 and the total converted score for the first fifteen trials appears in Appendix I, page 189.

APPENDIX G

RAW SCORES

I.D.N.

0010101-2 6 0 0 3 0 0-1 0 0 0 0 0 0 0 0 0 0 0 0 C C 0 0 0 0 0 0 0 0 0 0 1 3 0 0 0 0 0 0
0010102 C 5 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 3 0 3 0 0 0-1 0 0 0 0 0 0 0 0 0
00101C3 C C C 0 0 0-2 6-2 5 C C 0 0 0 0 1 5 0 0 0 0 0 0 0 0 3 1 5 0 0 0 0 0 0 0 0 0 0 0
0010104 7 7 C 5 0 0 0 0 0 5 0 C 1 2 0 0 7 7 0 0 7 7 0 0 2 4 0 0 1 1 0 5 0 0 3 5-2 5 0 0
0010105 0 C C C C 0 0 0 0 0 0 1-4-1 4 0 0 0 0-1 4 0 0 0 0 0 0 2 0 0 C 0 0 7 7-1 3 0-1 0 0
0010106 0 0 C 0 7 7 7 7 C-2 0-3 4 3 0 0 0 0 0 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 7 7
0010107 7 7 7 7 1-2-1-5 4 6 0 0 7 7-1-2 7 7-1-2 1-2 1-2 2-5 0 0 0 0 0-1-2 3-2 4 0 0 0 0
00101C8 7 1 C C C 0 0-4 0 0 0 0 1-4 0 0 0 0-1 3 7 7 0 0X0 0-4 2-1 2 0 3 0-1 0 0 0 0 0 0
00101C9 7 7-1-1 0 0 2-4 0 0 2-2 7 7 2 2-2 5 7 7-1-1 7 7 0 0 0 0-4-2 0-6 4 0-2 0 0 0 0 0
0010110 7 7 7 7 1 0 3-3 7 7 1-6 1 3-1-4 0 0 0 0-1-1 0 0 0 0 2-6 0 0 1-4 7 7 2 6 0-4 0 0
00101111 43 4 7 7 5 9 11 8 8 9 7

0020101 0-1 1-1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 0 0 0 0 0 C 2 0 0 0-1 1 0 0 0 0
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0020103 0 0 0 0 7 7 0 0 2 0 0 0 0 0 1 2-2 4 0 0 0 0 0 0 0 0 1 0-2 5 0 0 0 0 1 2 0 0 0 0
00201C4 C C 7 7 C C 7 7 0 0 0 0 0 0 0 0 0-3 0 0 C-1 0 0 0 0 0 0 0-1 6 0 0 1 6 0 0 0 0 1 6
0020105 7 7 0 0 0 0 0 0 0 0 0 0 0 7 7-3 4 0 0 0 C 0 0 1 2 0 0-3 1 0 0 0 0 0 0 7 7 0 0 0 0
0020106 7 7 C 0 7 7 4 1 0 0-1 3-2-2 0-5 0-1 2 6 0 0-1 4 0 0 0 0 0-4 1 1 0 0 0 0 7 7 0 0
00201C7 2 5 0 0 1 4 7 7 2 3 3 3 1 5 7 7 7 7 2 1 0-3 1 3 0 0 1-2 2 4 0 0 1 6 1 5 7 7 7 7
0020108 2 4-1 1-4-1 7 7-1 6 7 7 7 7 7 7 0 0 7 7 0 0 0 0 1 3 0 0 0-1-3 2 7 7 2 2 7 7-5 6
0020109 1 1 7 7 C C 0 0 0 0 0 0 2-4 0 0 0 0 1-5 0 0 2 5 3-4 0-3 0-3 0 0 0 0 0 0 0 0 7 7
0020110 7 7 1 1 7 7-2 C 2 C 0 0 7 7 2 6 0-4 1-6 0 0 2 4 0-2 0 0 0 0 7 7 0 0 0 0 7 7 7 7
0020111 48 6 6 9 11 8 9 11 9 8 11

0040101 0 C C C C 0 0 0 C-2 C 0 0-1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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00401C3 C C C C C-1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 C 0 0 0 0 0 0 0 4 0 0
0040104 C C C C 0 0 C-1 2 C C 0 C 0 0 0 0 0 0 0-1 2 C C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 2
0040105 1 3-2-1-2-2 0-2-1 0-2 2 4 6-2 5-2 6 7 7 C 0 0 0 0 0-2 2-1 3 0 0 7 7-2 2 0 0 7 7
00401O6 C C C C C 0 0 0 0 0-4 5 0 5-2-5 1-1 0 0 0 0-1-1 1 3-1-4 0 0 7 7 0 0-2 2 0 3 7 7
0040107 1 3 0-4-1-6 2 0 1 3-1 0-1-2 0 0 0 C 1-5-1 1 2-5-2 4 3-3 0 0 2 1 0 0 0 0 0 0 2 4
00401C8 C-2 C C 0 C-1-3-1 0 2-2-3 4 2 C 0 0 7 7-1 2-2-6 1 0 2 5 2 2-1 1 0 0 0 0 0 0 1 1
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004011C 6 4 0 0 0 0 0 0 7 7 1-2 0 0 7 7 0-4 7 7 0 0 0 0 0 0 7 7 1 0 1-3 0 C 1 3 1 5-1 4
0040111 42 4 6 8 5 5 7 9 10 7 9

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0060105 7 7 C C 0 C C 0 0 0 0 C-1 3 0 0 0 0 0 0 0 7 7-2 1 7 7 0 0 0-2 0 0 2 0 0-1 7 7 0-2
0060106 1 6 0 0 1 3 1-1 0-5 0 0 0 0 0-2-1 4 0-2 7 7-1-3 2 4-1 4 0 2 1 3 1-4 0-5 0 0 0-2
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00701C4 7 7 C-4 1-1 7 7 1 C C 0 0 C C 0 0 0 0 0 3 1 4 0-1 0 0 0 0 0 2 5 0 5 0 0 1 3 0 0 0 0
0070105 0 0 7 7 2 4 0-6 7 7-2 5 1 4 1 6-2 2 0 0-1 3-3 5 0 0 0 0 0 0 C-1 0 0 0 5 2 0 0 0 0
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0C701C7 3 6 7 7-3 5 7 7 0 C 0 0 3 2 7 7-2-5 7 7 7 7 1 0 7 7 2-3 0-1 0 0 7 7-1-5 7 7 0 0
00701C8 7 7 7 7 2 1 7 7 7 7 2 6 7 7 7 7 7 7 2 5 0-5 7 7 0 0 0 0 2-5-4 4 0-3-2 6-1 0 0 0
0C7C1C9 7 7 7 7 7 7 7 7 1 5 0 C 7 7 1-2 1 0 1 2-2 3 7 7 1-4-2 6 7 7 4 3 0 0 7 7 0 1 7 7
0070110 7 7 7 7 0-6 7 7 1-2 0-3 0-2 1 4 7 7 7 7 7 7 1-3-2 2-1 3 7 7 1-1 0 4 0 0 1 4-1 3
0070111 46 5 5 8 8 11 8 10 9 10 10

APPENDIX G (Continued)

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0080103 7 7-2 0 7 7 0 0 0 0 0 C 0 0-2-2 0 0 7 7 0 0 0 0 0-1 0-3-1-2 0 0 1 5 0 0 1 6 0 0
0080104 0 5 0 0 7 7 0 0 7 7 7 7.4 6 7 7 0 2 0 0 0 0 7 7 0 0 1 0 7 7 1 3 7 7 0 0 0-2 1 2
0080105 C C 0 0-2 1 0-5 0 0 1 4 1 3 1 4 0 0-1-2 1-4 0 0-1 3 1 1 0 0-1-4-2 1-1 4 7 7 0 0
0080106 7 7-3 5 0 0 7 7 0 0-1-1 7 7 7 7 1 3-2 4 1 2 1-1 0 0 7 7-1 0 1 4 2-1 7 7 0-3-1 1
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0C80109 7 7-2 2 3-1 7 7-4 1 0-5 1 3 1-3 0 0-1 6 1-6 0 0 0 0 0 0-1 3 0-5 0 0 7 7 0 6 7 7
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0080111 46  5  6  7  7  8  8  9 13  8  8

0100101 0 0 C 5 0-1 0 C C 0 0 C 0 C 0 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 5 0 0 0 0 1 6 0 2
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0100104 1 6 C 0 0 3 0-4 C C C C 0 C 1 2 2 7 7 C CX0 0 0 0 0 0 0 0 0 0 0 0-4-3 2 0 0 0 0
0100105 0 0 0 0 0 0 0 7 7 0 0 0 0-3 4 7 7 0-5-1-2 0 0 7 7 3 5 0 0-2 5 0 0 0 0 0 0 0 0 0
0100106 7 7 C C C C 0 0 0 0 0 0 0 0 2 0 1 0-5 0 0 0 0 2 4 0 0-1 4 2 2 7 7 0-2 0 0 2 4 1-2
0100107 0 0 0 0 1 2 1 3-1 2 0 0 7 7 7 7-1-5 0 6 0 0 7 7 7 7 7 7 0 0 7 7 7 7 1 4 3 1 0 0
0100108 7 7 C-3 0-3 0 0-3 5-2 0 0 0 7 7-1-1 0 0 2 3 0 0 0 0 1 4 0 C 0 0-1 4 0 0 7 7 0 0
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0110101 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 C C 0 0 0 0 0-2 1 0 0 C 2 0 C 0 C 0 0 0 0
0110102 C C C C 0 0 0 0 0 0 0 0 0 5 0 0 0 1 0 0 0 0-2 1 1 3 0 0 0-1 0 0 0 0 0 0 0 0 0 0
0110103 0 1 0-1 1 3 0 0 0 0 0 0 0 0 0 0 0 1 0 1 C 1 2 0 0 0 0 1-1 1 3 0-5 0 0-1-2X0 0 0 1
0110104 0 0-1 2 0 0 0 2 0 0 0 0 0 0 0 0 0 0-3 0 0 0 0 0 0 0 0 0 0 0 C 0 0 0 0 4 4 7 7 0 0
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0110106 2-1-1 0 0 0 0 0 0 0-2 6 0-3 0 0 2 6 0 0 0 0 7 7-1 4 0 0 7 7 0 0 4 3 0 0 0-2 7 7
0110107 1 0 0 C 1-3 0 0 0-3 0 0 0-2 0 0 0 0 7 7 1 0 1 1 0 0 1 0 1-1-1 C 0 C 7 7 0 0 7 7
0110108 7 7-1-2 0 C 1 2 0 0 2 6-1-3 7 7 0 0 0-1 0 0 0 0 7 7 0 0-2 5 3 2 0 0-1-3 0 0 2-1
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0120108 7 7-2 1 0 0 0 0 1 4 0 0 2 5 0 0 0 3 0 0-2-5 0 0 0 0 0 6 0 0-1 0 0 0 2 2-2 0-2 1
0120109 7 7 C C 2 6-1 1 0 C 7 7 0 3 0 0 0 0 0-3 0-2 1 1 0-3-1 3 0 0 7 7 1 3 0 0 0 0 0 0
0120110 7 7 0 0 0 0 3 5 0-3 7 7 6-4 0 0 0 0 3 C 0 0 1 1 0 0 0-2 3 3 7 7 0-4 7 7-1-4 7 7
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0130105 7 7 C C 0 C 0 C 0 C 1 1 0 C 1 1 0 0 0 0 1 1 0 0 0 0 1 0 2 0 0 0 0 0 0 0 7 7 0 0 0 0
0130106 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0-2 0 0 0 0 0 0 0 0 0 0 7 7 0 0 0 0-2 0-2 0 0 0 0
013C1C7 C C C-6 C 0-1 1 0-6 0-3 2 6 7 7 0 0 0 0 0 0 1 4-1-2 1 3 0 0 0 0 0 0 C 0 0 0 0 5 5
0130108 7 7-2 2 0 C C C 0 C-1 C 0 0 0 0 0 0-1 0 0 0 0 1 2-1 4 0 0 0 0 0 0-2 0 0 0 0 1 2 0 0
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APPENDIX G (Continued)

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0140103 C C C C C 0 0 0-1 0 0 7 7 0 0 0-1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 5 0-1 0-4 1-4 0 0
0140104 0 C C C 0 0 1 4 0 C 0-2 0 0 0 0-1 5 0 C-1-1 0 0 0-2 2 2 0 0 0 0-2 5 0 0 0-3 0 0
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0140106 7 7 C-3 C 0 0-1 0 0-4 5 0 0 0 0 0 0 0 0 1 3 0 0-3 4-1 1 7 7 0 0 0-1 0-4 1 6 0 0
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0140109 1 1 1 1 0-2 2 4 7 7 2 1 7 7-3 2 1 4 1 6-1-2 3 0 7 7 0-2 7 7-1 4 7 7 7 1-4 3-2
0140110-1 5 2-3 0-3 7 7-1 5 0-3 0 0-1 2 0 0 0 C 0 0 7 7 0 0 0 0 C 0 0 0 0 0-5-1 5-3 3
0140111 44  4  6  6  7  8  8  9 11  7  9

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0160106 2 5 1-6 7 7 0 C 0 0 7 7 0 0 7 7 1 6 1 4 7 7-1 1 0 0 1 2 0 0 1 2 0 0 0 0 0 3 0-2
01601C7 7 7 7 7 7 7 0 0 1-2 7 7 3 1 0 0 0-6 0-2 0 0 7 7 6 4 0 2 0 0 1 1 0 0 0 0 7 7 7 7
01601C8 7 7-2-5 0 C 7 7 7 7 1-2 1-2 7 7.7 7-1-2 2 4 2 4 0-2-1 5 0 0-2 6 0 0 2 3 1 0 7 7
0160109 7 7 0-4 7 7 7 7 0 0 7 7 7 7 1-1-1-1 2 0 2 1 3 5 4 2 0-4 0 C 2 1 7 7 0 0 0 0 1 5
0160110 7 7-1 C C C 7 7 0-2 0 0-1 5 7 7 2 5 0 0 C 0 0 0 0 0-3-1-1-2 5 3 2 7 7 7 7 0-1 0-2
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0180108 0 0 2 6 0 3-1 2 1 4-1-1 0 0 0-2 0 0 0 C 0 0 0 0 7 7 0 0 0 0 2 4 2 2 0 0 0 0-2 0
0180109 C C C-4 0 C 1-3 0 0 0 C 0-6 0 0 0-6 0 0 0 0 0 0 0 0 0 0 1 1 7 7 0 0 7 7 7 7 1 3
0180110 3 2 0 0 1-4-1-6 7 7-2 6 0-1-1-5 1 2 0-1 2 2-2 5 0 0 0 0 7 7 3 3 0 0 7 7 0 0 1-2
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0190108 2 4 C C C C C 0 C-3 0 5 C C-1-1 0-1 0-5 0 0-2 0 1 0 0 0 0 0 0 0 2-6 2 3 7 7 0 0
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0200106 7 7-1 2 0 0 0 0 0 0-3 0 0-2 4 0 0 0 0 0 0-1 0 0 0 0 7 7 0 0 0 0 0 0 1 5 0-1 0-2 0-1
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02CC1C8 7 7 C 0 0 0 0 1 4 0 0-1 1 0 0 0 0-2 3 0 0 C C 0 0 0 0 0 0 0 0 C 0 0 0 0 C 0 C 7 7 0 0
0200109 7 7 C-5 0-3 0 0 0-5 0 C 0 0 7 7 7 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 1-2 4 0-1 0 0
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APPENDIX G (Continued)

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0210103 0 0 7 7 0 0 2 3 3 1 0-3 0 0 0 0-6 0 0 0-2 6 0 0 1 2 0-1 0 0 2 2 1 1 0 0 1 5 0 0 0 0
0210104 7 7 0 0 0 0 0 0 0 0 0 0 0 0-2 0 0 4 6 1 2 0 0 0 0 0 0 0 0 0 0 0 7 7 0 0 0 0 0 0 0 0
0210105 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0210106 1-1 0 0 0 0 0 0 0 0 0 0 0 2 5-1 3 0 0 7 7 0 0 0-2-1 0 0 0 7 7 1 4-2 2 3 5 0 0 7 7
0210107 7 7 1 1 0-6 0-3 1 4 0 0 2 1 1 5 0 0 0 0 0 0 0 1 5 0 0 7 7 0 0 7 7 2 5-2 0 0 0 0 0
0210108 7 7 6 1 7 7 7 7 7 0 0 0 2 2 3 4 7 7 7 7 2 6 0 0 1 6 0 4-3 5 0 0-1 5 7 7 0 0 0 0 0
0210109 7 7 0 0-1 0 7 7-1 6-2 1 0 0 7 7 7 7-1 5 1 2-3 5 7 7 0 0 7 7 7 7-1 6 7 7-1 5 7 7
0210110 2 4 1 1 0 6 3 3 7 7 0 0 7 7 4 0-1 6 7 7 2 1 0 0 0 0 0 0 0 2 6 3 4 0 0 7 7 7 7 0 0
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0220103 7 7-1 1 2 5 0-1 0-2 0 0 0 0 0-3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0220104 0 0 0-1 0 0 0 0 0 0 0 0 0 0-6 0 0 0 0 0 0 0 0 0 0 0-1 0 0 2 4 0 0 0 0 0 0 0 0-2-2 1
0220105 0 0 0 0 0-3 0 0 0 0 0 0 0-3 0 0 0 0 0 0 0 0 0 0 0 0 1-5 0-4 0 0 0 0 0 0 0 0 2 3
0220106 7 7 0 0 1-1 0 0 2 0 7 7 0 0 0 6 0 0 0 0 0-1-3 0 0 0 0 0 2 0 0 0 0 1 5 0 0 0 0 0 0
0220107 1 6 0 0 0 0 0-3 7 7 7 7 1 3 0 0 2 4 0 6 0 0 1 0 0 0 1-1-4 1 2 6 0 0 0 0 0 0 0 7 7
0220108 7 7 7 7 0 3 7 7 0 0 3 0 1 5 1 2-1 4 2 4 7 7 0 0 1 0 1-3 0 0 0 0 0 0 0 0-1-1 0-6 0 0
0220109 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0220110 0 0 2-2 0-1 0 0 7 7 0 0 7 7-1 4 1 6 2 1 0 0 1 1 2 2 7 7-1-1 0 0 0-5 2-2 2 5 0-3
0220111 47  7  7  8  6  9 10 10  9  7 11

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0240102 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0240105 0 0 0 0 0-1 4 1 4-1-3 0 0 0 0 0-1 0 2 0 0 0 0 0 0 0 0 1 4 0-1 0 0 0 0 0 0 0 0 0 0 0
0240106 0-2-1-2 0 0 0 4 0 4 0 0 0 0 0 0 0-2 0 0 0 0 0 0 0-1 0 0 0 0 0 0-2 1 0 0-1 0 0 0 0
0240107 0 0 0 0 0 0-1 2 0-3-1-3 0 0 1 6 0-2 0-1 0 0 0 0 0 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0
0240108 0 0 3 1 0 0 7 7 0 0 0 0 0 0 0 7 7 0 4-2 0-3 2 2 6 1 4 0 0 1 6 0 0 0 0 0 0 0 0 0 0 0
0240109 0-3-1 1 7 7 0 0-1-5 0 0 1-1 0 0 0 0 0 0 2-3 0 0 0 0 2 2-1-1 0-2-1 5 1 3-1 3 2-3
0240110 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 4 0-6 0 0 2 1 7 7 0-2 0 0 0-3 1 0 0 0 0 0 0 0 0 0
0240111 41  6  6  6  7  7  8  8  9  7  9

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0250108 7 7-2 5 0 0 7 7 0 0 0 0 0 0 7 7-3 6 0 0-1 5 7 7 0 0 0 0 0 0 3-5-2 4-2 1 7 7 0 0
0250109 0 0-1-3 2-2-4 1 0 0 0 0 2 3 0 0 1 5 0 0 1 0 0 0 0 0-2 6 1 6 7 7-1 4 0 0 7 7 7 7
0250110 0-2 7 7 0 0-2 1 7 7-2 3-1 0 7 7 7 7 0 2 7 7-1 2 0 0 0 0 0 0-6 0 0-1-2 0 0 0 0 0 0
0250111 53  6  5  8 11 11 12 11 10  8 11

0260101 0 0 0 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 4 0 0 1 5 1 1 1 3 0 0 0 0 0 0 0 0 1 2
0260102 0 0 0 0 0 0 1 2 1 2 1 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0-1 1 0 1 1 0 0 1 3 0 0
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0260104-1 6-3 2 0 0 0 0 0 0 0 0-2 0 0-2 2-1 0 0-2-1 2-1 3 0 0 0 0 0 0 0 1 0 0 0-2 4 0 3 0 0
0260105 7 7 7 7 0 0 0 0 0 0 0 0 6 0 0 7 7 0 0 0 0 7 7 0 0 0-1 7 7 0-4 0-5 7 7 0 0 4 3 0 0
0260106 0 0 0 0 0 0 6 0-1 2-2 0 5 0-1 2 6-2-3 0 0 3 1 4 1 0 0 0 2 7 7 0-2 2 4 0 0 7 7 0 0
0260107 1 5 0-1 0-2 0 0 1-5 2 5 3 0-1 4 0-2 0 0-3 0 0 0 2 5 7 7 2 2 0 0-3 5-1 5 0 0 2-6
0260108 7 7 1 3 0-6 0-3 1 5 0-6 7 7-2 0 0 0 0 0 1 6-1-2 0-6 7 7 0 0 7 7 2 2 0-3-4 2 0 0
0260109 7 7 0-3 0-5 0 0-1-2 7 7 5-2 1 2 7 7 0 0 1 1 0-4 2 2-3-2 0 0 0-5 7 7 0 0 0 0 7 7
0260110 7 7 1 2-1 1 3-4 7 7 7 7 7 7-2 3 7 7-1 2 7 7 7 7 1 4 7 7 0-6 7 7 7 7 2 5 7 7 7 7
0260111 56  6 10 10  9  7 13 11 15  8  7
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APPENDIX G (Continued)

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0270103-2 3 0 0 0 0X0 0 0-1 1 1 0 0 1 1 0 0 0-5 0-1 0 0 0 0 0 0 1-1 2 1 0 0 0 0 0-1 0 0
0270104 0-1-2 5 0-1 0-1-1 2 C-2 0 3 0-2 0 0 0 0 0 0 1 1 0 0-2 5 0 0 0 0 0 0 0 0 1-2-2 4
0270105 0 0 7 7-1-4 0 0 0 0 0 0 0 0 0 1 6 0-2 C 0 0 0 0 0 0-1 0 0 0 0 0 5 4 C 0 0 0 7 7
02701C6 7 7 7 7 7 7 7 7 C 0 0-1 0 0-1 1-3 3 0 0 7 7 0 6 0 0 7 7-1 4 7 7 0 4 0 0 0 0 0 0
0270107 0 C C C 7 7 0 C 2 0 2 3 1 4 0 0-2 5 7 7 2 4 0 0 7 7 0 0 0 0 0 0 7 7 0 0 0 0 7 7
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0270109 3 3 7 7 7 7 0 0 0-2 3 5 0 0 0 0 0 0 0-2-1 0 0 7 7-1-2 7 7 7 7 7 7 0-1 7 7 0-4 0-4
027011C 7 7 7 7-2-2 0 0 0 0 0-4 7 7 0 0 0-3 2 1 7 7 1 4-1 0 7 7-5 4 0-1 1 0 7 7-1-1 0 0
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0280101 C 0 C1 0 1 3 1 0 0 1 0 3 4 C-3C 0 0 0 0 0    -1 1 0 0 1 3                1 4 0 0 0 0
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0280109 0 0 7 7-2-1-3 1 1 6 7 7 7 7 2 5 1 3 1-5 0 C 7 7-2 4 7 7 0-5 7 7 7 7 7 0 0 7 7 7 7
0280110 0 0 2 3 1 0-3 3 7 7 0 0-1 2-4 2 7 7 7 7 0 0 0 0 7 7-5 2 7 7 4 2 7 7 7 7 7 7 2-2
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C290104 7 7 7 7 0 0 1-4 2 0 0 0-1 3 0 0 0 0 0-1 2 0 0 0 0 0 0 0 0 0 0 0 0 3-1 5-1 4 0-1 0-1
02901C5-2 2 3 3-1 6 0 C-2 5 1 1 C 2 0-3-2-5XO 0-1-1 0 0 0 0X0 0 0 0 1 3 0-3X0 0 0 0 0 0
0290106-1-4 1 5 0 0 0 0 0 0 7 7 0 0 0 0 0 0 0 C 0 0 1 1 0-1 0 0 1 6 0 0 1 1 0 0 0-1 1 5
C29C1C7-1 4 2-6 1 4 7 7 7 7 2-3 0-2 1 4 0 0-1 0 2-3-1-4 3 2 2-4 0 0 2 2-1 6 1-1 0-1 7 7
0290108 7 7 7 7 0 0 1 1 1 0 2-2-2-6 0-5 2 0 0 5 2-3 1 1 0 0 7 7-1-2-4 1 2 1-2 1 0-6 0 0
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029011C C C C-3 C-4 0-1 C 0 7 7 C 0 1-5-2 5 2 1 0-5-1 1 7 7-1 4 1 1-4-1 7 7 2 1 0 0 0 0
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0300105-1 2 7 7 0 0 0 0 0 0 0 0 0 1-4 0 0 0 0 0-2 0 0 0 0 0 7 7 0 0 0 0 C 7 7 7 7-1-3 1 5-1 6
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03C01C8 0-5 1 3 7 7 1-1-1 1 1 5 0-5-2 1 7 7 1 5 1-3 7 7-4 3 7 7-2 C 7 7 2 2 2 3 0 0 7 7
0300109 7 7 7 7 7 7 7 7 C 3 1 C 7 7 7 7-2 2 0 0 0 0-3-1 7 7-2 0 0 3 0 0-3 2-2-3 7 7 7 7
030011C 0 0 7 7 7 7 7 7 2 1-2 0 4-2-2 0 0 0 1 4 0 0 2 5 2 1-1 4 0-4 0-5 1-3 0 1 7 7 7 7
03C0111 43  6  7  7  6  8 11  7  8  8  9

0310101 0-1 0 0 0 0 0 0 7 7 0-1 0 0 0 0 0 0 0 2 0 0 0 0 0 0-3 5 C-2 0-1 0 C 0 0 0 0 0 0
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0310103 4 1-3 4 0 0 0 0 0 0 0 0 2 0 0-3 C 0 0-1 7 7 0 C 0 0 7 7 1-4 0 0 0 0 7 7 2 4 0 0
0310104 7 7 7 7 7 7 7 0-3 0 0 0-1 0 0 0 0 0 0 0X0 0 0 0 0 0 0 0 0 0 0 0 0-5 0 C 0 0-2 6 0 0
0310105 1-1 C 0 1 5 1-5 2 1 0 C 0 C-1 0 7 7 2 4 7 7 0 0 7 7 0 0 1 4 1-1 1 1-1-1 2 4 0 4
0310106 0-3 0 0 7 7 0 0 0-4 7 7 1 5-1 5 7 7 2 2 0-1 0 0 0-1 1 4 1 5 7 7 0-2 0-1 0-1 2 5
031C1C7 7 7-1-5 7 7 2 5 2 2 7 7 0 0 0 0 7 7 0 0 7 7 0 3 0-4 7 7 7 7 7 7 7 7-1 3 7 7 0 0
0310108 7 7 7 7 1 1-1 5-1 0 1 6 7 7 0-1 0-2 7 7 2-5 0 0 0-3 0-6-1 2 0 0 7 7 0 0 4 3 7 7
0310109 0 0 0 0 7 7 1-6 0 0 7 7 0 0-3-5 0 0 0 0 7 7 7 7 7 7-3 2 7 1 1 5 7 7 0 0 0 0 0 0
031011C 7 7-2 5 7 7 3-4 0 0 0 0 2 0 7 7 0-4 0 1 7 7 7 7 0 0 7 7-3 3 7 7-1-1 2 2 0 6 3 5
C31C111 56  6  7 11  9  9 10 13 13 10 10
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APPENDIX G (Continued)

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03201C3XC C C C C C 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 3 0 0 0 0 0 0 0 0 0 0 0 0-2 1 0 0 0-1
03201C4 C 0 0 0 0 0 0 2 0-2 0-1 0 C 0 0 0 C C C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0320106 7 7 C 0 0-1-1 3 0 0-2-1 0-2 0 0 0-2-1 3 0 0-1 4 0 0 0-2 0 0 0 0 0 0 0 0 0 0-2 6
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0320111 4C  5  5  6  7  7  9  7  9  8  7

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0330103 0-2 0-5 0 0 0 0 0 0 0 C 0 0 0 0-2 2 7 7 C C 0 0 7 7-1 1 0 C 0 0 0-2 0 0 7 7 0 0
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0330106 7 7-1 1 7 7 0 0 0 0 0 0 0 0 1 5 3 4 0-3 1 2 0 0 7 7 0 0 2 6 7 7 0 0 1 5 1 5 0 0
033C107 7 7 2 6 1 5 C C 0-2 0-1 7 7 1 1 0-3 0 0 0 0 7 7 7 7-1 2 7 7 2 4 7 7 7 7 2-2 2 4
0330108 7 7 7 7 1 3 7 7 0 C 0-3 0-1 0-3 7 7 1 1-1 2 2 4 7 7 2-2 7 7 1 6 0 2 0 0 0-3 0-1
033C1C9 7 7 2-3 7 7 C 0 0-2 7 7 0 0 0 0 7 7 0 0 0-1 7 7 1 1 0 0 0 0 1 4 7 7 7 7 0 0 0 0
033011C 7 7 C C C C C C C C 0 C-2-2 C-2 0 0 0-5 7 7 0 C 0 0 0 0 0 0 7 7 0 0 0 0 0 0 0 0
0330111 47  5  8  6  7  8 10  9 10  8 10

0340101 0 C-2 0 C C 0 0 1 3 0 C 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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03501C5 7 7-1 6 7 7 7 7 C C 7 7 7 7 0 0 7 7 7 7 7 7 0 3 7 7 0 6 0 0 0 0 0 0 0 0-2 5 7 7
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03501C7 7 7 2-3-6 4 7 7 7 7 7 7 7 7 7 7 6 5 0 0 1-1 2 3 7 7 0 1 7 7 2-3 3 0 7 7 0-4 0 C
0350108 7 7 7 7 7 7 2-6-3-2 1-2 1 4 7 7 7 7 0 0-2-2 2-6 7 7 2 3 0 0-1 6 0-6-1-3 2-4 0-6
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03601C6 C-3 C C C C 0 0 0 0 2 5 2 C 0 0 0 0 0-3-1 2-2 1 0 0 0 0 2 2-1-1 1 1-1 2 0 0 0 0
0360107 1-1 0-4-1 1 7 7-1-1 1 C 0-1 1-6 0-1-1 5 1-2 0 0 1 5 0-4 0-2-1-2 0 C 0 0 2-5 1 4
0360108 7 7 C 0 0-2 0 0 1-2 0 0 1-6 0-3 0 3 0 1-2 5 1-2 0 0-2-2 0-3-1-2 7 7 2-5 0 6 0-3
03601C9 7 7 7 7 7 7 C C C C 1 4-1 2 0 0 0 0 2 3 1-4 0 0 7 7 0-5 0 0 2 2 7 7 0 0 1 1 7 7
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APPENDIX G (Continued)

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03701106 4 6 0 0-1 4 1 3-1 4 3 4 1-2 0 0 0 0-2 6 C 0 0 0 2 1 0 0 0 C 0 0 7 7 0 0 0 0 0 0
03701107 7 7-1 6 7 7 1 0 0-1 2 5 1-1 0 0 1-1 0 6 0 0-1 5 0 0-1 1 1 6-2 5 1 3 0 0 2 0-1 6
03701108-3 3-2 4-2 3 0 0-3 4-1 2-1 6 0 0-2 3 0 0 7 7 1 4 2 1-2-1-1 2 0 0 2-4-3 6-1 3 0 0
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03701IC-2 5 C 0 0-3 2 2-2 5 C C 3-3 0-1 1-3 0 0 0 C-2-6-1 1 1-5-2 6 0 0 0-3 3 4-3 6 2 5
C37C111 36  3  6  5  6  6  8  7  9  6  6

03801101 0 C C C C 0 0 2 2 C 0 C C 0 C C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
03801102 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
C3801C3 C C C C C C C 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
03801C4 C 0 0 0 0 0 0 0 0 0 C-1 0 0 0 0 0 C 0 0 0 0 0 C C 0 0 0 0 0 0 0 0 0 0 0 0 0-3 3 0 0 0 2 0 0
03801105-4 3 1-1 0-4 0 0 0 0 0 0 0 0 1 2 0-1 1 4 0 0 1 1 1 1 1 1XO C 0 0 1 5 0 3 0-2 1 5
038C106 C C C C 0 C 0 0 C C C C 0 0 0 0 0 0 0 0 0-1 5 0 0 0 0 0 0 0 0 0 0 0 1 4-1 2 2 0 0 0 0-1 4
03801107 7 7 0 0-2-2 0-5-1-3-1-1 0 0 0 0-1-3-1 2 0 C-1 5 2 3 0 0-1 C 0 0 0 0 0 0 0-1 2 2 6
03801108 7 7 2 0 7 7 0 C-1-5 0 C-1-1 1-2-1-4 2 5-1 2-1 3-1 3 1 3-1-1-1 6 1-1 0 C 0 0 0-1
03801109 1 3 1-1 7 7 C C C C 0 C 7 7 0-1 0 0 1-1 0-6 0 0 0 0 0-1 1 5-1-1 0 0 0 0 0 0 0 0-4
03801110 6 4-4 2 0-3 0-1 0-5 0-1-1-4 0 0 0 0 0 C C 0 0-2 0 3 0 0 2 C 1 0 0 0 0 0 0 1 3 2 0
038C111 43  6  6  7  7  8  9  9  9  7  9

03901101 0 0 0 0 0 0 1 1 0 2 0 0 0 0 0 0 0 0 1 4 0 0X0 0 1 2 C C 0 C 0 0 0 0 1-1 0 0 0 5
03901C2-1 5 C C C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 2
03901103 1-4 0 0 0-5-1 3 0 0 0-2 1-5 0 C 7 7 1-1 0 0 0 C 0 0 0 0 0 0 0 0-1 2 0-1 0 4 0-3
03901104-1 6 0-2 0-2-1 3 0-1-3 0 0 0 0 0 0 0 2 2 0-1 7 7 0 0 0 0 0 0-1 1 0 C C 0 7 7 0 0
C39C1C5 C-6 7 7 7 7 1-2 1-3 1-2 0 0 0-3 2 6-1 2 0 0 0 0 0 0 2 2 0 0 0-2 0 0-2 3 7 7 0 0
03901106 0-6 7 7 7 7 1-2 1-3 1-2 0 0 0-3 2 6-1 2 C C 0 0 0 0 2 2 0 C 0-2 0 0-2 3 0 0 0 0
C3901C7 7 7 7 7 0 0 7 7-4 3 1 6 0-2 0 2 7 7 3 4-2 5-2 4-1 0-1-4 0-5 0 0 0 0 1 5 0 C-5 4
03901C8-2 3-2 5 0 2 1 3 1 2 C C 0 C 0 0 0-4-1 1-5 5 0 0 2 4-4 2 6 6 2 4 0-5 7 7 0 2-3 6
03901109 0 0 2 6 2-1 0 0 0-6 0 0 1-4 0 0 7 7 2 2 0 0-2 3 1-5-2 3 3 0 0 0 7 7 0-2 7 7 0 0
C39C11C C C 7 7 2-3 7 7-1-2 3 1 0 0 2-3-2 1 0 1 7 7 1 3 4 1 0 0-4 2 0 0-1-2 0 0 1 2 0 0
03901111 41  4  6  5  7  9  8  9  8  7  9

04001C1 7 7 C C C 0 0 0 0 0 0 0 0 1-2 0-1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 C 0 C 0 C 0 0 0 0 0 0
04001102 7 7 C 3 0 0 0 0 C C C 1 1 0 0 0 0 0 0 C C C C C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
04C0103-2 5 0 0 0-1 2 2 0 0 0 C 0 0 0-1 0 0 7 7 C-1 0 0 0 0 0 0 C C 0 0-5 4 0 0 0 0 0 0
04C01C4 7 7 C C C C C 0 C C-2 0 0 0 C 7 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
C400105 1 3 0 0 0-1 0 0 0 0 2 1 2 1 0 0 1 1 1 2 0 C-1 6 0 0 1 5 0 C 0 0 0 0 0 3 3 1 0 0
C40C1C6 C C C-5 C C 0 0 1 1 7 7 0 0 0 0 0 0-2 0 0 0 2 5 0 0 0 0 7 7-1 2 0 0 0 5 0 2 7 7
04001107 7 7 0-6 0-2 2 3 7 7 0 0 3 2 7 7-2 1 1-2 C 0 0-2 1-3 7 7 0-5 1-2 0 0 1-4 7 7-2 4
04CC1C8 7 7 0 0 0 0 0 1 1 0-1 0 0 0 0 0-4 0 0 7 7 0 0 0 2 0 0 0 0-3 0 0 0 2 1 2 5 0 0-1 5
04CC109 0-3 7 7 7 7 2 5 7 7 0-1 1 5 0 0 1-6 0-2-1 3 2 1-2-3 0 0 0 0 4 1 0 0 0 0 0 0 0 0 0
04001IC-1 0 0 0-2-2 2-3 0 0 C-5 0 0-1 4 7 7 1-5 7 7 7 7-3 2 0 0 1 6 0-1 1 2 7 7 2 6 0 0
04001111 42  5  6  5  8  8 10  7  8  8  9

04501101-3 0 1 5 1 4 1 1 0 0 1 2 0 0 0 0-2 2 0 0 C C 0 0 0 0 0 0 0 0 C 0 0 0 0 0 0 0 0 0 0
045C102 0 0 0 0 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 2 0 0 0 C 0 0 0 0 0 0 0
04501103 0 0 C 5 0 C 0 C C C C C 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0-2 0 0 0 0 0-2 4 0 0 0 0 0 0
04501104 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
04501C5 7 7 C C 0 0 7 7-1 5 0 0 4 2 0 0 7 7 0 0 0 0 0 0 2 5 0 0 0 0 2 1 0 0 1-1 0 0 0 0
04501106 7 7 C-1-2 2 0 C 0 0 0 6 0-2 0 0 0 C 0 0 2 1 0-4 0 0 0 0 0 0 0 0-2 0 0 0 0 0 0 0 0
C45C1C7 C 0 0 0 4 3-1 1-1 0 3 1 0 0 2 0 1 1 0 C 0 0 1 2 0 0 1-1-1 4 0 0 7 7 0 0 0 0 1 4
04501C8 7 7 7 7 0 C 0 0 0-3 1 2 0 C 0 C 0 0 0 C 0 C 2 0 0-1 2 0 4 0 0 0-2 1 4 0 0 0 0 0 0
04501109 0 0 7 7 2-3 7 7 0 0 0 0 2 5 4 3 2 1 0 0-5 4 0 0 0 0 0-1 0 C 0 0 7 7 0 0 7 7-5 6
045C11C 7 7-2 2 0 0-1 4 2 6 7 7 0 0 7 7-2 2 2 6 0 2 1 1 3-4 0-3 7 7-1-2-1-1 0 0 0 4 0 6
04501111 49  6  7  7  8  9 10  8 10 10 11
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APPENDIX G (Continued)

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I.D.N.
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0470103 0 0 7 7 4 1 0 0 0 0 7 7 0 0-4 2-3 2-4 2 0 0 2 1 7 7 7 7 7 7 0 0 0 0 7 7 7 7 7 7
0470104 0 0 0 0 1 3 0-2 1 5 0 0 1 5 0 0 1 5 1-3 7 7 1 5 0 0 0 0 1 6 0 0 0 0 0 0 0 0 0 6
0470105 7 7 0 0 0-2 7 7 0 0 1 2 0 0 0 0 2-5 7 7 1 2 0-3 0 0 3 3 0 0 0 0 0 3 0 0 0 0 0 2 4
0470106 7 7 0 0 7 7 0-1-1-1 1 4-1 6 1 1 0 0 0 0 0 0-1 6-2 2 7 7 0-2 0 0 0 0 0 0 7 7-1 4
0470107 7 7 7 7 7 7 0 0 0 0 0 0 0 0 0 0 1 2 7 7-2-3 0-1 7 7 1 2 7 7 1 3 7 7 0 0-1 5 0 0
0470108-2 0 7 7 0 0-3 5 7 7 2 4 0 0 7 7 2 6 7 7 0 0 0 0 0 6 0-2 0 0 1 1 7 7 0 0 1-4 0 0
0470109 7 7 7 7 7 7 7 7 7 7 0-5-1 0 1 0 0-2 7 7-1-5-3 3 0-3 7 7 0 0 7 7 1-3 0 0 0 0 0 0
0470110 7 7 0 0 7 7 0-5 0 0 1 0 0 0 0 0 0 0 0-2 1-2 0-2-1 1-2 1 0-3 7 7 7 7-3 3-3-2 0-6
0470111 46  5  6  6  8  9 12  7 11  8  8

0500101 1 5 1 2 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0500102 0 0 0 0 0-1-2 1 0 0 0-1 0 0 1 1 0-1 0-1 0 2 1-2 0 0 0 0 0-1 0 0 0-1 0 0 0 0 0 0
0500103 0-1-1-3 0 0-1-1 0 2 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 3 0 0 0 0-1 0 0 2 2 1 0 0
0500104-1-1 0 0 1 1-1 1 2 0-4 0-1 0 0 1 3-1 2 0 0 0 0 0 0-1 1 0 3X0 0 2 0 0-1 0 0 2 3
0500105 0 0 0-5 0-2 0 0 0 0 0 0 0 1 0 5 0-2 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 2 6-1-4 0 0
0500106 0-4 0 0 0 0-1-2 0-2 0 0 0 0 1 5 7 7 1-3 0-1-1-4 7 7-1 3-1 1 0 0 0 0 0 0-2 3 7 7
0500107-1 1 0 0 0-4-2-2-1-1 0 0 0 0 7 7 0 0 0 0-1 0 0 0 0 0 0 0 0 0 0 0-5 6 7 7 0 0-3 3
0500108-3 5-1 1 7 7 1 3 7 7 0 0 2-6 0 0 2-2 7 7 0-4 0 0 0-3 3 1 1-1 1 2 2 0-1 5 0 1-1 2
0500109 1 6 3 1-1 3 0-2 2 0 0 0 0 0 1-4-2-4 7 7 0 0 0 0 7 7-4 1 0 0 0 0 1 2 0 0 0 0-3 1
0500110-1-3 0 0 0-1-3 5 1-5 0-5 0 0-1-2 0 2 0 0 7 7 1 4 0-3 0 0 0-4 7 7 3 4 0 0-1 0 0 0
0500111 45  5  7  8  7  8 10 11  9  7  8

0510101 7 7 0 0 0 0 0 0-2 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 6 0 0 0 0 0 0 0 0 0 0 0 0 0
0510102 0 0 0 0 0 0-1 0 0 0 0 0 0 0 0 0-1 5 0 1 0 0-1 5 0 0 0 0 0 0 0 0 0 1 2 0 0 0 0
0510103 0 0 0 0 0 1 2 0 0 7 7 0 0 1 0-1 2 2 6 0-3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0510104 0 0 0 0 1 5 1 2 0 0 1 6 0-1 0-4 0 0-1 4 0 0 0 0 0 0 0 0 0 0 7 7 2 0 0 0 0 0 0 4
0510105 1-4 0 0 7 7 0-2 7 7 0 0 0 0 0 0 7 7 0 0 7 7-2-2 0-1 0 0 0 0 7 7-2 2 0 0-2-1 0 0
0510106 7 7 0 3 0 0 1 2 0-1 0 0 0 0 0 0 7 7-2 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 3
0510107 1 6 3 4 1 0 0 0 0-5 0-5 0 0 0 7 7 2 2X0 0 7 7 0 0 1 3-1 4 7 7-1-5 1 0 0 0 1 5 3 3
0510108 2 4 2-5 0 0 1-6-1-5 0-1 2-6 0 0 0 0 0 0 0 7 7 7 7 0 0 3 1 0 0 2 6 1-5 0 0-2-2 0-1
0510109 0-2 0-4 7 7-6 6-1 0 7 7 7 7 0-1 0 0 2-2 0 0 0-6 0 0 0 2 0 0-2 4 1-2 1-4 7 7 3 0
0510110 0 0 0 0 0 0 0 0 0 0 0 0-2 7 7 5 4 0-3 7 7-2-2 7 7 7 7 7 7 7 7 1-1-5 5 0-4 7 7 0-4
0510111 48  7  7  6  7 10 13  8  8  8 11

0520101 0 0 1 1 0 0 0 0 0 1-2 0 0 0 0 0 0 0 0 0-1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0520102 0 0 0 0 1 2 0-1 0 0 0 0 0 0 0-1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0
0520103-1-3 0 0-1 2 0 0 0 0 0 0 1 2 0 0 0 0-1 2 0 0 0 0 0 0 0 0 0 0 0-5 0 0 0 0 7 7-1 4-1 6
0520104-1 4-1 1 1 1 0 0 0 0 0-1 4-1 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 0
0520105 1 5 0 0 0-2 0 0 0 0-1 1 1 6 0-1 0 0 2 6 0 5 1 4 1 0 0 0 0 0 0 0 0 0 0 1 2 0 0 0 0
0520106 7 7 0-5 0-3-1 2 0 3-1 2 0 3 1-1-1-5-2 5 0 0 1 4 7 7 0 0 0 0-1 2 0 0 0-4 0 0-2 0
0520107 7 7 0 0 0 6 7 7-1-2 1-6 7 7 2 0-1 0-1 3 0 0 0-5-1 2 0 0 0 0 0 0 0 0 0 0-6 0 0
0520108-3 5 7 7 0 0 0 0 0 0 0 0-4 1 1 0 0 1 6-1-3 1 4 0 0 0 0 4 5 0 4 0 0 7 7 7 7 0 0 7 7
0520109 7 7 0 0 7 7 0 0-1 4 7 7 7 7 7 7-2 5 0 4-5 4 0-5 0 0 0 0 7 7 1 4 1 6 7 7 0 0 0-1
0520110 7 7 2 5 0 0 0 0-1 4-3 4 1-1-2 0 0-3 0 0 7 7 7 7 7 7 7 7-1 4 0 0 0 5 0 0 7 7 0 0
0520111 38  5  6  6  5  7  9  7  8  7  7

0530101-1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0530103 7 7 0 0 7 7 7 0 0 0 0 0 0 1 6 0 0 7 7 0 0 3 1 0 0 7 7 0 0 0 0 0 0 0 0 0-2 0 0 0 2 6
0530104 2 5-2 5 0 0 0 0 0 0 0 0 0 0 1 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 4 0 0
0530105 0 0-3 5 0 0 1 5 7 7 0 0 0 0 0 0 0 0-1 0 0 0 0 0 0 0 0 0-3 0 0 0 0 0 0 0 0 0 0 0 0
0530106 7 7-2 5 1-2 7 7 2 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 7 7 0 0 0 0 0-1 7 7 7 7 7 7-1 3
0530107 0 0 0 0 7 7 7 7 7 7 0-1 7 7 7 7 0 0 0 7 7 0 0 7 7 7 7-1 4 7 7 7 7 1-2-2 1 0 0-1-1
0530108 7 7 7 7 0 4 7 7 0 0 7 7 7 7 0 0 0 0 0 7 7 0 0 7 7 1 4 7 7 4 3 3 6 0 0 0 4 1 0 1-1
0530109 7 7 0-5 0 0 7 7 2 1 7 7 1 2-4 5 2 2 7 7 0 0 0 0 0 0 7 7 7 7 1-3 3 5 0 0 0 0 2 5
0530110-2 2 0-5 2 0 0 0 1 4 7 7 0-4 0-5 0 0 7 7 3-3 1-2 0-2-1 0-3 6 1-3 6 5 3 6 7 7 0 0
0530111 48  6  7  9  7  6 10  9 12  9  8
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APPENDIX G (Continued)

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05401C2 1 3 1 C 0 0 0 0 C C C 0 C 0 C 0 0X0 0 0 0 0 0 0 0 0 0 0 0 0 1-1 0 0 0 0 0 0 0 0
0540103 0 0-2 4 0 0 0 0 0 0 0 0 0 0 0 0 7 7 0-2 C 0 0 0 0 0 0 C 0 C 0 6 1 2 0 0 0 0-2 1
05401C4 C C C C 0 0 0 0 0 1 3 0 0 0 0 0 0 0 0 0 0 0-1 4 0 0 0 0 1 5 1 4 0-1 0 0 0 0 0 0 0 0
C5401C5 7 7 C C 0-3 7 7 7 7 0 C 0 0 0 0 0 1-3-1 1 0 C 2-1 0-4 2 2X0 0 3-2-1-1 1-2-1 2 0 0
C540106 C 0 0-1 0 0 0 0 0 0 0 7 7 0-1-1 2 1 1 0 C-1-6 1 6 1 6-1-1 0 C 0 0 1-1-1 0 7 7 1 4
C54C1C7 C C C C C-1 0-1 1 1 0-3 3 4 3-2 0-4 1-1 0-4 1 4 1 6 0 0 0 1 0-3 1 4-1 2 1 6 0 0
0540108 0 0 7 7 7 7-1-5 0 0 1 1 1 1 0 0 0 0 0-3 0-3 7 7 0 0 7 7 0 0 0 5 7 7-2 4-1 5 7 7
C540109 0-2 0 0-1 5 0 0 0 0 2 1 1-3 2 4 0 0 0 0 2 6 0 0 1 1 0 0-1-2 1 5 1 4 0 C 0 0 0-1
054011C C-2 7 7-1-1 0.0 2 2 0-2 1-4 7 7 0-2 7 7 7 7 0 0 0-5 4-6 3 0-1 3 3 5-1-5 0-1 0 0
0540111 41  6  4  8  5  9  8  8  9  7 10
```

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C55C1C1 C C 1 5 C C 0 0 1 5 1 5 0 C 0 0 7 7 0 0 2 5 2 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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05501C3 7 7 0 0 7 7 2 4 0 0 0 0 0 0 2 3 0 0 0 0 0 0 2 4 0 0 2 5 0 C 0 0 0 C C 0 0 C 0 0
05501C4 7 7 C C 0 0 1 3-1 3 0 5 2 C 0 0 0 0 7 7 0 0 7 7 0 2 7 7 1 4 0 0 0 0 0 0 0 5 0 0
05501C5 7 7 0 0 0 0 0 0 7 7 2 2 0 0 1 6 2 3 2 4 0 0 1 6 7 7-1 5 1 3 2 1 7 7 1 4-2 0 7 7
05501C6 7 7-1 5-1-4-1-2 0 0 1 5-2 1 2-6 0 0 0-4X0 0 0 0 2 1 2 2 2-1 3 2 0 0 0 0 2 6 0 0
0550107 6 5 7 7 7 7 7 7 7 7 3 5 7 7 1-5 7 7 1 5 7 7 1 4-3 6 2 6 7 7 0 0 3 4 7 7 0 0 7 7
C55C1C8 C C 7 7 1 2 2 5 C 0 7 7-1 0 1 1 0 0 2 2 0 0-1 0 2-1 0-3 1-3 0 0 0 0 7 7 0 0 7 7
05501C9 7 7 C C C-6 C C C C C 0 0 0 0 0 7 7 C C 0 C 7 7 0 0 1-2-3-1 3 3-1 5 0-6 2-1 2 1
055C11C 7 7 7 7 0-3 7 7 7 7 7 7 2 4-2-3 7 7 1 5 C C 0 0 0-6-2-3 0-3 7 7-2 4 7 7 C 0 0-1
0550111 41  5  6  6  7  8 10  7 10  7  7
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0560103 1 5 2 1 0 0 0 0 0 1 0 C 0 0 0 0 0 0 0 0 0 0 C-1 C 0 C 0 0 0 0 0 0 0 0 0-1 0 1 2X0 0 0 0
C5601C4 0 0 0 0 4 3 0 0 0 0 0 0 0 6 0 0 0 0-3 4 C 0 0 0-3 4 0 0 0 C 0 0 0 5 0 C 0 0 0 0
C56C1C5 0 C 0 0-1 4-1 6 7 7 0 5 7 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 5
0560106 0 0 0 0-1 6 0 0 0 C 0 C 0 0 0 5 0 C 0 C 0 0-1 6 1 4 0 0 0 C 0 5 0 0-1 5 3 0 1 4
05601C7 C C 7 7 C C 0 0 0 0 0 0 3 7 7 7 7 7 7-1 5 0 0 0 0-1 2-1 5 1 4 0 0 0 C C C 0 7 7 7 7
0560108-1 0 7 7 0 0 0 0 7 7 7 7 0 C-1 5 1 6 0 C C C 0 C 0 0-6 4 7 7 7 7 0 0-1 6-3 1 0 0
05601C9-1 0 1 2 2 5-1-1 2-4 0 0 0 0-1 6 0 0 0 0 0 0 0 0 0 0 0 0-1 0 2 4 0 0 0-2-1 3 0 0
056011C 2 5-1 3 1 1 0 C C C 0 0-1-4 0 0 0 0 0 0 0 0 0 0 1 3 2-5-1-1 0 0 0 0 3 3 0-4 0 0
0560111 34  3  4  5  6  6  6  8  8  6  6
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C570103 C C C C C C 0 0 C 3 0 0 0 0 0 0 5 0 0 0 0 0 0 0 0 0 0 1 4 0 C 0 C 0 C C 0 0 0 0 1 6
05701C4-1-1-1 2 0 C 1-3 C 0 0 C 0 C 0 C 0 0 C 0 0 0 0 0 0 0 0 0 0 0 2 1 2 3 1 2-1 4 0 0
0570105 7 7-2-6-1 5 0 0-2 3 7 7 0 0 0-2 1 4 0 C C 0 0 0-2 2 0 0 C C 0 0-2 5 0 0 0 0 1 6
C5701C6 7 7 7 7 C C 0 0 1 4 0 0 7 7 7 7 0 0 7 7 0 0 0 0 0 0 0 0 1 6 1 6 0 0 0 0 0 0 0 0
057C1C7 7 7 C C 0 0 0 6 5 1 6 7 7 2 4 1 3 1 4 7 7 C C 7 7 1 2-1 3-4 2 2 2-3 5 1 4 2 2 2 4
05701C8 0 0-2-2 1 2-1 5 0 0 0 0 0 0 0 0 1 1 0 0 0-2 1 2 0 0 0 0 7 7 1 1 0 0 7 7 1-1 7 7
057C1C9 7 7 C C 7 7 C C C 3 0 C-3 0 1 1 0 0 7 7 0 0 0 0-1 0 7 7 0 0 7 7 7 7 1 5 2 3 0 0
057011C 0 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 5 7 7 0 C 7 7 0 C 0 0 0 0 7 7 0 0 0 0 0 6 0 0 7 7
0570111 39  5  5  5  7  8  9  6  9  7  8
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0590103 0-2 0-2 0 0 0-3 0 0 0 1 3 0 0 0 0 0 C C C C 0 0 2 0 0 0 0 0 0 0 0 0-1 3 0 0 0 0 0 0
C5901C4 0 0 0 0 0 0 0-2 4 3 5-2 1-1 2 0 0 0 0 0 0 0 0 0 0 0 4 0 0 7 7 0 0 0 0 0 0 0 0 0 0
C59C1C5 C C 1 4-2-2 0 C C C C 0 0 0 0 0-3-2 1-1 2 C 0 0 0 0 0 0-1 6-1-1-1 4 0 0 0 0 0 0 0 0
0590106 0 0 0 0 0 0-1 0-5-1 1 0 0 0 0 0 0 0 0 0 0 0 1 1 1 0 0 1 7 7 0-2 0 0 7 7 0 0 0 0 0 0
C59C1C7 0 C 7 7 0 0 1 0 1 4-1-5 0 0 1 2 0 0 1 0 0 0 7 7 0 0 0 0 0 2 3 0 0 1 6 2 2 3 2-1 5
05901C8 1-3 7 7-1 C 7 7 2 5 0 C-2 1 0 0 0 0 1 0-2 3 0 0 Q 0 1-1-1 4-2 3 0 5 1 2 0 0 0 0
0590109 0 0 0 0 0-5 1 4 0 0 0 0 0 1 3 0 0 0 0 0-2 1 5 0-1 0-1 7 7-1 2-1-1 0 0 0-1 0 0-1-1
C59C11C 2 2 1 2 0 C 0 C 7 7 0 0 0-4-1-4-4 4 0 0-2 0 0 0 3 1 0 0 0 0 1-3 0 5 1 6 0 0 0 0
0590111 38  6  7  5  6  6  8  8  8  6  8
```

APPENDIX G (Continued)

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C6C0103 C-3 C C-1 4 0 0 0 0 1 4 0 0 0 0 0 0 1 4 0 0 0 0 0 0 0 0 0 0 C 0 C 0 C 0 0 0 0 0 0
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06CC1C5 C C 7 7 0 C 0 0-1 5 7 7 0 0 0 0-2 1 0 0-1 5 0 0 0 0 1 3 0 C 0 C 2 C 0 0 2 2 7 7
0600106-1 6-1 1 0 0 0 0 C C C C C 0 0 0-4 0 0 2 2 0 C 0 0 1 1 0 0 0 0-1 6 0 0 0 0 0 0 1 5
0600107 7 7 0-1 0 0 7 7 0 C 1 0 0 0 1 2 0 0 2 1 0 0-2 3 1-3 6 5 7 7 0 0 7 7 1 2 0 0 0 0
C6CC1C6-1 6 1 2 C C 0 0 C 5 3 0 0 0 0 0 0 0 0 0 0 7 7 0 0 7 7 7 7 0 0 0 0 2 3 2 0-1 5 0 3
0600C1C9 7 7 2 4 0-2 0-4-2-1 0 C 0 0 2 3-3 6 0-6 C 0 0 0-1 3 0-5 0-6 0 0 0 0-1 4 7 7 0 0
06C011C 7 7 C 0 0 0 0 0 0 0-2 0 0 0 0 0 2-5 7 7 0 C 1 1-2 6 0 0 7 7-1 6 0 0 0 0 7 7 C 0 0 0
C6CC111 36  5  5  7  5  6  7  7  8  6  8

0620101 0 C 7 7 0 0 0 0 7 7 0 0 0 0 0 0 0 0 4 1 0 C 0 0-5 2 C 0 C C-3 5-4 4 0 0 0 0 0 0
06201C2 C C C C C 0 0 0 0 C 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0620103 2 4-2 0 0 6-1 0 0 C 0 C 0 0 4 3 0 C 7 7 C C 0 0 0 0 1 3 0 C 0 0 7 7 0 0 0 0 7 7
0620104-2 1 7 7 0-3 1 1 1 1 1 2 1 4 0 0 1-3 0 0 1 3 0-2 0 0 0 0 1 5 0 0 0-2 0 C 0 0 0 0
0620105 7 7 7 7 7 7 C C C C 0 C 7 7 7 7 0 C 0 0 7 7 7 7 0 0-3 0 0 0 7 7 7 7 0 0 0 0 0 0
0620106 0 0 7 7 0 0 0 0 0 0 0-2-1 6 0 C 0 0 4 3 0 0 0 C 0 0 0 0 2 3 0 C 0 0 7 7 0 0 7 7
0620107 2 4 7 7 C C 0-5 7 7 0 0 0 0 2 4 1 5 0 0 0 0-3 0 2 2 0 0 0 0 0 0 0 7 7 7 7 1 4 7 7
0620108 7 7 C 0-1 2 0 0 0 0 2 2 7 7 C C 0 0 3 4 7 7 7 7 0 0 0 0-5 6 7 7 7 7 7 7 7 0 0
0620109 7 7 7 7-1 5-1-3 0 0 0 6-5 4 0 0 0 0-2 0 7 7 7 7-1 6 7 7 2 0 7 7 C 0 0 0 1 4-2 6
062011C 7 7 7 7-3-1-1-1 2-5 7 7 7 7 0-1 7 7 3 6 0 0 2 4 5 4 7 7 1 5 0 0-1 6 7 7-2-5 7 7
0620111 46  5  6 10  7  6  7 12 10 10  7

0630101 C C C 4 0 C C C C C 0 C 0 0 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0630102 0 0 0 0 0 0 0 0 0 0 0 0 0 0 7 7 0 0 0 C C 0 0 0 0 0 0 0 0 C 0 0 0 0 0 0 0 0 0 0
C63C1C3 C-3 C C C 4 0 0 2 1 0 0 0 0 1 1-2 0 0 0 C 0 0 2-1 2 0 0 0 1 0 0 0 0 0 0 0 0 0 0
06301C4 C C C C C C C C C C 0 C 0 0 0 0 0 C C C C C 0 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0630105 0 0 1 3 0 0 0 0-1 1 7 7 0 0 0 0 0 0 0 6-1 3 7 7 1 5 0 0 7 7 0 0-1 4 0 0 2 6 7 7
063C1C6 7 7-2 1 0 C C C 7 7 0 0 2 3 7 7 2 1 0 C 0 0 1 3 0 0 2 1 7 7 7 7 0 0 0 0-6 6-1 5
0630107 0 0 7 7 7 7-6 6 7 7 7 7-5 5 7 7 0 0 2 1 7 7 2 5 7 7 0 0-3 5 0 0 7 7-1 3 7 7 1 4
063C1C8 0 C 4 1 0 0-2 4 7 7 2 6 0 0 2 4 7 7 2 4 0 0 1 1 0 2 0 0-1 4 0 0 0 0 2 5 0 0 0 0
0630109 0 C C C 0 C-2-2 0 C 0 C 3 3-1 3 2 5 0 0 0 0 0-1-1 2 7 7 0 0 1 2 0 0 7 7-1 3 0 0
0630110 1 6 0 0 0 0 1 0 1 2 1 0 0 5 0-3 0 0 2 3 1-4-2 5 C 0 0 0 0-5 0 C 1 5 1 2 2 0 0-1
063C111 37  5  5  7  6  6  9  7  8  6  8

0640101 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 3 0 0 C C 0 0 0 0 0 0 0 C 0 0 0 0 0 0 0 0 0 0
064C1C2 C C C C C C C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0640103 0 0 0 0 1 1 0 0 0-1 0 C 0 0 0 C 0 C C C C C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0
064C104XC C 0 0 0-1 0-1 0-2 0 0 0 0 0 0 1 1 0 0 0 0 0 0 1 2 0-1 0 0 1 2 0 C 0 0 0-1 0-3
064C1C5 7 7-1 4 3-1 7 7 C C 1 3 0 0 2 C 0 4 0 0 0 0 0 0 2 3 0 0 0 4 1 2-1 5-1 4 0 0 2 1
0640106 1 3-1-1 0 0 0 0 1 5 7 7 2 4 0 0 C 0 0 C 0 2 0 0 0 0 C C 0 C 0 0 0 0-1 4 0 0 0 0
0640107 2 5 C C C C 2-2 7 7 0 0 0 0 7 7 2 0 0 0 1 1 0 0 0 0 2 4 0 C 1-1 3 C 0 0 2-2 0 0
064C108 2 3 C 6 2 2 C C 1 C 0 C 0 C 3 3 0 0 0 0 3 2 2 5 0 0 0 0 0 0 0 0 0 0 0 0 7 7 2 3
0640109 7 7 1-4 0 0 7 7 1-5 2 3 7 7 1-3 2 0 7 7 2-1 1 2 0 0-1 1-1-3 1-5 0 0 2 2 1-1 7 7
064C11C 7 7 1 2 2 4 2 1 C 0 0 0 3 1 0-1 0 0 7 7 3 2 1 2 0 0 3 0 1-1 0 0 0-2-1 2 7 7 1 1
0640111 43  7  5  6  7  5  8 10  9  9  7

C66C1C1 C C C C C C 0 0 0 0 0-1-0 0 0 0 0 0 0 0 1 3 0 3 0-1 0 0 0 C 0 0 0 0 0 0 0 0 0 0
0660102 C C C C 0 C 0 C C-1 0 C 0 0 0 0 0 0 0 0 C C 0 0 0 1-3 0 0 0 0 0 0 0 0 0 0 0 0 0
0660103-2 1 C 0 0 0 0 0 0 0-3 1 0 0 0-1 3 0-1 0 C-1 2-1 2 0 0 0 C C C 0 0 0 C 0 0 0 C 0 C
C66C1C4-2 1 C C 0 0 0 0 C 1 0-1 4-1-2 0 2 0 0 1 1 1 4 0 0 0 0 0 0 2 1 0 0 0 0 1 6 0 0 0 0
066C1C5 7 7-1 6 0 0 0-1 0 0 0 0 0 0 0 0 0 0 5 0 C 3 5 0 C-1 1 0 C 0 C 0 C 0 0 C 0 0 0-1 4
C66C1C6-1-2 C C-3 4-1 2 0-3-1-1 0 0 0 0 0-1 0 0 7 7 1 0 0 1-2 1 0-5 0 0 0-2 0 5 0 0 0 0
0660107 0 0 0 2 0 0 0 0 C 0 C 0 0-1 5-1 3 0 C 0 C 7 7-1 6 0 0 0 0 7 7 7 7 0 0 0 0 0 0 0 0
C660108 7 7-1 6 3 4 7 7 2-2 0 0-2-3-3 2 0 0-2 4 1 5-1-1-2 5 7 7-2-1 2 2-2 5-1 6-1-2-2 4
066C1C9-1-2-2-1 7 7 C 0 C-2-1-2-4-1-1 4-1-6-1 6 7 7 7 7 1 4 0 0 0 0 0 0 7 7 7 7 0 0 0-1
0660110 0-4 0 0 1 0 1 5 0 C 0 0 7 7 0 0 0 0-2 5 C 5 0-2 0 0 2 0 1 4 7 7 1 6 0-2 1 6 0-2
C66C111 45  6  7  6  6  7 10  9  9  9  8
```

APPENDIX G (Continued)

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0680102 0 0 0 0 0 0 0 0 0 4-2 2 0 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0680103 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 2 0 0 0 0
0680104 0-2 0 0 0 0 0 0 0 0 0 0-3 3 0 0 0 0X0 0 0 0 0 0 0 0 0 0 0-1 0 0 0 0 0 0 0 0 0-2
0680105 5 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 5 3 5 0 0 0 0 1 1
0680106 0 0 0 0 0 0 0 0 0 0 0 0 2-2 0 0 0 0 0 0 0 7 7-1 6-1 4 0 0 0 0 0 0 0 0 0 0 0 0 0
0680107 0 0-4 3 1 0 0 0 7 7 0 0 2 2 7 7-1 4 0 0 0 0 2 0 0 0 2 2 0 0 0 0 0 0 1 3 0 0 0-1
0680108-2 6 2 4 2 3 0 0 0 0 2 5-1 2 0-1 0 0 0 0 0 3-2 2 0 0 0-1-1-2 3 3-1 3 2 4 0 0-2 5
0680109-2 0 2 4 0 0-1 0 0 0 1 1 0-2 7 7 0 4 0 0 0 0 0 2 1 0 0 2 3 1 3 0 0 0 0-1 5 3 0 0 0
0680110-2 6 4 1-1 5 1 6-2 0 0 0 0 0 0 0 0 6-1 3 0 0 2 2 0-1 0 0 0 0 0 0 0 0 0 0 0-1 2-2 3
0680111 39  3  8  7  6  6 10  8  8  7  6
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0690102 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 2 0 0 0 0 0 0-1 1 0 0
0690103 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0690104 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0690105 1 4-1 1 0 0 0 0 0 0 7 7 0 0 0 0 0-1-1 3 0 0 0 0 2 0 0 0 1-4 0 0 0 0 0 0 0 1 0 0-3
0690106 7 7 0 0 7 7-2 5 0 0 2 3 0 0 0 0 1 1-1 3-1-1 0 0 0 0-1 2-1 5 4 3-1-1 1 5 1 3 7 7
0690107 0-1 1-3 0 0 0-2 0 0 0 0 0 2 1 2 5 0 0-1 5 1 1 0 0 2 1 0 0 7 7 2 2 0 0 0 0 0 1 2 0 0
0690108 3 1-1 4 1 4 0 0 0 0 0 1 2 1-1-2 4 0 0-1 5 0-1 0 0-1 3 7 7 0 0 2 6 0 0-1-1 0 0 0 0
0690109 7 7 0 0 7 7-2-1-1-5-3 4 7 7-1 2 0-2 0 0 0 0-3 4 7 7 7 7-2-3 1 4-2 1 0-5 7 7-2-5
0690110 0-5-1 3 2-4-2 1 0-2-1 1 1 4 7 7 0 0 0-6 0 0 0 0 0 0 3 2 0 0 0 0 1 0 0 0-6-1 2 0 0
0690111 38  5  4  7  6  6  7  7  9  8  7
```

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0700103-4 5 0 0 0 5 0 0 0 0 1 2 0 0 0 0 0 0 0 0 0 0 0-1 0 0 0 0 0 0 0 0 0 1 6 7 7 0-1 0 0
0700104 0-3 0 0 0 5 0 0 0 0 0 0 0 0 0 0 0 0-2 0 0 0 0 0 0 1 3 0 0 0 0 0-1 0 0 0 0 0 0 0 0
0700105 0 0 0 0 0 0 0-1 0 0 0 0 0 0 0 0 0 0 0 0 0 1-1-3 2 0 0 0 0 0 0 0 0 0 0 0-1 0-1 3 0 0 1 3
0700106 7 7 0 0 0 0 0 0 0 1 2 0 0 1 3 0 0-3 3 1-1 0 0 0 7 7 1-3-2 3 7 7 0 4-1 4 0 0-1 5
0700107 0 0 0 0 0-1 2-2 0 0 0 0-1 1-1 2 0 0 0 0 0 0 0 0 0 0 0 0 0-5 5 2 6-3 0 7 7 0 0 0 0
0700108 0 0 0 0 1 1 3 5 7 7 0 0 2 6 3 3 0 5 0 0 0 0-2 6 0-1 0 0 0 0 2-2 0 0 1 4 0 0 0 0
0700109 7 7 1-1-2-6 1 2 0-4X0 0 0-2-2-5 1 4 0 0-2 5 7 7 0 0 0-3 0 0 0 0 0 0 0-2 0 0 0 0
0700110 1 5 0-2 0 0-1 0-1 1 0 0-1-1 0 0 1 2-1 3 0 0 2-2 7 7 3 0 1 5 0 0 0 0 0 0 0 0 0 3 4
0700111 39  6  5  6  7  6  8  7  9  8  7
```

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0710103 0 0 0 0-2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 1-1-1 0 0 0 0 0 6 0-1
0710104 1 4 1 2 0 0 0-1 0-1 0 0 0 2 0 3-1 0 0 0 0-1 1 2 0 0 0 0 0 3 0-1 0-2-1 4 0 0 0 0
0710105 0 0 0 0 0 0 0 4-1 5-1 6 0 0 0 0 0 0 0 0 0 0 1 4 0 0 0 0 0 0 0 0 0 1 4 0 0 0 0
0710106 7 7-2 5-1 4 0-2 0 0 0 0 2 1 0 0 0 4-1 1 0 0 0 3 1 3 0 0 7 7 0 0 1 2 0 0 1 3 1 2
0710107 0 0-1 2 0 0 0-1 0-1 0 0 0 0 0-3 1 0 0 6 0 0 7 7 0 0 0 0 0 0 0 0-2-1 4 0 0 0 0 0 0
0710108 0 0 0 0 0 0 0 0 0-2 2 0 2 3 0 0 0 0-2 0-2 2-4 1 0-2 1 0 2 0-2 2 2 3 7 7 1-4 5 2
0710109 0 0 0-2 0 0 0 0 1 2 0-3 3 2-1-1 2 3 0-2 2 6 7 7 2-1-2-1 2 6-1-2 2 1 1 1 1 1 0 0
0710110 2 4 0 0 0 1 0 0 0 0 0 0 0-2-1-3 0 0 0 2 0 0 0-2 0 0 0-6 0 0 0 0 0 0 0 0 0 4 0 0
0710111 36  3  5  6  7  6  9  7  8  7  5
```

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0720101 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0720102 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0720103 0 0 0 0 0 0 0 0 0 0 0 0 7 7 0 0 0 0 1 2 0 0 0 0 0 0 0 0 1 5 1 4 0 4 0 2 1 2 0 2
0720104 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 0 0
0720105 0 0 0 0 0 0-1 1-2 6 1-5 1-5 2 2 7 7 1 3-1 2 0 0 0 0 0 0 1 3 0 0 0 0 0 3 1 4 0 0
0720106 1 2 1 2 0 0 1 3 0 0 0 0-2 1 1 2 0 0 0 0 0 5 0 0 0 0 0 0 0 0-1 5 0 0 7 7 0-1 0-2
0720107-2 0 7 7 0 0 1 6 0 0-1 5 0 0 0 0 0 7 7 0 0 0 0 7 7 7 7 2 2 2 3 1 2 2 4 0 0 0 0 7 7
0720108 2 0 7 7 7 7 0 0-1 5 2 1-1 5-1 6 1 1 0 0 7 7 0   3 6   0                   7 7 0 0
0720109 7 7 7 7 3 3 0 0-1 4 0 0-3 3 0 0 3 5-1 0 1 2 1 5 0 0 0 0 2 3 1 1-2 3 1 5 7 7 1 6
0720110 0 0 1-3 0 0 0 0 0 0 0 0 0 0 0-2 0 0 0 0 1 3 0 0 1 0 0 0 0 0 0 0 0 2 1 1 2 0 0 0 3
0720111 38  6  6  5  5  6  8  8  7  7  8
```

APPENDIX G (Continued)

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0740102 0 0 0 0 0 0 0-1 0-1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0740103 C 4 C C 1 1 0-2 0 0 0 C 0 0 0 0 0 0 0 0 0 6 0 0 0 0 0 0 0 0 0 0 C 0 0 0 0 0 0 0 0
0740104 0 C 2 5 0 C 0 0 0 C 0 C-1 4-1 1 1 2 0 0 C C 0 0 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0740105 1 5 0 0 0 0 0 0 0-2 0 0 0 0 0 1 3 0 0 0 C-5 5-4 2 0 0 0 0-1-1 1 5 0 0 0 0 2 3 7 7
0740106 1 4 2-3 C C 0 0 1-6 1 0 0 0 2-1-1 4 2 2-2 6-2 2 1 0 2-5 0 0 0 0-2 5 1 0 0-1 0 0
0740107 2 0-1 6 7 7 1 5 0 0 1-5 0-6 7 7 7 7 7 7 C 0 0 0-2-1 0-2 0 0 0 0-3 0 1 0 0 0 2 3
0740108 2 5 0 0 0 0 1 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 1 4 0 0 0-4 0 0 1 1 2 2 0 0 1 4
0740109 1-3 C-6 0 1 1 0 C-2 0 0 0-5 1-2-4 1 2 3 0 0 0-2 1 5 0 0-2 5 2 4 0 1 3 5-1-2 0-4
0740110 0-3 1 3 0 0 0-2 4 2 2 5 0 0 7 7 2 1 7 7 1 4 0 0 0 0-1-3 2 1 3 6 2 6 7 7 0 0 0 0
0740111 39  5  6  7  6  6  8  8  8  7  8

0750101 0-1 0 0 0 1 1 2 0 0 0 C 0 0 0 0 1 2 0 0 C C 0 0 0 0 0 0 C 0 C 0 0 0 0 0 0 0 0 0 0
0750102 C 0 C C 0 0 0 0 0 0 0-1 0 0 0 0 0 0 0 0 0-1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0750103 0 4 0 5 0 0 0 0 0 0 C-1 0 0 0 0 3-1 0 0 C 1 2-1 4 0 0 0 0 0 0 0 0 1-1 0 0 0 3 0 0
0750104 2 2 0 0 0 0-1 6 0 0 0 0-1 4 1 2 1 4 0 0 0 0 0 0-1 4 0 C 0 C 0 0 0 0 0 0 1 5 0 0
0750105-1 5-2 0 1 3 1 3 C C 0 C 1 1 0 0 0 0 1 3-1-2-2-1 1 3-1-1 0 0 0 0 1-1 0 0-1 1 0 0
0750106 0 0 1-1 0 0 0 0 0 0 0 0 0-2 0 0 0 0 0 1 3 0 0-1 5 1-1 0 0 0 C 0 0 1 1 2 3 0 0 1 1
0750107 0 2 0-3 C-3 0 0 0 0 0-2 0 0 0-1 0 0 0 0 0 0 4 1-2 0 0 2 4 0-1 3 2 2 2 0 C 0 C 3 0
0750108 0 C 2-5-2 4 0-1 2 3 0 C-2 5 1 2 0 0 1 1 1 3 2 4 2 1 2 3-1 2 0 0 0 0 0 0 0 0 0 2
0750109-1-4 0-1 2 3-1 0-1 5-1-1-1-5-2 5 7 7 2 C 0 0 7 7 0-6 2-1-1 C-1 6 7 7-1-1 0 0 7 7
0750110-4 4-3-6 2 4 0 0-1-5-1 5 0 0 0-1 2 2 0-1 5 1 0-1 0 0 1-1-2 3-2 3 7 7-1 2 1 1 0 0
0750111 42  6  5  7  8  6  8 10  9  7  8

0780101 7 7 1-2 1 1 1 0 0 2-1 3 0 0 1 3 0 3 0 0 0 1 0 0 0 0-2 2 0 C 0 0 0 0 0 0 0 0 0-1
0780102 C C-2 1 0 0 1 2 1 3 1 2 0 0 0 0 0 0 0 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0780103 2 1-1-3 1 1 0 0 0-1 0 0 0 0 2 2 0 0 C C C 0 0 0 0-3 1 1 C C 1 0 1 2 0-1 0 0 0 0
0780104 1 3-1 2 C-2 0-1 C C C C 0 0 0 0 1-1 0 0 0 0 0 0 0 0 0 0 0 0 1 4 2 2 0 0 0 0 0 0
0780105 7 7 2 4-1-1 2 3 0-2 0 0 0 0 0 0-1 1 5 0 0 0 0 7 7 0 0 0-2 0 0 2 6 0 0 0 0 2 5-1-1
0780106 7 7-1 2 C-1 0 C-1 2 1-3 0 0 0 0 7 7 0 0-1 3 0 0-1 1 0 0 2 1 0 0 7 7 0 0 0 0 0 2 3
0780107 0 0 0 0 7 7 0 C 0 0 1 4 2 3 2 4-5 5 2 4 7 7 0 0-1 0 0 0 7 7 0 0 0 0-2-2 0 0 0 0
0780108 0 3 0 0 0 0 0 0 0 0 0 0 0 0-1 0 0 1-1 0 C C C 2 0 1 4 0 0-1 4 0 0 0 CX0 0 0 0 0 5
0780109 7 7-1 2 0 C 0 C-1 3 7 7 7 7 7 7 7 7 0-6 0 0 0 0 0 0 0-1 5-2 6 7 7 0 0 7 7-2-2 7 7
0780110 7 7 0 0 1 2 1-1-1 5 0-4 7 7 0 0-3 2 0 C 7 7 1 3 2 4 7 7 2-2 0-3 2 4-2 4 1 1 0 0
0780111 36  3  6  7  6  6  8  8  7  7  6

0790101 0-2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 C C C 0 0-1 0 0X0 0 0 0 0 0 0 0 0 0 0 0 0 0
0790102 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 C 0 0 0 2 0 0 0 0 1 1
0790103 4 4 C C 1 5 C 3 0 C 7 7 C C 0 0 0 0 0 0 0 0 0 0 0 0 0 1 5 0-1 0 0 0 0 0 0 0 0 0 0
0790104 0 0 0 0 7 7 0 0 0 0-1 2 0 0 0 4 0 0 0 0 1-2 0 0 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0790106 7 7-5 5-1-1-1-4 0 0-1 1-2 2 0 0 0 0-2 1 C-1 0-1 0 0 0-2 0 0 0 0-1 2 0 0-1 5 0 0
C790107 0 0 0 0 0 0-1 5 0 0 1-1 0 0 0 0 7 7 C C 0 0 2 2 0 0 0 C 0 C 0 0 0 0 1 2 0-1 0 0
0790108 0 C 2 4 2 6 7 7 C-3 0 0 0-3 0 0 7 7 0-4 0 0-6 6 2 0 1 5 7 7 2 0 7 7-1-2 0 0-4 3
0790109 7 7 7 7 1-2-3-5 0 0 0-2 1-4-1 1 0 0 0 C C 0 0 0 0-3 0-2 0 C 1 6 0 0-2 1 3-2-3 2
C79C11C 7 7 C C C-2 0 0 7 7 0 C 0 0 7 7 0 0 0 0 0 0 0 0-2-3 7 7 7 7-2 6-1-2 1-2 7 7 3 6
0790111 41  6  6  6  6  7  9  9  8  7  8

C81C1C1 C C C 0-1 1 0 0 0 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 C C 0 0 0 0 0 0 0 0 0 0
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0810103 0 0 0 0 7 7 0 0 0 0 0 0 2 5 0 0 0-2 0 C 0 0 1 3 0 0 C-1 0 C 0 0 0 C 0 0 0 0 0 0 0
C81C1C4 C C C C C C 0 0 0 0 0 0-1 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 3 0 0 0 0
0810105 7 7-1 1 0 0 0 0 0 0 0 0 0 0 0 0 C 0 0 0 0 0 0 6 2 2 0-1 0-5 0 0 0 0 1 1 0 0 0 0 0-6
C810106 2 6 0 0 0-1 0 0 0 0 2 3 0 0 0 0 0 0 0 1-2 0 0 0 0 0 0 0 0 0 2 3 0 0 1-2 0 C 0 C 2 4
0810107 2 2 C 2 C-2 0-1 1 1 1 0 2 2 0-4 0 0 0-3 0 0 1 0 1 3 0 0 2 5-2-6 0-4 0-4 1 1 1 0
0810108 0 0 0 4-1 3 0-3 0 0 0-2 2-1-1 0 0 0 0 0 0 C 6 0-1 0 0 2-4 0-4 2 5 0 0 0-5-2 0 0 0
C81C1C9 C C C C 7 7 C 5 7 7 0 0 0 0 0 0 0 0 0-4 0 0 4 3 0 0 2 3 0 0 0 0 0 0 1 4 2 3 7 7
0810110 C 0 1-2-2-6-1-2 1 C 7 7-1-2 0-2 0 0 3 5 0 0 0-5-1 2 2 3 0 0 0-4 0 0 0 0 3-4 0 0
C810111 38  4  6  6  7  6  8  8  9  6  7
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APPENDIX G (Continued)

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0820103 7 7-2 5 0 0-2 5 C 0 0 0-2 1 1-2 0 0 0 C 0 C 0 0 0 0 1 2 7 7 1 0 1 2 0 0 0 0 1 3
0820104 0 0 7 7 0-1-2 1 1 5-2 5 7 7-3 2 7 7 C C 0 0 0 3 0 0 0 0 0 C 0 0 0 0 0-3 4 0 0 0 0
08201C5-1 4 2 4-1 C-3 5 2 5-1 6 0-1 7 7-1 0 0 0-3 4 0-3 7 7-1 2 0-3 0 0 0 0 0 2 1-1 3 7 7
0820106 0 0 0-3 2-3 2 3 0 0 0 0 1 4 0-1 2 5 0 0-1 6 3 5 0 0 0 0 1 5 4 4 0-1 4 5 0 0 2 0
0820107 7 7 0 0 0-6-1 3 1 0-1-4 2-1 1 2-2-2 7 7-2 2-1 1 1-5 1-1 1-6 0 0-1-1 0 0 1 2 7 7
0820108 7 7 7 7-1 4 0-6 1 2 0 0 3 5-3-4 0 0 2 2-3 4 2 3-1 3 0 0-3 4 0 0 0 0 3 5 0-2 7 7
0820109 7 7-2-1 0 0 0 0 0 0 0 0 7 7 0 0-2-3 7 7 2-1 2 4 0 0 7 7 3 2-2 5 7 7 0 0 7 7 7 7
082C11C 7 7 C-1-2 0 0 0 0 0 0 0 0 0-1-1-1 5 7 7 0 0-3 6 0 0 0-2 7 7 7 7 0 C 0-3 1 6 1 0
0820111 44  6  7  7  7  8 11  8 10  7  8

C840101 1 4 C C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1-1 0 0 0 1 0 0 0 0 0 0 0 0 C 0 C 0 C 0 0
0840102 0 0 C C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 2 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0
0840103 0 0-1 3 0 0 0 0 0 2 6 0 0 0 0 0 0 0 1 6 0 0 0-2 0 0 0 2 1 0 0 C 0 C 0 C 0 0-3 3 0 0
08401C4-1-2 C C C C 0 0 0 2 0 2 1 1 0 0 0 2 3 0 0 0 0-1-1 0-1 0 0X0 0 0 0-2 2 0 0 0 4 0 0
0840105 0 0 0 0 0 7 7 0 0 0 0 0 0 0 7 7 0 5 1 5 0 0 0 0 C-1 4 2 2 0 0 7 7 1 1 0 0 0 0 0 0 0 0
08401C6 7 7-1-3 0 0 0 0 0 0 0-1-1 0 0 0 0 2 5-3 3 0 0 0 0 0 0 0 1 3-1 3-1 1-1 1-2 0 0 4 0 0
C840107 7 7 0 3 1-5 1 4 7 7 2 C 0 0 3 5 7 7 C C 7 7 7 7 7 2-6 0-3 7 7 0 0 0 0 1 3 0 0-1 5
0840108 7 7 2 2 0 0 0 0 0 0 0 1 6 0 0-1 3 3 2 7 7 0 C 0 0 0 0 0 7 7 2 4 0 0 0 0 7 7 0 0 2 4
084C1C5 7 7 1 3 0-6 0 0 7 7 7 7-1 2 5 3-1 2 0-2 0 0 3 6-4 6 2 0 1 5 0 0 7 7 7 7 7 2 6 2 5
0840110 0-2 7 7 1 0 0 0 7 7-1 5-2 6 7 7-1 4 7 7 1 7 7 7 0 0 7 7 0-3-1 4 7 7 2 3 7 7 7 7
0840111 32  4  4  5  6  6  7  6  7  5  7

0860101 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 C 0 0 C C 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
C860102 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 C 0 0 0 C 0 0 0 0 0 0
08601C3 0 C C C C 0 0 C C C C 0 C 0 0 0 0 1 3 0-2 0 0 2 2 0 0 0 0 0 0 0 0 1 2 0 0 0 0 0 0
0860104 0 0 0-2-1 1 0 0 0 0 0 0 0-1 1 1 0 0 C 0 C 0 0 2 0 0-1 2 0-1-1 1 0 0 0 0 0 0 0 0
0860105-4 C 2 5-1 3 0 0 0 0 1 1 2 4 0 0 0-2-1 1 0 0 0 0 0-5-1 0 0 4 0 C 0 C 0 0 0 0-2-1
08601C6 0 0 7 7 0 0 2 1-1 2 1-5-1 2 1-1 0-2-1 3 0 0 0 0 1 1 0 0 0 0 7 7-1 0 0 0 0 0 0 0 0
086C107 7 7 0 0 7 7 0 0 0 0 0-2 0 0-3 1-2 3 2 0 1 5-1-4 0 0 0 C 0 0 4 0 0-1 4 2 2 0 0-1 2
08601C8 7 7 C C C 0 0 0 0 0-1 3 1 3 0 0 0 0 0 0 0 0 0 0 0-1 6 4 4 0 0 1-1 0 0-1 5 2 2 0 0
0860109 2 2-2 4-2 3 0 0 2 5 0 0 1 1 0 0 3 5-1 4 0 0-3 2 0 5 7 7 1 1-1-6 0 0 3-3 0 0 0 0
086C11C-1 2 C C-2 C 1-5 0 0 7 7 0 0 7 7 7 7 7 7 1 1 0-4 1-1 1 0 0 0 0 4-2 2-2-2 0 0 1-3
0860111 35  3  5  7  6  6  7  7  9  6  6

08801C1 7 7-2 3 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-2 0 3 0 2 0 0 C-1 0-2 0-1 C C 0 C 0 0
0880102 0 0 1 4 0 C 0 0 0 0 0-1 5 0 C 0 0 0 0 0 0 0 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0880103 7 7 0 0 0 0 0 3 0 0 7 7 0 0 2 3 0 0 0 C-1 0-2 4 0 0 2 1 0-5 3 4 2 3 0 0 1 1 2 2
C88C1C4 1 5 7 7 C-2 C C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 5 0 0 0 0 1 6 3 4 0 0 0 0
0880105 7 7 7 7 0-1 1-5 7 7 7 7-1-2 0 0 2 4 0 0 7 7 0-1 7 7 0-3 2 6 1 2 0 0 7 7 0 0-1 5
08801C6 0 0 0 0 0 0 0 2 2 0-1 0-4 0 0 2 0 0 0 7 7 C 0 2 4 2 5-1-5 0 C 7 7 1-3 2-1 1 1 0 0
08801C7 7 7 1 2 0 0 1-1 7 7 2 3-3-2 2-1 1-5 7 7-1 3 0 0 0 0 2 3 1-4 0-4 1 1 0-5 0 0 7 7
0880108 7 7 2-3 1-5 1-4 7 7 0 5 1 1 0-5 7 7 7 7 1 3 7 7 1-1 7 7 7 7 0 0-3 1 7 7 7 7 3 5
0880109 1-6 1-6 7 7 3-1 1 5 7 7 2-1 0 0 2-2 7 7 3 2 7 7 7 7 7 7 7-1-2 2 5 7 7-7 7 2 5 7 7
088011C 2 0 7 7-2-5 0 C 0 0-1-6 1-3-1-5-1-5 0 3-1 5 7 7 0 0 4 1 0 2 7 7 7 7 7 7 7 7 0 0
0880111 41  5  6  7  7  7  9  8 11  6  7

08901C1 C C C 0 0-1 0 0 0 4 0 0 0 0 0 0 0 0 0-1 0 0 0 0 0 0 0 0 0 0-1 0-2 0 0 0 0 0 0 0 0
0890102 0 C 0 0 7 7 0 0 3 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 7 7 0 C 0 C 0 0 0 0 0 0 0 0
C89C1C3 7 7 C C 0 0 1 2 1 1 0 C 0 C 0 3 0 0 0 0 0 5 0 4 0 0 0-1 0 0 3 2 0 0 7 7 0 0 0-2
0890104 0 0 0 0 7 7 0-1-1 1 1 2 0 0 7 7 0 0 0 0 7 7 0 0 7 7 2 6 7 7 0 0 7 7 0 0 0 0 0 6
08901C5 7 7 0 0 0 5 0-2 0-3 1 0-1 4-1-3 1 4 0 0 7 7 0 0 0 0 7 7 2 2 0 0-2 4 0 0 2 3 0 0
08901C6 7 7-3 3-2 5 2 6 C C C C 0 0 7 7 0 0-1 5 0 0 0 0 0 0 7 7 0 0 0 0 0 0 0 0 3 3 0 0
0890107 0-3 0-2 0 0-1 6 7 7 2 1 2 4 0 0 0-4-1 3 0 0 2 3 0-2 0 0 7 7 7 7 1 3-3 2 0 0 7 7
C8901C8-2 C-2 3 7 7-1-4 0 0 2-6 0 0-2 4 0 0 1 0-3 5 1 3 7 7-2 2 2 5-2-1 7 7 1 2-1 2 1 6
08901C9 7 7-1 C 7 7-2 6-1-4-1-1 7 7-2 3 0 0 0 5 2-4 0 0 0 0 0-1 7 7-1 0 7 7 1-4-1-2-1 1
0890110 7 7-1-1 7 7 1 4 0-3 0 0 0-6 0-2 7 7 0-4 0 C 7 7 0-4 2 3 3 5 7 7 0-6 1-3 7 7 7 7
C890111 41  4  6  7  8  7  9  8  8  8  8
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APPENDIX G (Continued)

I.D.N.

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09C0101 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 0 0 0 0 0 0 0 C 0 0 0 0 0 0
0900102 0 C C C 0 0 0 0 C 0 0-1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0900103 0 0 0 5 0 0 0 0 0 3 0 0 0 0-1 2 0 0 0 5 1 1 0 0 0 0 0 0 0 0 C 0 0 0 4 0 0 0 0 0 0
05CC1C4 C C C C C 0 0 0 0 0 0 0 0 0 2 0-1 0 0 0 0 5 C 0 0 0 0 0 0 0 0 0XC 0 0 3 3 1 0 0 0 0 0
0900105-1 0 0 0 0 0 0 0 0 0 0 0 0-2 5 1 0 0 0 0 0 0-2-2 5 0 C-1 0 0 C 0 C 0 0 0 0 0 0 0 0
0900106 C 0-1-1 0 0-2 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 7 7 0 0 0 0 0 0 0 0 0 0 0 C 0 0 0 0
090C1C7 0 C 1 4-1-1-1 C 0 C 0 C-1 1-1 1 2 3 2 3 C C 2 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
09C0108-1 6 0 0 2-2 0 0 0-1 0 0 0-1 0 0-1 6 1 1 0 0-1 6 2 0-1 5 0 C 0 0 7 7-1 0 0 0-2 5
05C01C5 7 7 C C C-6 0 4 1 4 0-3 0-3 0 0-1-1 0 0 0 0 0-3-1 0-3-3 1 2 0 0-3-1 0 0 0-1 0 0
0900110 7 7-2-2 0 0 0-6 0 0-1 5 0 0 0 0-2-3 7 7 1-2-1 0 0-2 7 7-1 0-1 5-1-1 1-2-1 0-1 4
0900111 36  4  6  6  5  6  8  8  7  6  7

0920101 C C 0 0 1 2 0 C C C C C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0920102 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
C9201C3 C C C C 0 C 0 0 0 0 0 0 0 0-1 5 0 0 0 0 0 0 0 0 0 0 1 3 0 0 0 0 0 0 0 1 0 0 0 0
0920104 C-1 0 0 0-1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 C 0 0-1 2-1 0 0 0 0 0 0 2 0 0 1 1 0 0 0 0
0920105 C 0 0-2 0 0 0 1 0 0 0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 0 0 0-1 0 6 0 0 0 0-3 3 0 1
C920106 C C C C 0 0 0 0 0 7 7 0 C 0 C 5 2 0 0 0 0-1 6-2 4 7 7 0 0 7 7 0 0 7 7 7 7 0 0 1 5
0920107 0 C 0 0 1 6 0 0 0 0 0 0 C 0 0 0 0-1 5 3 5-2 4 0 0 7 7 2 5 1 6-1 4 0 0 1 1 7 7 7 7
C9201C8-2 3 2 3-1 4 C C-1 5 1-1 0 0 0 0 0 0 0 7 7 0 0 0 0-1 6 7 7-2 4 2 2 2 6 0 0 0 0 0 0
0920109 0 0-2 6 2-3 0 6 0 0 1-1 7 7 0-3 7 7 C 0 0-1 0 3 0 3-5 5-2 6 0 0-1 4 1 5-1 2 0 0
C92011C 0 0 0 0 3 3 0 0 0 0-2 5 0 0 0 0 7 7 0 C 0 0 7 7 0 0 0 0-1 2 0 0 0 C 2 3 1 6 0 0
09 2C111 35  5  4  6  5  6  7  7  7  7  7

0940101 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 C 0 0 0 0 0 0
09401C2-1 1 C C 0 0 0 0 C 0 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0940103 1 2 0 0 0 0 0-1 0 0 1 3 0 1 1 4 0 0 C C C 0 0 0 0 0 2 4 0 0 0 0 0 0 0 0 0 1 1
C940104 0 0 0 0 0 0 0 0 0 0 0 0 0 2 1 0 0 0 0 0 0 0 0 0 0 0 0-1 0 0 0-1 0 0 0 0 0 0 C 0 0 0 0
0940105 0 0 C C 0 0 0 0 C C C 0 0 1 3-1 1 0 0 1 3 0 0 0 0-1 3 0 0 0 1 0 0 1 6-2 2 0 0 0 0
0940106 1-1 2 2 0 0 0 0 0 0 0 0 0 C 0 0 0 0 0 0 0 0 0 C C 0 0 1-1 0 0 0 0 0 2 4 0 0-1 2 0 0-1 2
0940107 1 C 0 C 2-1XC 0 0 0 0 1 0 2 2 1 5 0 0 0 0 1 4-1 3 1-2-2-3 0 C-2 2 1 5-2 2 7 7 0 0
09401C8-1 2 C C 7 7 2 2 3 1 0 C 1 1 0 0 3 5 0 0 0-2 2 5 0 0 0 0 0 0 1 5 2 3 1 4 0 0 0-3
C9401C9 0 0-2-4 0 0 0 5 0 0 1 4-2-5-1 3-1-3 0 C 7 7 0 0 0 6 0 0-1-2 1 2 0-3 7 7 0 0 3 3
C94C11C C C 2-1 1 3-1 3-1 1 2 0 0 0 0 0 0 0 0 0 0 0-1 5 0 3 0 0-1 1 0 0 0 0 0 0 0 0 0 0
0940111 37  6  4  7  7  6  7  8  9  6  7
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APPENDIX H

TOTAL CONVERTED SCORES FOR TWENTY TRIALS

	4'	4' RETEST	8'	8' RETEST	12'	12' RETEST	16'	16' RETEST	20'	20' RETEST
1	57.319	57.010	105.858	272.157	120.832	168.719	329.592	180.183	316.254	341.679
2	29.021	60.855	115.723	178.701	170.411	262.115	417.524	441.129	200.470	372.685
4	12.750	80.339	38.250	31.027	303.848	223.250	208.100	197.594	343.358	295.765
6	48.174	45.510	139.445	122.371	220.984	262.330	241.844	178.740	319.845	290.956
7	150.629	21.773	182.690	203.506	272.293	299.075	473.578	507.909	508.808	461.159
8	57.010	88.470	220.765	390.599	212.338	381.225	400.898	430.003	371.297	394.887
10	93.852	29.750	177.835	160.684	225.890	203.706	405.089	241.380	291.567	376.993
11	18.003	52.693	96.961	96.868	254.459	253.754	189.929	250.948	312.302	543.124
12	12.750	31.027	142.673	140.215	271.915	93.291	253.064	187.397	238.748	358.357
13	105.561	43.777	97.587	87.133	114.927	71.823	209.231	107.623	307.523	324.652
14	29.021	33.960	114.846	109.862	167.367	216.161	221.546	329.288	441.289	238.766
16	113.309	41.434	184.573	230.143	230.092	306.671	396.610	418.470	391.423	337.393
18	35.003	21.940	61.507	46.021	94.452	72.905	234.358	162.766	227.108	313.912
19	66.909	152.847	59.073	94.273	291.831	275.667	282.278	181.543	293.395	440.142
20	13.753	44.950	71.783	88.325	140.871	168.326	201.370	123.003	214.228	251.414
21	81.013	157.506	189.421	132.796	407.025	235.631	272.234	427.742	521.738	379.396
22	9.503	14.586	96.470	71.010	79.494	167.767	277.429	310.695	299.522	288.317
24	0.0	0.0	36.450	40.815	83.009	78.507	87.045	208.663	194.243	120.099
25	43.546	101.544	103.397	180.825	178.372	214.747	403.294	336.723	280.701	300.947
26	85.147	59.707	218.129	133.396	341.687	260.589	280.814	380.284	357.862	632.374
27	56.023	83.891	79.423	132.297	167.484	382.824	293.604	343.624	403.079	367.208
28	36.973	68.650	180.837	121.265	300.185	315.447	356.646	401.449	525.704	456.611
29	21.940	43.190	47.781	193.556	168.833	149.310	349.050	315.246	328.652	292.100
30	118.573	68.548	130.868	268.248	264.780	414.182	438.010	443.776	468.762	379.250
31	96.604	122.402	227.021	193.913	279.891	340.984	520.496	414.860	382.137	454.740
32	25.852	12.750	29.758	21.250	195.234	152.608	298.264	152.230	188.510	263.737
33	22.253	84.252	182.500	330.027	272.444	309.697	434.107	393.519	346.117	167.989
34	21.940	44.507	72.720	53.530	281.749	247.539	236.153	283.590	346.333	212.277
35	38.602	83.161	231.614	284.273	507.716	291.223	528.477	485.187	404.436	308.098
36	99.405	8.500	146.903	85.662	112.237	109.438	243.964	285.552	351.591	279.123
37	13.753	64.575	200.850	153.887	249.583	188.342	303.116	273.352	207.676	273.102
38	12.021	0.0	21.250	30.781	160.725	74.720	195.364	262.185	188.287	165.617
39	71.362	31.174	173.970	179.718	269.142	227.069	387.443	316.131	291.213	262.538
40	55.826	60.833	116.944	92.646	125.922	224.119	383.240	186.717	277.918	342.137

APPENDIX H

TOTAL CONVERTED SCORES FOR TWENTY TRIALS

	4'	4' RETEST	8'	8' RETEST	12'	12' RETEST	16'	16' RETEST	20'	20' RETEST
1	57.319	57.010	105.858	272.157	120.832	168.719	325.592	180.183	316.254	341.679
2	29.021	80.855	115.723	178.701	170.411	262.115	417.524	441.129	200.470	372.685
4	12.750	80.339	38.250	31.027	303.848	223.250	208.100	197.594	343.358	295.765
6	48.174	45.510	139.445	122.371	220.984	262.330	241.844	178.740	319.845	290.956
7	150.629	21.773	182.690	203.506	272.293	299.075	473.578	507.909	508.808	461.159
8	57.010	88.470	220.765	390.599	212.338	381.225	400.898	430.003	371.297	394.887
10	93.852	29.750	177.835	160.684	225.890	203.706	405.089	241.380	291.567	376.993
11	18.003	52.693	96.961	96.868	254.459	253.754	189.929	250.948	312.302	543.124
12	12.750	31.027	142.673	140.215	271.915	93.291	253.064	187.397	238.748	358.357
13	105.561	43.777	97.587	87.133	114.927	71.823	209.231	107.623	307.523	324.652
14	29.021	33.960	114.846	109.862	167.367	216.161	221.546	329.288	441.289	238.766
16	113.309	41.434	184.573	230.143	230.092	306.671	396.610	418.470	391.423	337.393
18	35.003	21.940	61.507	46.021	94.452	72.905	234.358	162.766	227.108	313.912
19	66.909	152.847	59.073	94.273	291.831	275.667	282.278	181.543	293.395	440.142
20	12.753	44.950	71.783	88.325	140.871	168.326	201.370	123.003	214.228	251.414
21	81.013	157.506	189.421	132.796	407.025	235.631	272.234	427.742	521.738	379.396
22	9.503	14.586	96.470	71.010	79.494	167.767	277.429	310.695	299.522	288.317
24	0.0	0.0	36.450	40.815	83.009	78.507	87.045	208.663	194.243	120.099
25	43.546	101.544	103.397	180.825	178.372	214.747	403.294	336.723	280.701	300.947
26	85.147	59.707	218.129	133.396	341.687	260.589	280.814	380.284	357.862	632.374
27	56.023	83.891	79.423	132.297	167.484	382.824	293.604	343.624	403.079	367.208
28	36.573	68.650	180.837	121.265	300.185	315.447	356.646	401.449	525.704	456.611
29	21.940	43.190	47.781	193.556	168.833	149.310	349.050	315.246	328.652	292.100
30	118.573	68.548	130.868	268.248	264.780	414.182	438.010	443.776	468.762	379.250
31	96.604	122.402	227.021	193.913	279.891	340.984	520.496	414.860	382.137	454.740
32	25.852	12.750	29.758	21.250	195.234	152.608	298.264	152.230	188.510	263.787
33	22.253	84.252	182.500	330.027	272.444	309.657	434.107	393.519	346.117	167.989
34	21.940	44.507	72.720	53.530	281.749	247.539	236.153	282.590	346.333	212.277
35	38.602	83.161	231.614	284.273	507.716	291.223	528.477	485.187	404.436	308.098
36	99.405	8.500	146.903	85.662	112.237	109.438	243.964	285.552	351.591	279.123
37	12.753	64.575	200.850	153.887	249.583	188.342	303.116	273.352	207.676	273.102
38	12.021	0.0	21.250	30.781	160.725	74.720	195.364	262.185	188.287	165.617
39	71.362	31.174	173.970	179.718	269.142	227.069	387.443	316.131	291.213	262.538
40	55.826	60.833	116.944	92.646	125.922	224.119	383.240	186.717	277.918	342.137

APPENDIX H (Continued)

	4'	4' RETEST	8'	8' RETEST	12'	12' RETEST	16'	16' RETEST	20'	20' RETEST
47	74.020	24.014	416.946	215.487	239.150	291.833	368.200	347.065	440.724	307.413
50	56.674	59.017	72.143	121.126	114.163	252.879	196.322	311.977	230.873	260.314
51	87.146	61.345	104.959	163.372	274.182	133.592	331.241	282.952	343.157	425.056
52	19.764	24.014	148.647	61.578	145.689	265.747	269.516	317.111	448.008	380.131
53	4.250	19.574	242.962	84.445	105.525	325.404	467.518	448.126	393.035	367.699
54	43.879	26.265	114.086	74.407	239.848	219.509	217.098	373.555	157.957	358.135
55	145.256	52.424	160.369	272.194	379.055	241.619	616.206	262.906	258.870	482.163
56	45.807	0.0	55.992	110.500	170.441	163.671	335.555	332.075	132.705	137.228
57	0.0	21.250	77.375	80.807	234.802	279.591	404.607	205.448	325.191	215.041
59	28.510	29.750	65.129	121.868	110.686	138.666	231.534	223.410	158.731	204.643
60	12.750	0.0	65.320	34.421	213.024	114.416	267.258	244.600	285.202	258.420
62	173.379	0.0	218.165	168.924	391.405	197.144	333.592	412.550	427.514	528.308
63	17.000	42.073	76.017	12.750	292.754	325.370	532.904	240.488	187.221	198.763
64	13.440	0.0	16.271	65.832	244.572	128.223	183.352	170.733	364.979	249.522
66	34.690	17.690	63.200	108.168	141.740	174.343	195.681	384.335	355.897	274.430
68	21.250	50.271	9.503	41.846	79.676	97.469	177.400	209.738	178.027	180.462
69	9.503	15.514	54.532	17.000	126.319	283.434	159.361	197.329	430.601	217.383
70	25.500	0.0	134.391	60.190	61.569	258.160	143.539	199.699	239.151	179.149
71	15.324	0.0	57.284	117.803	99.569	224.205	128.599	201.445	221.776	104.696
72	0.0	0.0	134.273	4.250	196.981	149.196	322.241	354.334	324.189	71.386
74	24.014	8.500	57.010	65.427	177.747	199.420	321.811	107.475	247.139	308.160
75	27.507	10.260	105.287	121.616	126.978	82.976	136.604	175.144	361.492	255.585
78	130.487	41.950	81.988	71.247	223.184	207.192	243.401	90.372	445.596	339.039
79	19.565	14.510	126.456	78.079	198.128	171.367	95.528	362.164	237.716	350.656
81	6.010	15.315	91.149	17.690	142.614	99.790	197.018	183.836	233.889	219.320
82	18.836	17.000	185.622	233.853	328.214	224.366	305.036	341.342	386.057	288.584
84	27.784	19.764	105.452	88.926	204.694	166.841	412.402	272.940	440.685	545.148
86	0.0	6.010	43.464	53.034	144.857	172.537	225.150	158.548	246.093	295.717
88	104.146	39.194	220.834	140.595	423.993	218.434	336.173	539.354	557.593	426.901
89	38.250	105.396	178.733	324.580	267.805	233.718	326.929	345.191	362.144	477.838
90	4.250	4.250	87.764	62.755	67.024	62.594	97.331	203.467	195.831	286.195
92	2.236	0.0	39.36	36.764	81.78	299.780	289.79	243.756	305.97	175.742
94	4.250	6.010	73.983	18.003	88.452	62.055	197.835	206.483	266.979	91.324

APPENDIX I

TOTAL CONVERTED SCORES FOR TEN TRIALS

	4'	4' RETEST	8'	8' RETEST	12'	12' RETEST	16'	16' RETEST	20'	20' RETEST
1	43.879	27.260	71.437	136.149	52.570	126.646	249.119	90.036	198.164	205.314
2	10.260	56.605	79.083	96.896	105.396	179.509	231.158	278.756	88.761	218.960
4	12.750	66.900	4.250	19.007	182.221	77.361	113.655	110.033	147.065	183.369
6	25.521	22.253	105.094	60.444	55.513	101.075	131.850	71.094	128.790	165.746
7	108.612	0.0	134.663	124.156	206.935	168.291	259.793	353.779	255.292	284.141
8	27.260	34.774	146.739	228.689	88.743	231.530	197.156	231.805	201.110	159.187
10	38.250	0.0	83.720	125.795	136.149	76.073	163.763	148.938	185.168	206.305
11	0.0	25.500	30.440	30.753	176.749	80.262	81.013	147.721	133.077	248.614
12	12.750	6.010	88.287	89.643	144.153	35.031	118.454	104.736	142.535	165.074
13	66.034	27.507	61.137	35.712	60.104	12.750	138.713	62.594	129.070	243.823
14	24.771	20.521	50.573	47.694	75.260	86.286	116.150	237.235	191.875	135.741
16	48.864	41.434	94.057	184.841	123.003	218.332	225.234	261.761	247.885	183.526
18	12.750	21.940	30.753	37.521	59.763	47.131	94.183	81.166	81.440	167.325
19	31.862	94.726	0.0	61.268	142.079	128.758	97.014	84.517	125.916	235.468
20	13.753	17.000	58.344	57.885	17.690	87.583	124.829	80.930	181.469	192.503
21	64.013	68.263	135.965	90.723	219.952	84.410	135.031	269.487	229.567	237.618
22	0.0	2.565	96.470	29.750	25.500	124.156	180.694	219.422	138.210	153.295
24	0.0	0.0	32.200	15.315	61.236	60.503	74.295	123.085	88.514	43.023
25	26.023	66.854	40.946	95.832	107.885	68.416	182.579	177.615	79.978	214.368
26	17.000	27.507	140.050	74.446	151.719	109.474	117.752	191.506	202.112	271.955
27	34.352	81.326	55.409	74.890	93.948	196.583	148.379	118.994	144.962	177.493
28	0.0	18.760	97.323	94.005	166.538	105.796	150.904	279.054	233.011	192.333
29	17.690	13.440	18.760	133.112	131.503	81.267	191.668	184.306	209.059	130.134
30	46.750	39.281	68.576	92.263	77.599	195.318	272.677	204.951	277.208	189.252
31	59.073	25.500	64.273	145.784	124.185	211.331	224.870	238.824	134.779	200.105
32	25.852	12.750	2.565	21.250	66.214	99.705	146.225	101.657	95.864	159.887
33	12.750	66.728	83.844	152.139	127.419	145.827	164.206	217.491	192.115	83.844
34	21.940	25.500	15.324	40.780	97.529	112.211	100.317	95.190	162.719	92.438
35	34.352	36.450	172.541	201.156	320.361	142.866	331.601	279.594	180.632	200.896
36	60.152	4.250	83.949	22.253	72.984	56.887	137.377	115.678	168.569	138.913
37	0.0	27.784	103.304	70.555	144.653	136.766	178.905	124.290	130.515	106.266
38	12.021	0.0	8.500	4.250	75.537	21.671	117.737	170.240	113.856	109.677
39	32.034	21.671	130.467	85.312	191.225	191.225	253.643	92.664	133.499	151.489
40	55.826	60.833	85.481	92.646	52.210	77.833	209.872	111.406	222.128	134.111

APPENDIX I

TOTAL CONVERTED SCORES FOR TEN TRIALS

	4°	4° RETEST	8°	8° RETEST	12°	12° RETEST	16°	16° RETEST	20°	20° RETEST
1	42.879	27.260	71.437	136.149	52.570	126.646	249.119	90.036	198.164	205.314
2	10.260	56.605	79.083	96.896	105.396	179.509	231.158	278.756	88.761	218.960
4	12.750	66.900	4.250	19.007	182.221	77.361	113.655	110.033	147.065	183.369
6	25.521	22.253	105.094	60.444	55.513	101.075	131.850	71.094	128.790	165.746
7	108.612	0.0	134.663	124.156	206.935	168.291	259.793	353.779	255.292	284.141
8	27.260	34.774	146.739	228.689	88.743	231.530	197.156	231.805	201.110	159.187
10	38.250	0.0	83.720	125.795	136.149	76.073	163.763	148.938	185.168	206.305
11	0.0	25.500	30.440	30.753	176.749	80.262	81.013	147.721	133.077	248.614
12	12.750	6.010	88.287	89.643	144.153	35.031	118.454	104.736	142.535	165.074
13	66.034	27.507	61.137	35.712	60.104	12.750	138.713	62.594	129.070	243.823
14	24.771	20.521	50.573	47.694	75.260	86.286	116.150	237.235	191.875	135.741
16	48.864	41.424	94.057	184.841	123.003	218.332	225.234	261.761	247.885	183.526
18	12.750	21.940	30.753	37.521	59.763	47.131	94.183	81.166	81.440	167.325
19	31.662	94.726	0.0	61.268	142.079	128.758	97.014	84.517	125.916	235.468
20	13.753	17.000	58.344	57.885	17.690	87.583	124.829	80.930	181.469	192.503
21	64.013	68.263	135.965	90.723	219.952	84.410	135.031	269.487	229.567	237.618
22	0.0	2.565	96.470	29.750	25.500	124.156	180.694	219.422	138.210	153.295
24	0.0	0.0	32.200	15.315	61.236	60.503	74.295	123.085	88.514	43.023
25	26.023	66.854	40.946	95.832	107.885	68.416	182.579	177.615	79.978	214.368
26	17.000	27.507	140.050	74.446	151.719	109.474	117.752	191.506	202.112	271.955
27	34.352	81.326	55.409	74.890	93.948	196.583	148.379	118.994	144.962	177.493
28	0.0	18.760	97.323	94.005	166.538	105.796	150.904	275.054	233.011	192.333
29	17.690	13.440	18.760	133.112	131.503	81.267	191.668	184.306	209.059	130.134
30	46.750	39.281	68.576	92.263	77.599	195.318	272.677	204.951	277.208	189.252
31	59.073	25.500	64.273	145.784	124.185	211.331	224.870	236.824	134.779	200.105
32	25.852	12.750	2.565	21.250	66.214	99.705	146.225	101.657	95.864	159.887
33	12.750	66.728	83.844	152.139	127.419	145.827	164.206	217.491	192.115	83.844
34	21.940	25.500	15.324	40.780	97.529	112.211	100.317	95.190	162.719	92.438
35	34.352	36.450	172.541	201.156	320.361	142.866	331.601	279.594	180.632	200.896
36	60.152	4.250	83.949	22.253	72.984	56.887	137.377	115.678	168.569	138.913
37	0.0	27.784	103.304	70.555	144.653	136.766	178.905	124.290	130.515	106.266
38	12.021	0.0	8.500	4.250	75.537	21.671	117.737	170.240	113.856	109.677
39	32.034	21.671	130.467	85.312	191.225	191.225	253.643	92.664	133.499	151.489
40	55.826	60.833	85.481	92.646	52.210	77.833	209.872	111.406	222.128	134.111

APPENDIX I (Continued)

	4'	4' RETEST	8'	8' RETEST	12'	12' RETEST	16'	16' RETEST	20'	20' RETEST
47	41.260	14.510	155.006	100.392	167.109	143.791	177.795	247.459	290.687	118.146
50	52.424	32.514	36.450	71.727	63.750	112.187	98.775	209.350	148.334	103.395
51	57.396	30.171	104.959	95.799	152.242	120.152	150.510	120.545	208.302	132.609
52	19.764	18.003	41.950	57.328	93.162	171.148	213.263	129.156	267.774	130.993
53	4.250	19.574	152.070	67.445	92.775	139.423	256.687	269.437	247.782	181.690
54	39.629	20.255	69.579	13.440	158.419	66.087	86.844	130.587	72.120	187.273
55	107.085	42.921	118.476	140.775	156.348	165.824	353.753	138.817	109.646	321.188
56	45.807	0.0	35.424	68.000	148.771	47.102	202.712	177.991	87.509	59.860
57	0.0	4.250	34.000	28.953	174.043	227.887	235.233	49.205	157.729	63.323
59	0.0	21.250	43.190	62.795	61.301	31.510	99.270	138.476	60.713	122.162
60	0.0	0.0	65.320	25.921	115.320	60.883	111.652	60.137	165.416	115.533
62	101.669	0.0	120.579	116.813	210.364	97.675	165.080	126.920	180.469	285.461
63	17.000	42.073	53.764	0.0	87.023	160.549	285.982	185.568	66.379	93.179
64	13.440	0.0	10.260	25.575	154.048	102.200	127.553	75.126	244.749	139.848
66	4.250	4.250	44.193	55.290	93.425	63.267	43.610	192.922	165.833	107.881
68	0.0	50.271	0.0	29.096	27.213	54.094	139.190	97.850	105.340	139.365
69	0.0	0.0	29.032	0.0	83.296	141.806	80.251	104.677	196.646	162.806
70	21.250	0.0	57.967	42.500	21.940	89.057	31.784	139.025	152.941	69.385
71	15.324	0.0	12.021	61.026	64.523	123.497	60.503	40.824	75.911	53.696
72	0.0	0.0	51.576	0.0	143.765	51.453	140.168	177.353	166.763	21.940
74	10.260	8.500	31.510	55.924	43.610	101.996	271.485	37.397	119.540	170.232
75	27.507	4.250	59.500	82.422	76.500	27.950	46.750	99.868	164.159	135.421
78	109.966	41.950	45.224	41.703	116.834	120.842	142.985	23.010	258.807	153.654
79	12.750	0.0	100.535	68.576	111.918	123.193	69.754	172.532	150.464	134.719
81	6.010	15.315	73.460	4.250	48.083	55.956	85.302	65.443	122.396	134.994
82	14.586	0.0	106.853	199.853	164.873	88.057	175.886	194.725	151.045	124.577
84	17.523	4.250	66.171	47.080	127.067	102.441	211.444	150.781	217.446	247.115
86	0.0	0.0	21.940	24.771	92.854	120.204	129.909	68.952	117.553	207.965
88	57.396	39.194	112.219	72.244	222.722	83.844	203.553	271.319	234.557	168.843
89	25.500	63.323	70.337	103.909	137.309	173.614	148.124	133.556	217.455	213.502
90	0.0	4.250	64.753	34.000	31.387	20.521	70.452	78.235	133.606	158.661
92	2.236	0	21.67	8.50	29.75	64.96	72.30	117.91	170.60	82.99
94	4.250	6.010	48.966	9.503	32.890	18.031	54.260	107.829	107.546	50.893

APPENDIX J

TOTAL CONVERTED SCORES FOR FIFTEEN TRIALS

	4'	4' RETEST	8'	8' RETEST	12'	12' RETEST	16'	16' RETEST	20'	20' RETEST
1	43.679	57.010	105.858	203.239	61.070	126.646	291.012	162.183	265.254	238.204
2	14.510	56.605	106.220	126.997	128.339	214.032	285.857	296.446	158.398	246.467
4	12.750	80.339	21.250	19.007	207.681	114.334	179.590	185.574	230.702	229.692
6	39.674	45.510	113.594	113.871	157.661	201.617	171.008	106.097	245.259	253.190
7	132.626	21.773	158.676	168.816	245.156	195.505	367.762	439.989	399.163	407.186
8	57.010	78.967	173.243	317.084	125.716	293.366	313.164	335.760	240.402	297.426
10	38.250	4.250	165.335	128.360	225.890	124.623	289.981	181.784	236.744	302.073
11	9.503	52.693	59.393	30.753	212.386	181.931	101.533	212.681	194.156	374.833
12	12.750	25.017	119.416	140.215	191.592	65.784	179.715	153.123	183.235	197.616
13	90.047	37.767	69.637	44.212	72.854	54.823	179.179	89.620	219.419	290.129
14	29.021	33.960	54.823	74.225	136.339	169.059	221.546	270.517	306.774	177.814
16	78.888	41.434	175.069	210.693	145.946	275.918	306.454	329.944	318.176	225.174
18	30.753	21.940	40.257	41.771	85.952	53.142	145.183	123.239	87.450	244.305
19	45.385	108.166	46.323	87.458	232.235	220.154	188.164	97.267	176.489	371.190
20	13.753	44.950	71.783	66.385	59.517	129.656	188.620	80.930	181.469	223.150
21	72.513	93.763	161.740	90.723	297.380	139.233	198.774	363.999	347.997	274.001
22	9.503	14.586	96.470	53.007	64.171	146.096	208.477	279.185	165.554	219.409
24	0.0	0.0	36.450	40.815	83.009	64.753	74.295	208.663	121.869	115.849
25	26.023	80.294	103.397	117.082	149.609	128.791	306.399	241.359	136.959	291.444
26	75.644	36.007	169.070	97.389	257.114	191.009	207.482	294.434	252.467	441.196
27	34.352	81.326	65.670	103.788	98.198	323.752	209.459	217.529	280.683	310.625
28	19.450	38.210	126.276	112.765	222.050	207.464	214.423	308.804	357.413	299.366
29	21.940	34.690	18.760	133.112	140.078	117.379	258.845	257.216	256.829	223.001
30	63.750	58.288	113.868	134.336	119.672	321.536	381.649	332.286	353.970	256.165
31	92.354	82.083	165.942	145.784	225.854	259.025	380.838	309.464	318.394	344.355
32	25.852	12.750	16.005	21.250	92.135	125.729	265.417	143.730	146.437	215.461
33	22.253	66.728	131.927	260.741	179.799	224.282	299.528	342.167	244.448	125.917
34	21.940	25.500	57.396	45.030	170.630	202.981	146.640	164.065	220.115	185.084
35	38.602	48.471	189.541	254.221	442.757	170.548	441.330	375.890	278.218	239.146
36	81.402	8.500	103.399	66.656	94.234	87.914	194.051	172.839	249.415	213.736
37	0.0	48.304	133.406	130.631	231.552	146.269	232.438	212.396	180.539	187.706
38	12.021	0.0	21.250	4.250	96.133	21.671	158.981	226.073	165.277	139.427
39	44.102	21.671	130.467	131.635	203.245	203.245	338.560	196.791	198.567	243.531
40	55.826	60.833	89.731	92.646	99.732	142.793	295.135	132.656	260.395	259.432

APPENDIX J (Continued)

	4'	4' RETEST	8'	8' RETEST	12'	12' RETEST	16'	16' RETEST	20'	20' RETEST
47	50.763	14.510	290.727	189.587	207.393	232.237	291.017	281.459	385.211	164.413
50	52.424	54.767	49.890	90.488	69.760	195.483	103.025	258.550	207.930	192.741
51	87.146	51.842	104.559	95.799	210.585	120.152	265.619	218.131	242.302	312.921
52	19.764	18.003	63.200	57.328	136.185	230.744	244.016	190.893	358.310	316.808
53	4.250	19.574	207.583	67.445	105.525	181.496	400.428	392.356	331.927	250.484
54	39.629	20.255	69.579	70.157	199.508	149.652	151.469	227.483	114.513	293.993
55	145.296	52.424	160.369	250.944	259.383	199.416	510.811	178.760	174.661	374.761
56	45.807	0.0	39.674	89.250	148.771	90.477	251.410	250.711	91.759	102.197
57	0.0	4.250	51.523	28.953	186.063	253.739	319.255	109.281	204.052	147.469
59	0.0	21.250	51.690	79.795	93.163	96.594	156.667	177.333	142.460	144.101
60	0.0	0.0	65.320	25.921	150.430	66.893	215.682	186.355	225.606	216.347
62	124.556	0.0	134.019	160.424	307.260	112.958	189.850	244.259	341.039	395.424
63	17.000	42.073	76.017	12.750	206.279	225.564	417.795	217.602	122.205	154.839
64	13.440	0.0	10.260	39.329	186.372	110.700	152.570	113.336	283.205	183.436
66	34.690	17.690	63.200	82.317	124.217	144.593	153.608	295.066	267.501	163.654
68	21.250	50.271	0.0	33.346	27.213	97.469	159.711	136.374	143.606	155.636
69	9.503	0.0	50.282	12.750	109.319	178.991	137.837	164.440	317.365	178.130
70	25.500	0.0	62.217	55.940	30.440	159.894	61.837	170.155	230.651	157.899
71	15.324	0.0	21.524	87.530	82.046	191.759	102.576	91.618	190.749	87.696
72	0.0	0.0	73.247	0.0	166.708	72.703	251.658	294.258	213.261	39.629
74	14.510	8.500	57.010	65.427	98.679	168.033	289.488	71.921	172.598	210.698
75	27.507	10.260	86.526	99.945	114.957	55.631	96.510	166.644	245.485	182.675
78	126.237	41.950	63.985	41.703	167.407	149.795	231.380	66.557	307.357	282.266
79	19.565	0.0	126.456	78.079	153.621	140.193	81.775	280.838	171.714	234.188
81	6.010	15.315	91.149	4.250	111.104	71.280	125.879	131.200	158.969	181.070
82	14.586	4.250	158.429	212.603	263.199	160.361	247.450	265.988	236.952	203.660
84	27.784	19.764	87.421	59.906	198.683	129.320	377.292	211.861	306.774	386.083
86	0.0	6.010	33.960	47.024	135.354	126.214	186.103	118.846	202.210	241.236
88	91.396	39.194	166.229	93.494	350.747	147.408	249.840	416.987	385.602	258.610
89	29.750	105.396	112.837	257.007	233.475	215.687	214.021	248.757	282.784	312.680
90	4.250	4.250	70.764	36.565	67.024	62.594	97.331	134.257	178.141	227.237
92	0.0	0.0	35.11	22.25	34.00	193.96	182.12	204.84	257.28	134.56
94	4.250	6.010	67.973	18.003	50.579	24.042	110.050	139.215	184.622	91.324

APPENDIX K

CALCULATIONS FOR THE 0.05 CONFIDENCE LEVEL

"TEST OF CORRELATION COEFFICIENTS"

$$t = r\sqrt{\frac{N-2}{1-r^2}}$$

Beginners (Group I)

$N = 42$

$t_{table} = 2.021$

$$2.021 = r\sqrt{\frac{42-2}{1-r^2}}$$

$$2.021 = \frac{r\sqrt{40}}{\sqrt{1 - r^2}}$$

$$2.021\sqrt{1 - r^2} = r\sqrt{40}$$

$$(2.021)^2 (1-r^2) = r^2(40)$$

$$(4.084)(1-r^2) = 40r^2$$

$$4.084 - 4.084\, r^2 = 40r^2$$

$$4.084 = 44.084r^2$$

$$r = \underline{0.3044}$$

Intermediates (Group II)

$N = 26$

$t_{table} = 2.064$

APPENDIX K (Continued)

$$2.064 = r\sqrt{\frac{26-2}{1-r^2}}$$

$$2.064 = \frac{r\sqrt{24}}{\sqrt{1 - r^2}}$$

$$2.064\sqrt{1-r^2} = r\sqrt{24}$$

$$(2.064)^2(1-r^2) = r^2(24)$$

$$4.26(1-r^2) = 24r^2$$

$$4.26 - 4.26r^2 = 24r^2$$

$$4.26 = 28.26r^2$$

$$r = \underline{\underline{0.3882}}$$

Beginners and Intermediates (Group III)

$N = 68$

$t_{table} = 2.000$

$$2.000 = r\sqrt{\frac{68-2}{1-r^2}}$$

$$2.000 = \frac{r\sqrt{66}}{\sqrt{1-r^2}}$$

$$2\sqrt{1-r^2} = r\sqrt{24}$$

$$4(1-r^2) = r^2(24)$$

$$4-4r^2 = 24r^2$$

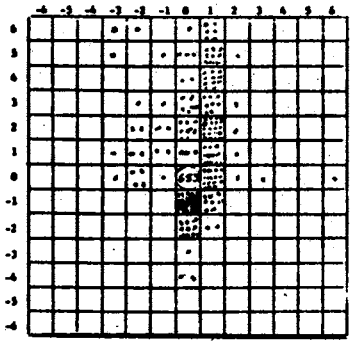
$$4 = 28r^2$$

$$r = 0.2390$$

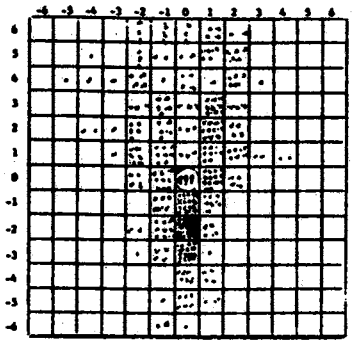
APPENDIX L

TREND ANALYSIS ILLUSTRATING THE POSITION WHERE EACH TRIAL STOPPED ON THE GRID

BEGINNERS



4'



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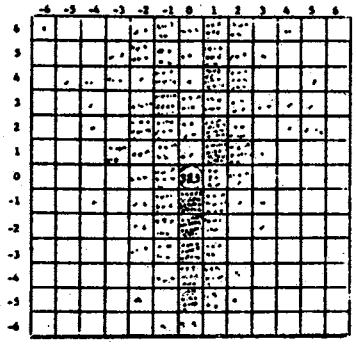

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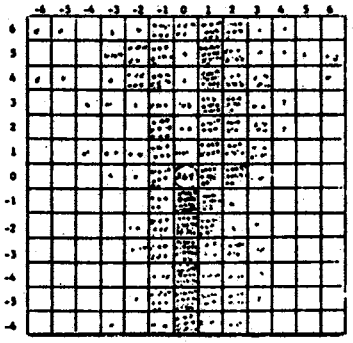
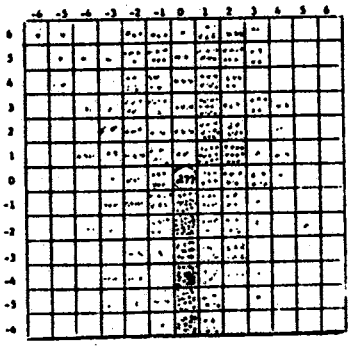
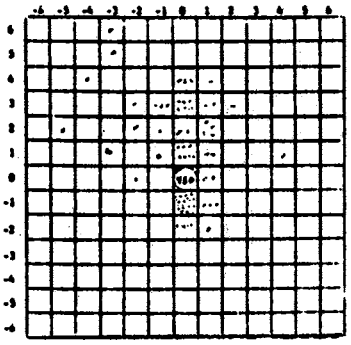


16'



20'

INTERMEDIATES



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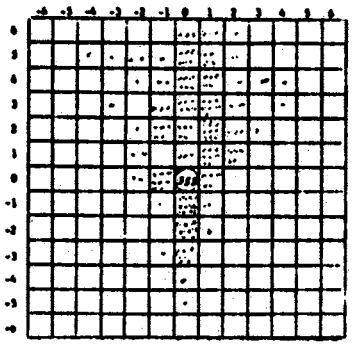

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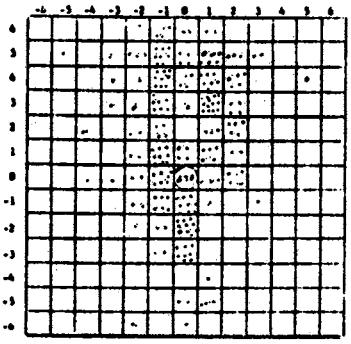

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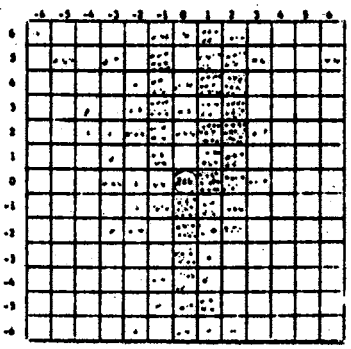

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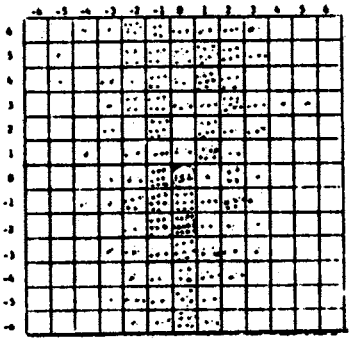
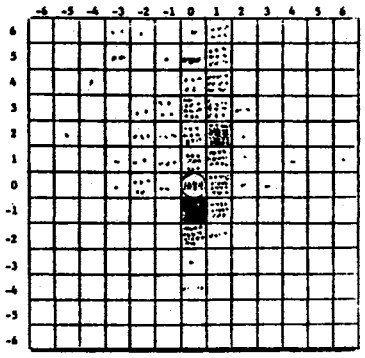


20'

COMBINED GROUP



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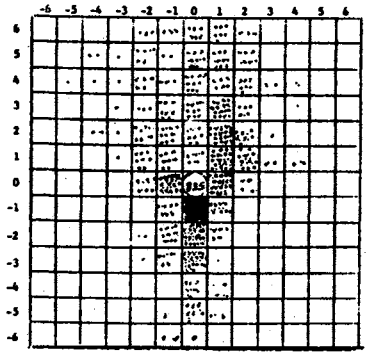

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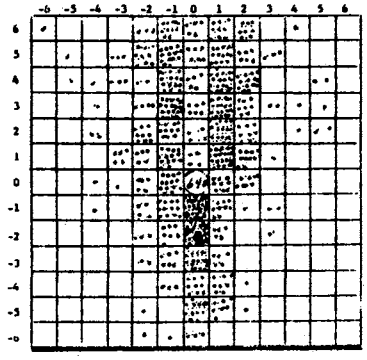

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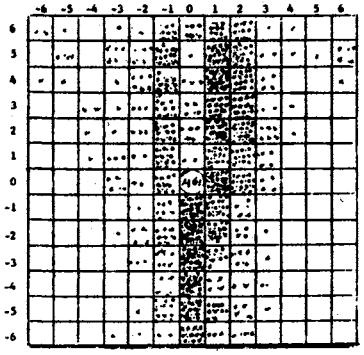

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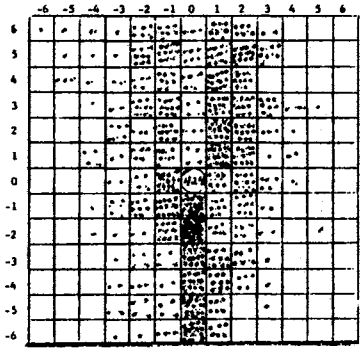

20'

VITA

Lea A. Larson

Candidate for the Degree of

Doctor of Education

Thesis: THE DEVELOPMENT OF A GOLF PUTTING TEST

Major Field: Higher Education

Biographical:

Personal Data: Born in San Francisco, California, February 20, 1944, the daughter of Mr. and Mrs. W. L. Larson.

Education: Graduated from St. Joseph High School, Conway, Arkansas in May, 1961; attended Hendrix College in 1961 and 1962; received the Bachelor of Science in Education degree from State College of Arkansas in 1965, with a major in mathematics; received the Master of Science in Education degree from State College of Arkansas in 1969, with majors in Physical Education; completed requirements for the Doctor of Education degree at Oklahoma State University in May, 1972.

Professional Experience: Physical Education instructor, Clarksville Public Schools, Clarksville, Arkansas, 1965-1966; Physical Education instructor, girls' basketball coach, mathematics and chemistry instructor, Desha Central Schools, Rohwer, Arkansas, 1966-1969; graduate teaching assistant, Department of Health, Physical Education and Recreation, Oklahoma State University, 1969-1971.

Professional Organizations: State Tournament Chairman and Board Member, Arkansas Women's Golf Association; American Association of Health, Physical Education and Recreation; Oklahoma Association of Health, Physical Education and Recreation; National Association of Physical Education for College Women; Southern Association of Physical Education for College Women.