Chapter III

PROCEDURE

The procedure adopted by the investigator in the identification of specific skills and strategy components, identification of specific skills and strategy tests, selection of the subjects, criterion measure, reliability of the data, instrument reliability, tester's competency, reliability of the test items, collection of data, skills and strategy test administration procedure, subjective evaluation (rating scales) and statistical procedure for analysis of data have been explained in this chapter.

Identification of Specific Skills and Strategy Components for Badminton Players

It is an admitted fact that skills and strategy play a pivotal role in the achievement of top level performance in badminton. Many of the sports scientists like Thani¹ Bloss and Hales,² Mills,³ Downey,⁴ and Sullivan⁵ also laid stress on different attributes which are the essential requirement for a top level badminton player. Many of the other experts in the game of badminton have also explained various specific skills and strategy components which are considered to be most important for excellent performance in this game. Therefore, on the basis of overall empirical views of experts, the following specific skills, and strategy tests were considered for this study:


¹Thani, *Skills and Rules of Cricket with Laws*, p.3.
²Bloss and Hales, *Badminton*, p.4.
⁴Downey, *Better Badminton for All*, p.216.
Identification of Specific Skills and Strategy Tests

Eight functional skills and strategy tests, were ascertained after carefully examining the related literature and consulting the experts in the field, which could evaluate each skill and strategy independently. The final specific skills and strategy tests have been explained in Table 1.

TABLE 1
LIST OF TESTS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Component</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Skill</td>
<td>High Serve</td>
</tr>
<tr>
<td>2.</td>
<td>Skill</td>
<td>Low Serve</td>
</tr>
<tr>
<td>3.</td>
<td>Skill</td>
<td>Forehand Overhead Clear</td>
</tr>
<tr>
<td>4.</td>
<td>Skill</td>
<td>Backhand Overhead Clear</td>
</tr>
<tr>
<td>5.</td>
<td>Skill</td>
<td>Forehand Overhead Smash</td>
</tr>
<tr>
<td>6.</td>
<td>Skill</td>
<td>Forehand Overhead Drop Shot</td>
</tr>
<tr>
<td>7.</td>
<td>Skill</td>
<td>Backhand Overhead Drop Shot</td>
</tr>
<tr>
<td>8.</td>
<td>Strategy</td>
<td>Singles Strategy</td>
</tr>
</tbody>
</table>

Selection of Subjects

All the sixty male badminton players, of Madhya Pradesh state who participated in 31st Madhya Pradesh Inter-District and 45th Senior State Badminton Championship held at Indore from 13th August to 18th August, 1991, were selected to serve as subjects for the study. The age of the subjects ranged from 18 to 33 years. The break up of the subjects on which data were collected have been given in Table 2.
TABLE 2
THE DETAILS OF THE MADHYA PRADESH BADMINTON PLAYERS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>District</th>
<th>No. of Subjects</th>
<th>No. of State Level Players</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Indore</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td>Bhopal</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Dewas</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Durg</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>5.</td>
<td>Dhar</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>6.</td>
<td>Jabalpur</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>7.</td>
<td>Neemuch</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>9.</td>
<td>Balaghat</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>10.</td>
<td>Raipur</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>11.</td>
<td>Guna</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>12.</td>
<td>Bilaspur</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>13.</td>
<td>Shivaipur</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>14.</td>
<td>Sihore</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>15.</td>
<td>Ratlam</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>16.</td>
<td>Khandwa</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>60</td>
<td>12</td>
</tr>
</tbody>
</table>

Criterion Measure

The criterion measure was the average of the playing ability scores of badminton players assigned independently by three badminton experts. The detailed guidelines worked out for judges are shown in Appendix A.

Reliability of the Data

The reliability of the data was ensured by establishing the instrument reliability and tester's competency.

Instrument Reliability

The indoor Fenta Shuttlecocks (69 grains) manufactured by Variety Sports Industries, Jalandhar, and approved by the Badminton Association of
India and Netaji Subhash National Institute of Sports were used throughout this study as the same shuttlecocks were used in the Madhya Pradesh State badminton Championship. Thus the instruments were considered reliable for the purpose of this study.

**Tester's Competency**

The investigator was well versed with the techniques of conducting tests since he has been working as a lecturer in the Department of Physical Education, Indore University, for more than four years. He is a qualified badminton coach and official also.

**Reliability of the Test Items**

The test-retest method was employed to compute reliability of the test items. The obtained scores were correlated and their values are presented in Table 3. The data pertaining to this have been presented in Appendix C.

**TABLE 3**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Test Items</th>
<th>Co-efficient of Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>High Serve</td>
<td>.878*</td>
</tr>
<tr>
<td>2.</td>
<td>Low Serve</td>
<td>.806*</td>
</tr>
<tr>
<td>3.</td>
<td>Forehand Overhead Clear</td>
<td>.844*</td>
</tr>
<tr>
<td>4.</td>
<td>Forehand Overhead Smash</td>
<td>.793*</td>
</tr>
<tr>
<td>5.</td>
<td>Forehand Overhead Drop Shot</td>
<td>.865*</td>
</tr>
<tr>
<td>6.</td>
<td>Backhand Overhead Clear</td>
<td>.835*</td>
</tr>
<tr>
<td>7.</td>
<td>Backhand Overhead Drop Shot</td>
<td>.796*</td>
</tr>
<tr>
<td>8.</td>
<td>Strategy Test</td>
<td>.868*</td>
</tr>
</tbody>
</table>

Significant at .05 level of confidence

$r_{.05 (13)} = .514$
Table 3 reveals that the obtained correlation values for all the skills and strategy test items range from 0.793 to 0.878 which are significant at .05 level of confidence, because the required value of significance at .05 level of confidence with 13 degrees of freedom is .514. Hence all the test items for specific skills and strategy tests have been considered reliable.

**Collection of Data**

All the sixty male badminton players who participated in 31st Madhya Pradesh Inter District and 45th Senior State Badminton Championship held at Indore from 13th August to 18th August, 1991 were selected for administration of the test items. The coaches and managers of the teams were consulted at the personal level to conduct the test on badminton players, and a rapport was established with them for the testing programme. All those in charge of teams, coaches and managers, were made fully conversant with the study. Tentative times were finalised with them. The researcher approached each player after giving proper and timely information before the tests were conducted.

Before administering the tests, the subjects were briefed about the purpose of the study and details of all the tests were explained to them. They were also given a sufficient number of trials to enable them to become familiar with the tests. To ensure uniform testing conditions, the subjects were tested in the morning and evening sessions. The duration of test administration was set in a manner so that fatigue may not occur. Sufficient time was given in between the tests, so that the subjects could show their best performance.

The subjects were directed to come in proper playing kit during the performance of the tests. No special motivational technique was used to enhance their performance. But the nature of the tests was such that each subject was so enthusiastic that he performed each test in the spirit of the competition to surpass his counterpart and know his status of specific skills and strategy. The subjects gave the maximum co-operation throughout the test administration. The data obtained have been presented in Appendix D.
Skills and Strategy Test Administration Procedure

High Serve Test

Purpose:

To measure ability to serve high and deep rear of the court.

Sex and Age Level:

Test may be used with college players of both sexes.

Equipment and Court Markings:

The court was marked as shown in Figure 1. Four lines were drawn as indicated by dotted lines in the figure. One line was drawn 3 inches behind and parallel to back boundary line. A second line was drawn parallel to and 10 inches closer to the net from the back boundary line. The third line was drawn parallel to and 10 inches closer to the net than the second drawn line. This places the third drawn line 20 inches from the back boundary line and 10 inches in the back of the doubles long service line. The fourth line was drawn 10 inches closer to the net and parallel to the doubles long service line. A 12- by- 12 inch square was drawn 4 feet from the net in the middle of both the service courts (O and P). Two rackets and preferably two boxes of shuttles, in good condition were needed for the test.

Directions:

The subject stood anywhere in the right service court (X) and served five shuttles and also served five shuttles standing anywhere in the left service court (Y). The server attempted to serve over the extended racket of a student who stood in the squares in the target court. This student acted as the “opponent” and assisted in scoring by yelling “low” for any shuttle which does not go over his racket.
The scorer stood at point Z in the figure. Each serve was scored according to the space in which the shuttle hit. All the ten games were totaled. A test score was fifty. Shuttles hitting on the line were given the higher point. No points were given for a serve that failed to cross the net or to the racket of the opponent.

Only legal serves were scored.

The height of the player O or P was extended the racket over his head was of the consequence. Naturally extremes were to be avoided.

**Low serve Test.**

To measure ability to serve low and accurately.

**FIG. 1: HIGH SERVE TEST**

The court was marked as shown in Figure 2. Four lines have to be drawn where indicated by the dotted lines in the figure. One line was drawn 3 feet close to the net and parallel to the short service line. A second line was 18 inches behind and parallel to the short service line. The third line was drawn 10 inches behind the third drawn line and parallel to the short service line. Two vertical lines were drawn between second and third drawn line. Two more lines were drawn between the first line and the net. Two more lines were drawn parallel to the first line. Two more lines were drawn parallel to the second line, one on each 2 feet away from the net. Two rackets and preferably twelve shuttles in good condition were used for the test.
**Scoring:**

The scorer stood at point Z in the figure. Each serve was scored according to the zone in which the shuttle hits. All the ten serves were totaled. A perfect score was fifty. Shuttles hitting on the line were given the higher point values. No point was given for any shuttle that fails to clear the upheld racket of the player at O or P.

**Additional Pointers:**

(a) Only legal serves were scored.

(b) The height of the player O or P who extended the racket over his head was of little consequence. Naturally extremes were to be avoided.

**Low serve Test.**

**Pupose:**

To measure ability to serve low and accurately.

**Sex and Age Level:**

Test may be used with college players of both sexes.

**Equipment and Court Markings:**

The court was marked as shown in Figure 2. Four lines have to be drawn which are indicated by the dotted lines in the figure. One line was drawn 3 inches closer to the net and parallel to the short service line. A second line was drawn 12 inches behind and parallel to the short service line. The third line was drawn 10 inches behind the second drawn line and parallel to the short service line. The fourth line was drawn 10 inches behind the third drawn line and parallel to the short service line. Two vertical lines were drawn between second and third drawn line, 2 feet closer to the center line from each side line for doubles. Two more vertical lines were drawn between second and third drawn line each 2 feet away from the center line. A clothesline rope was stretched 15 inches above and parallel to the net. Two rackets and preferably twelve shuttles in good condition were needed for the test.
The subject stood anywhere in the right service court (X) and served the shuttlecock. The server attempted to hit the shuttlecock between the net and the rope.

The zones were given point values of five, four, three, two, and one as indicated in figure 2. The value of the area in which each shuttle hits was recorded as the score for each trial. No point was given for any shuttle that failed to pass between the net and the rope. A shuttle that hit the rope was not counted and another trial was allowed. Shuttle hitting on the line were given the higher point values.

Additional Notes:
1. Some prior sessions prior to the testing day were unlimited.
2. A group of four students were on court at one time, two taking the test and two scoring.

Forehand Overhead Clear Test

To test a player's ability to move to the shuttlecock quickly and accurately and execute a forehand overhead clear shot from the back court high and deep into the opponent's court.

Set and Age Level:

This test may be used with college players of comparable age and court markings.

The court with scoring zones was marked as shown in Figure 2. One
Directions:

The subject stood anywhere in the right service court (X) and served five shuttles, and also served five shuttles standing anywhere in the left service court (Y). The server attempted to serve the shuttle between the net and the rope.

Scoring:

The zones were given point values of five, four, three, two, and one as indicated in figure 2. The value of the area in which each shuttle hits was recorded as the score for each trial. No point was given for any shuttle that failed to pass between the net and the rope. A shuttle that hit the rope was not counted and another trial was allowed. Shuttle hitting on the line were given the higher point values.

Additional Pointers:

(a) Some practice sessions prior to the testing day were permitted.
(b) A group of four students were on court at one time, two taking the test and two scoring.

Forehand Overhead Clear Test

Purpose:

To test a player's ability to move to the shuttlecock quickly and successfully execute a forehand overhead clear shot from his back court high and deep into the opponent's court.

Sex and Age Level:

Test may be used with college players of both sexes.

Equipment and Court Markings:

The court with scoring zones was marked as shown in Figure 3. One
line was drawn 3 inches behind and parallel to the back boundary line. A second line was drawn 18 inches closer to the net from and parallel to the back boundary line. The third line was drawn 10 inches from and parallel to the long service line for doubles. Two vertical lines were drawn between second drawn line and the long service line for doubles 2 feet 6 inches closer to the center line from each side line for singles. A clothesline rope was stretched across the court 11 feet from the net and parallel to it, at a height of 8 feet 6 inches from the floor on the examiner's side of the net. A 12- by-12 inch square (S) was drawn 10 feet 6 inches from the net in the middle of the center line. A 12- by- 12 inch square was drawn for the examiner (E) 8 feet 6 inches from the net in the middle of the center line. Set-up area was marked as shown in Figure 3. Two rackets and preferably twelve shuttles in good condition were needed.

**Directions:**

The player being tested stood with at least one foot in the square (S) in the court opposite to the examiner (E). The examiner stood in the square, on the same side of the net as the target area as marked. The player attempted to send the shuttlecock by means of forehead overhead clear stroke above the rope so that it landed in the target area. Ten trials were administered.

**Scoring:**

The point value of the zone in which the shuttle landed was recorded for each attempt. A perfect score was fifty. A shuttlecock that hit the rope was not counted, and another trial was allowed, shuttles which hit on a line were given the higher point values. A score of zero was given if any trial failed to go over the rope, and if no attempt was made by the player to hit a valid set-up.

**Additional Pointers:**

(a) If the examiner determined that a set up was not adequate, it was not counted as a trial.

(b) The subject should not move from the square before the examiner started to hit the shuttle in the set-up area.
FIG. 3: FOREHAND OVERHEAD CLEAR TEST
Backhand Overhead Clear Test

**Purpose:**

To test a player's ability to move to the shuttlecock quickly and successfully execute a backhand overhead clear shot from his back court high and deep into the opponent's court.

**Sex and Age Level:**

Test may be used with college players of both sexes.

**Equipment and court Markings**

The court with scoring zones was marked as shown in Figure 4. One line was drawn 3 inches behind and parallel to the back boundary line. A second line was drawn 18 inches closer to the net from and parallel to the back boundary line. The third line was drawn 10 inches closer to net from and parallel to long service line for doubles. The fourth line was drawn 10 inches closer to the net from the third drawn line and parallel to the back boundary line. A clothesline rope was stretched across the court 11 feet from the net and parallel to it, at a height of 8 feet 6 inches from the floor on the examiner's side of the net. A 12-by-12 inch square (S) was drawn 10 feet 6 inches from the net in the middle of the center (E) 8 feet 6 inches from the net in the middle of the center line. Set-up area was marked as shown in the figure 4. Two rackets and preferably twelve shuttles in good condition were needed.

**Directions:**

The player being tested stood with one foot in the square (S) in the court opposite to the examiner (E). The examiner stood in the square, on the same side of the net as the target areas. The set-up hit by the examiner was to be high and go into the set up area as marked. The player attempted to send the
Scoring:
The point value of the zone in which the shuttlecock was recorded for each attempt. A score of fifty was possible on this test. A shuttlecock that hit the rope was not counted and another trial was allowed. Shuttlecocks landing on the line were given the higher point values. A score of zero was given if a trial failed to go over the rope, and if no attempt was made by a player to hit a valid set-up.

Additional Notes:
1. If the examiner determined that a set-up was adequate it was not counted as a fault.
2. The subject should not move from the square before the examiner permitted to hit the shuttle in the set-up area.

Purpose:
The test was used to evaluate a player's ability to move to the shuttlecock quickly and successfully return a forehand overhead smash shot which ended in a suitable area of the court.

Equipment:
The court with scoring zones was marked as shown in Figure 5. One line was drawn 3 feet from the back boundary line and parallel to the short service line. A second line was drawn 3 feet closer to the boundary line from the first drawn line and parallel to short service line. The third line was drawn 3 feet closer to the boundary line from the second drawn line and parallel to short service line. The fourth line was drawn 3 feet closer to the boundary line from the third drawn line and parallel to short service line.
shuttlecock by means of backhand overhead clear stroke above the rope so that it landed in the target area. Ten trials were administered.

**Scoring:**

The point value of the zone in which the shuttle landed was recorded for each attempt. A score of fifty was possible on this test. A shuttlecock that hit the rope was not counted and another trial was allowed. Shuttle hitting on the line were given the higher point values. A score of zero was given if any trial failed to go over the rope, and if no attempt was made by the player to hit a valid set-up.

**Additional Pointers:**

(a) If the examiner determined that a set-up was not adequate it was not counted as a trial.

(b) The subject should not move from the square before the examiner started to hit the shuttle in the set-up area.

**Forehand Overhead Smash Test**

**Purpose:**

To test a player's ability to move to the shuttlecock quickly and successfully execute a forehand overhead smash shot which landed in a desirable area of the court.

**Sex and Age Level:**

Test may be used with college players of both Sexes.

**Equipment and Court Markings:**

The court with scoring zones was marked as shown in Figure 5. One line was drawn 3 feet 6 inches closer to the back boundary line from and parallel to the short service line. A second line was drawn 3 feet closer to back boundary line from the first drawn line and parallel to short service line. The third line was drawn 3
feet 6 inches closer to the back boundary line from the second drawn line and parallel to the short service line. Two vertical lines were drawn extending from the short service line to the long service line for doubles, 3 feet closer to the center line from each side line for singles and parallel to it on the examiner's side of the net. A clothesline rope was stretched 18 inches above and parallel to the net. A 12 - by - 12 inch square (S) was drawn 10 feet 6 inches from the net in the middle of the center line. A 12 - by - 12 inch square was drawn for the examiner (E) 8 feet 6 inches from the net on the center line towards the target area side of the net. Setup area was marked as shown in figure 5. Two rackets and preferably twelve shuttles in good condition were needed.

Directions:

The player being tested stood with one foot in the square (S) in the court opposite to the examiner (E). The examiner stood in the square, on the same side of the net as the target areas. The set-up hit by the examiner was to be high and go into the set-up area as marked. The player attempted to send the shuttlecock by means of forehand overhead smash shot between the net and the rope stretched above the net so that it landed in the target area. Ten trials were administered.

Scoring:

The point value of the zone in which the shuttle landed was recorded for each attempt. A score of fifty was possible on this test. A shuttlecock that hit the rope was not counted and another trial was allowed. Shuttles hitting on the line were given the higher point values. A score of zero was given for any trial failing to go between the net and the rope stretched 18 inches above the net. A score of zero was given if no attempt was made by the player to hit a valid set-up, and if the shuttle contacted below head level.

Additional Pointers:

(a) If the examiner determined that a set-up was not adequate, it was not counted as a trial.

(b) The subject should not move from the square before the examiner
FIG. 5: FOREHAND OVERHEAD SMASH TEST
started to hit the shuttle in the set-up area.

**Forehand Overhead Drop Shot**

**Purpose:**

To test a player's ability to move to the shuttlecock quickly and successfully execute a forehand overhead drop shot which landed in a desirable area of the court.

**Sex and Age Level:**

Test may be used with college players of both sexes.

**Equipment and Court Markings:**

The court with scoring zones was marked as shown in Figure 6. One line was drawn 18 inches closer to the back boundary line from and parallel to the short service line. Two lines each 3 feet inside both the side line for singles and parallel to it were drawn extending from the net to the first drawn line. Two more lines each 5 feet inside both the side lines for singles and parallel to it were drawn extending from the net to short service line. A clothesline rope was stretched 18 inches above and parallel to the net. A mark for the subject (S) was drawn 10 feet 6 inches from the net on the center line. A mark for the examiner (E) was drawn 8 feet 6 inches from the net on the center line towards the target area side of the net. Set-up area was marked as shown in the Figure 6. Two rackets and preferably twelve shuttles in good condition were needed.

**Directions:**

The players being tested stood on the mark (S) in the court opposite to the examiner (E). The examiner stood on the mark, towards the same side as the target areas. The set-up hit by the examiner was to be high and go into the set-up area as marked. The player attempted to send the shuttlecock by means of forehand overhead drop shot between the net and the rope stretched above the net so that it landed in the target area. Ten trials were administered.
FIG. 6: FOREHAND OVERHEAD DROP SHOT TEST
Scoring:

The point value of the zone in which the shuttle landed was recorded for each attempt. A score of fifty was possible on this test. A shuttlecock that hit the rope was not counted, and another trial was allowed. Shuttles hitting on the line were given the higher point values. A score of zero was given for any trial failing to go between the net and the rope stretched 18 inches above the net. A score of zero was given if no attempt was made by the player to hit a valid set-up.

Additional Pointers:

(a) If the examiner determined that a set-up was not adequate, it was not counted as a trial.

(b) The subject should not move from the mark before the examiner started to hit the shuttle in the set-up area.

Backhand Overhead Drop Shot

Purpose:

To test a player’s ability to move to the shuttlecock quickly and successfully execute a backhand overhead drop shot which landed in a desirable area of the court.

Sex and Age Level:

Test may be used with college players of both sexes.

Equipment and Court Markings:

The court with scoring zones was marked as shown in Figure 7. One line was drawn 18 inches closer to the back boundary line from and parallel to the short service line. Two lines, each 3 feet inside both the side line for singles and parallel to it, were drawn extending from the net to the short service line. Two more lines, each 5 feet inside both the side line for singles and parallel to it, were drawn
FIG. 7: BACKHAND OVERHEAD DROP SHOT TEST
extending from the net to the short service line. A clothesline rope was stretched 20 inches above and parallel to the net. A mark for the subject (S) was drawn on the center line 10 feet 6 inches from the net. A mark for the examiner (E) was drawn 8 feet 6 inches from the net on the center line towards the target area side of the net. Set-up area was marked as shown in the Figure 7. Two rackets and preferably twelve shuttles in good condition were needed.

**Directions:**

The player being tested stood on the mark (S) in the court opposite to the examiner (E). The examiner stood on the mark on the same side of the net as the target areas. The set-up hit by the examiner was to be high and go into the set-up area as marked. The player attempted to send the shuttlecock by means of backhand overhead drop shot between the net and the rope stretched above the net so that it landed in the target area. Ten trials were administered.

**Scoring:**

The point value of the zone in which the shuttle landed was recorded for each attempt. A score of fifty was possible on this test. A shuttlecock that hit the rope was not counted, and another trial was allowed. Shutles hitting on the line were given the higher point values. A score of zero was given for any trial failing to go between the net and the rope stretched 20 inches above the net. A score of zero was given if no attempt was made by the player to hit a valid set-up.

**Additional Pointers:**

(a) If the examiner determined that a set-up was not adequate, it was not counted as a trial.

(b) The subject should not move from the mark before the examiner started to hit the shuttle in the set-up area.

**Strategy Test**

**Purpose:**

To test a player's ability to move to the shuttlecock quickly and to
decide upon and then successfully execute an appropriate shot in a given situation.

**Sex and Age Level:**

Test may be used with college players of both sexes.

**Equipment and Court Markings:**

The court with scoring zones for forehand and backhand clear, forehand and backhand drop shot and forehand and backhand smash was marked as shown in Figure 8. For forehand and backhand clear one line was drawn 3 inches behind and parallel to the back boundary line. A second line was drawn 18 inches closer to the net from and parallel to the back boundary line. The third line was drawn 10 inches closer to the net from and parallel to the long service line for doubles. The fourth line was drawn 10 inches closer to the net from the third line and parallel to the back boundary line. A clothesline rope was stretched across the court 11 feet from the net and parallel to it, at a height of 8 feet 6 inches from the floor on the examiner's side of the net.

For forehand and backhand overhead smash test one line was drawn 3 feet 6 inches closer to the back boundary line from and parallel to the short service line. A second line was drawn 3 feet closer to the back boundary line from the first drawn line and parallel to the short service line. The third line was drawn 3 feet 6 inches closer to the back boundary line from the second drawn line and parallel to the short service line. Two vertical lines were drawn extending from the short service line to the long service line for doubles, 3 feet closer to the center line from each side line for singles and parallel to it on the examiner's side of the net. A clothesline rope was stretched 20 inches above and parallel to the net. Set-up areas A and D for forehand and backhand smash respectively were drawn as shown in figure 8.

For forehand and backhand overhead drop shot one line was drawn 18 inches closer to the back boundary line from and parallel to the short service line. Two lines, each 3 feet inside both the side line for singles and parallel to it were drawn extending from the net to the first drawn line. Two more lines each 5
feet inside both side lines for singles and parallel to it were drawn extending from the net to short service line. Set-up area B for forehand clear and forehand drop shot was marked as shown in figure 8. Set-up area C for backhand clear and backhand drop shot was marked as shown in figure 8. A mark for the subject (S) was drawn 10 feet 6 inches from the net on the center line. A mark for the examiner (E) was drawn 8 feet 6 inches from the net on the center line towards the target area side of the net. Two rackets and preferably three boxes of shuttles in good condition were needed.

**Directions:**

The player being tested stood on the mark (S) opposite to the examiner (E). The examiner stood on the mark on the same side of the net as the target areas. The set-up hit by the examiner was to be high and go into the set-up area A,B,C, or D in a sequence decided by the examiner. Subjects were tested preferably one at a time to test them under identical conditions. A player hit a forehand smash if the shuttle fell midway in the set-up area A and hit a backhand smash if the shuttle fell midway in the set-up area D. A player hit a forehand clear or clear or forehand drop shot if the shuttle went in the back alley in the set-up area B and hit a backhand drop shot if the shuttle went in the set-up area C. A forehand or Backhand drop shot was to be used at least part of the time when the player was slightly in front of or on the back boundary line in set-up area B and C respectively. Twenty trials were administered.

**Scoring:**

If the set-up was in the forehand or backhand smash area then a forehand or backhand smash was to be attempted or a score of zero was given. A score of zero was given for any trial for smash or drop failing to go between the rope stretched 20 inches above the net. If the set-up was in the forehand clear or drop shot and backhand clear or drop shot area then either of these strokes had to be attempted or a score of zero was given. A score of zero was given for any trial for forehand or backhand clear failing to pass over the rope. Shuttles hitting on the line were given the higher point values. The point value of the zone in which the shuttle landed, according to the set-up hit by the examiner, was recorded for each attempt. A score of 100 was possible on this test.
The subjective evaluation (rating scales) was based on the opinion of experts and the examination of the related literature on the eight skills and strategy for which objective scales have been developed. The construction of the rating scales was based on the evaluation of ten components, sub-components, and categories for each skill and strategy in badminton. The scales were further subdivided into twenty components/sub-categories in consultation with experts including physical education specialists and coaches of the All India Badminton Association. Each of the components was scored on a 5-point scale based on the researchers' views. The reliability of each specific skill and strategy test item for subjective and objective evaluation was established by test-retest method employing product moment correlation coefficient.
**Additional Pointers:**

(a) If the examiner determined that a set-up was not adequate, it was not counted as a trial.

(b) The subject should not "move" from the mark before examiner started to hit the shuttle in the set-up area.

(c) The score of the trial in which the shuttle was set-up in the backhand smash area (D) was not counted.

**Subjective Evaluation (Rating Scales)**

On the basis of opinion, overall empirical views of experts and after carefully examining the related literature all the eight skills and strategy for which the objective tests have been developed were also ascertained for the construction of rating scales.

The skills (high serve, low serve, forehand overhead clear, forehand overhead smash, forehand overhead drop shot, backhand overhead clear and backhand overhead drop shot) for which the rating scales have been prepared were further subdivided into ten components/subheadings. Rating scale for strategy in badminton was further sub-divided into twenty components/subheadings in consultation with experts including physical education lectureres, selectors, officials and the national coaches of Sports Authorrity of India. Each of the components were scored on 5-4-3-2-1 basis. The details of each subheading/component were prepared and then the rating scales were distributed to the experts for further comments, views and suggestions for improvement in the scales. The experts were consulted personally by the research scholar, after modifying the rating scales based on their views and suggestions before finally preparing the rating scales.

The final rating scales for subjective evaluation of the badminton players in specific skills and strategy have been presented in Appendix B.

**Statistical Procedure**

The reliability of each specific skill and strategy test item for subjective and objective evaluation was established by test-retest method employing product-
moment correlations on fifteen randomly selected subjects.

Validity of each specific skills and strategy test item for objective evaluation was established by product-moment correlation i.e. correlating each specific skill and strategy test item scores with the badminton playing ability scores assigned independently by three experts.

Coefficient of correlations and Wherry-do-little method of multiple correlation were used to find out R values and to select a group of test items that provided the highest multiple coefficient with the criterion and also to select them in order of their contributions to the correlations. The regression equation was also employed to determine the best combination of test for purposes of establishing a test battery by assessing the most effective tests and also to find out the weightage of each test item towards the main criteria.

Validity of each specific skill and strategy test item for subjective evaluation was established by product moment correlation i.e. correlating rating scale scores for each specific skills and strategy with the badminton playing ability scores assigned independently by three experts.