DISCUSSION

The discussion in this chapter will be guided by the order in which the main results were presented.

Summary organization of the data is given in the results (chapter IV), although it is known that such organization of data often obscures rudimentary statistical treatment. On the other hand, description of mass data with all rudimentary statistical analysis may lead to a thoroughly confusing series of gigantic tables which go beyond the human perceptual ability to absorb it as an entity. Sometimes, rudimentary statistical analysis is risky because it provides an opportunity to spin around one's own psychological axes and interpret anything and everything from them (Haire et al., 1966). While presenting the results a compromise has been made between the above two extremes. Summary of the cognizable data is presented in chapter V itself, the rest are given in the appendix. The analysis in the first section of the chapter is organization of the data, the second section presents the funneled out data for intercorrelation matrices and finding out the key test parts which are representative of groups of tests (elementary linkage analysis). The third section deals with the correlation coefficients of the job performance scores with the test performance scores on parts 1, 3 & 6; and, evaluations of multiple regression
equations with multiple correlation coefficients of test parts 1, 3, 6, and job performance. This section also includes percentage of improvement in forecast for job success, using Taylor-Russell table (1939).

Statistically insignificant differences among the mean scores of the GATS parts (Table-11, p. 69) and the aptitudes (Table-12, p. 70) of the clerical personnel could have been due to the fact that the clerical jobs of the various departments, viz., Personnel, General Office, Sales & Accounts, were more or less similar in nature (p. 113). It further reveals that the clerical abilities required for the technical departments, viz., Bleaching, Dyeing, Printing & Sizing, might also be more or less identical and probably to the same degree, as that required by the other departments.

Significantly higher scores on part 1 (Table-12, p. 70) and aptitude Q (Table-12, p. 77), obtained by the personnel with length of service up to 25 years than the personnel with relatively longer length of service, i.e., 26 years to 35 years (usually older persons), may have been because part 1 required identification of whether two names were similar or different in respect of spelling and punctuation, thereby involving more of speed component of performance than intellectual ability. This is in confirmation with Crossman (1959), who showed that speed in human performance increases during the first
few years of service, then levels off, and ultimately it tends to deteriorate. No significant differences were obtained on parts 2 & 6 (Table-12, p. 70) and aptitude N (Table-19, p 77) across the entire length of service because elementary numerical computations in part 2 and arithmetic problems, inclusive of numerical problems, in part 6 might have appeared so well learned by the personnel that the answers came almost automatically to them (Fitts and Posner, 1969). According to Fitts and Posner (1969), automatic means that the persons are more or less unaware of the process involved in arriving at the answer. Part 5 required matching the response item with the stimulus item in respect of black and white shadings, thereby calling for perceptual ability. Evidence from research studies (Dirren, 1964) indicates that it is the perceptual component of the task which is affected by ageing. This may be the probable reason for the personnel with work experience up to 25 years scoring higher on this test part than those with work experience from 26 years to 35 years, usually older persons. Similar results were also obtained on part 7 because this test part requires the persons to find out which lettered figure in the stimulus box exactly matched the numbered figure in size and shape, by screening through many other numbered figures in the response box, thereby entailing searching ability, which
probably sets in more efficiently in younger persons who have usually shorter length of service. Same arguments also hold good for aptitude P since it comes from parts 5 & 7. Results on parts 3 & 4 were similar to the findings discussed above. Part 3 (aptitude 5) required the persons to find out the response item from a set of four responses by bending the stimulus item along the dotted lines; and part 4 (aptitude V), to find out the two words, from a set of four, which were either same or opposite in meaning. Thus, both these parts demanded more of thinking or processing in an organized way, which is rather believed to improve as the level of education increases. This is so because as the individuals get higher education they are themselves exposed to wider fields of learning that may improve their performance on tests demanding intellectual task performance (Anastasi, 1968). It may be seen from Figure 1 (p. 52) that the personnel with length of service up to 25 years had higher educational level (51% graduates, 35% matriculates and only 14% non-matriculates) as against the personnel having length of service from 26 years to 35 years (only 4% graduates, 24% matriculates, and the major portion, 72%, non-matriculates). The higher educated personnel had consequently significantly higher scores than the less educated personnel, as seen from Table-13 (p. 71). This is also in confirmation with the earlier
studies which indicate that the individuals who have continued their education longer, consequently, scored higher on tests calling for intellectual involvement (Husen, 1951; Lorge, 1945; Owens, 1951; Campbell, 1965). Similar explanations might hold good for part 6 (N) and parts 5 & 7 (P) as these test parts demanded intellectual thinking, and also for aptitude G because it is derived from parts 3, 4 & 6. On part 1 and aptitude Q, the significantly higher scores of the graduates compared to that of the matriculates, and the non-matriculates (Table-13, p. 71 & Table-20, p. 78), might have been because the test part, apart from speed component of performance, also demanded knowledge of English language in spelling and punctuation, the level of which is presumably higher for those who extend their studies to graduation than those whose education is restricted to matriculation or non-matriculation. Likewise, the significantly higher test scores of the matriculates than those of the non-matriculates (Table-13, p. 71 & 20, p. 78) may be explainable because the matriculates had presumably better understanding of the language than the non-matriculates. The significantly higher scores on part 2 might have been probably because the graduates had prolonged their educational career, thereby availing of the greater opportunity of numerical calculations which ultimately turned out to be overlearned material.
for them (Anastasi, 1968). Likewise, significantly higher scores on parts 5 & 7, of the graduates might have been due to the fact that the higher educational level facilitated developing insight into the understanding of the problems set out therein in a somewhat better way compared to the other two groups.

Significantly higher scores on all the parts, except part 2 (Table 14, p. 72), obtained by the supervisory technical personnel of the printing/dyeing departments as compared to those of the Spinning/Weaving/Finishing/Engineering departments may be because: (i) 82% of the former group had length of service up to 15 years, and 18% (7 persons only), from 16 to 30 years, as against 65% and 35% respectively, in the latter group (Figure 2, p. 58). Further, the personnel with length of service up to 15 years had significantly greater contribution to the total performance scores compared to those with length of service from 16 years to 30 years (Table-15, p. 73). In addition, (ii) for the length of service up to 15 years, the former group had 84% graduates as against 25% in the latter group, and, for work experience from 16 years to 30 years (the former group was constituted of 7 persons only, which precluded statistical analysis), the latter group had 81% personnel with practical experience and certificates (Figure 2, p. 58). The
contribution of the graduates to the total performance scores was significantly higher than the less educated personnel (Practical/Certificate holders) as shown in Table-16 (p. 74). The reason for such results may be the same as that given for the clerical group (pp. 103-105).

For the aptitude scores of the supervisory technical personnel (Tables-21 - 23, pp. 79-81) the results may have been due to the same reasons as those mentioned for the clerical personnel (pp. 101-105).

Further, it may be seen from Tables 17 & 24 (pp. 75 & 82) that the scores of the supervisory technical personnel did not differ significantly across the various levels of occupations, either on the test parts or on the aptitudes. This might have been due to the fact that the level of education did contribute significantly to the performance of the personnel on the GATB parts (Table-16, p. 74) and the aptitudes (Table-23, p. 81), whereas the educational levels of the personnel did not differ significantly, across the different levels of occupation (Table-41).
Table 4.1
FREQUENCY DISTRIBUTION OF THE SUPERVISORY TECHNICAL PERSONNEL ACCORDING TO THEIR LEVELS OF EDUCATION IN DIFFERENT OCCUPATIONAL LEVELS

<table>
<thead>
<tr>
<th>Level of Occupations</th>
<th>Level of Education</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Practical/Certificate</td>
<td>Diploma</td>
</tr>
<tr>
<td>Supervisor</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>Junior Assistant</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Senior Assistant</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>46</td>
</tr>
</tbody>
</table>

Chi-Square ($\chi^2$) = 1.12 (d.f. = 4), not significant at acceptable level (0.05 or above).
McQuitty's (1957) technique has been applied to group out test parts on the basis of those parts which are most like (or most unlike, or closest to, or furthest from) other test parts, so far as the patterning of the seven test parts are concerned. From the inter-correlation matrices (Tables 29 to 30, pp. 87-96) it may be seen that most of the parts are positively correlated. This indicates that the parts are somewhat similar to each other, possibly because all of them warranted either intellectual abilities or speed component of performance or both. For the clerical group ten types (Figures 3a to 3e) have been obtained while that for the technical group are seven (Figures 3f to 3j).

It is interesting to note that for group I (Figure 3a, p. 63) type I has emerged from the primary linkage of part 5 with part 7, and the secondary linkage of part 5 with part 1 and that of part 7 with part 3. The reasons for the primary linkage between parts 5 and 7 may be that group I constituted of less educated (below matric) clerical personnel with work experience up to 25 years. Hence, they probably performed on both the parts in more or less similar way, and found the problems easier too, as the parts were non-verbal in nature, requiring, comparison of black and white shadings between the stimulus and the response items in parts 5, and searching abilities in part 7. In answering part 1,
speed component of performance appeared to be elementary which was also true for part 5 and probably that is why part 5 had secondary linkage with part 1. Further, searching abilities involve relatively higher thinking process (part 7) which is also required in part 3, probably to a little more extent. This might be the plausible explanation of secondary linkage of part 7 with part 3. In type II, the primary linkage between parts 4 and 6 may be attributable to the verbal ability required by both the parts. The secondary linkage of part 6 with part 2 may be because both the parts require numerical computations apart from understanding language (problems) in part 6. Thus, this suggests, that from type I part 3 which is a test of three-dimensional nature (size, shape & depth), can substitute part 7 in that of size and shape and part 5 in that of depth through its black and white shadings. Part 1 may be essential in assessment of the speed component of performance. Of parts 4, 6 and 2 (type II) part 6 is preferable because it contains both understanding of language (also obtained by part 4) and ability of numerical computations (also obtained by part 2).

For group IV (similar demographic characteristics to that of group I, but with longer length of work experience - 25 years to 35 years), type I has emerged out
out of primary linkage of parts 1 and 5 (Figure 3d, p. 63). Further, part 5 formed a secondary linkage with part 7 and part 7 with part 3. In type II primary linkage between parts 4 and 6 and linkage of part 6 with part 2 has been obtained as that for group I. The reasons for the linkages thus obtained may be due to the same reason given for group I. Hence, parts 3, 6 and 1 could be retained for this group.

Interestingly, also, two identical types (type I) have evolved for both groups II (Figure 3b, p. 63) and V (Figure 3e, p. 63), but type II are slightly different in linkage formations. Group II had work experience upto 25 years, and group V, from 26 years to 35 years, thus indicating that typal linkage (type I) may have formed irrespective of work experience. The primary linkage of part 2 with part 6 has evolved probably because both the parts are similar in nature to the extent that the parts contain numerical computations. The secondary linkage of part 6 with part 4 may have been because both the parts contain understanding of language. The primary linkage of part 3 with part 7 (type II) of group II might have been because both parts demand intellectual abilities, and assessment of size and shape as obtained from part 7 might have also been partially fulfilled in part 3, which requires assessment of size.
shape and depth. The secondary linkage of part 3 with part 5 may have been because assessment of depth, as customarily assessed by part 5, might have been partially fulfilled in part 3. Further, the linkage of part 5 with part 1 (type II) probably may have been because both the parts involve speed component of performance. The primary linkage of part 3 with part 7 (type II) of group V may be explainable in the way similar to that given for group II (pp. 190-191). The reasons of typical linkage of part 7 with part 5 and part 5 with part 1 may have been the same as that explained for group I (pp. 83-84), although, the personnel of group V had a little higher education (matriculation) than the personnel of Group I (below matric). It may thus be argued that the test parts to be included for groups II and V are: part 6 in place of part 2 and part 4, from type I, because part 6 contains both understanding of language and numerical computations in contrast to part 2 which deals with numerical computations only and part 4 which deals with understanding of language only; part 3 in place of parts 5 and 7 from type II because part 3 can assess a person's ability to understand size, shape and depth of objects, whereas in part 5 understanding of depth of field is assessed, and in part 7 only understanding of size and shape can be assessed; part 1, which is the
remote linkage of part 5 from type II and hence may be an useful test part for the purpose of assessment of speed component of performance.

For group III (figure 3c, p.63) type I has formed the primary linkage of part 1 with part 4, the secondary linkages of part 4 with part 6 and also part 6 with part 2, all the tests being verbal in nature. It is very interesting finding in that part 4 (understanding of language), part 6 (understanding of language and computation) form a chain of linkages which might have been possible because the higher educational level (graduates, (Figure 2, p.58) of the personnel of group III might have endowed them, with better understanding of the test items. Similarly, in type II primary linkage between part 5 (field of depth) and part 7 (size & shape) and secondary linkage of part 5 with part 3 (size, shape & depth), all non-verbal in nature, have been possible because of the higher educational level of the personnel. The higher educational level might also have some role to isolate all verbal tests in one typal linkage and all non-verbal tests in another (figure 3c, p.63). Thus, ultimately, for this group the test parts 3, 6 and 1, the same as that for the other groups, could form the test battery for the reasons given earlier (groups II & V), which would probably serve the same purpose if the
other parts of the GATB are also included in it.

This analysis shows that any one test from parts 1, 3 & 6 appears either in type I or type II linkages for all the groups, and according to McQuitty any one of the tests in a linkage should conveniently substitute the other tests in that linkage. It thus suggests that the psychological test battery consisting of parts 1, 3 and 6 would be amenable to the assessment of general aptitudes of the clerical personnel.

As seen from the figures 3f-3j, the typal structures obtained for the different technical groups (VII - X & X V) are different from those of the clerical groups (I - V), probably because the nature of jobs of the two groups are different. For e.g., the job of the clerical personnel involve computations, accounting, letter sorting, filing, maintenance of ledgers, drafting, etc., while the job of the supervisory technical personnel include general supervision of the workers working under them, identification of yarns and necessary materials, supervision in maintenance of machineries, preparation of technical reports, preparation of schedules for manpower and materials ancillary to the machines, duty rostrum, supervision of quality of the produces, finding out reasons for breakage, damage, etc. However, parts 1, 3 and 6, same as that for the clerical group.
seem to form the psychological test battery for the supervisory technical groups as well. The reasons for the final inclusion of these three test parts in the battery have already been explained in detail for the clerical group (pp.*14-18) and hence, further discussions, more or less on the same lines have been avoided, which would otherwise entail a long repetitive argument.

Further, the multiple regression equations (chapter IV, pp.*66 to 67) for the purpose of prediction of job performance (J) scores based on the performance on test parts 1, 3 & 6 had highly significant positive coefficients of multiple correlations (corrected). For example, for group I, the corrected coefficient of multiple correlation was found to be, $R_C (J.136) = 0.7646$ (Table 40). The standard error was calculated to be 0.0979 with the 't'-value being 7.80 ($p < 0.001$). This indicates high association of the predicted scores (job performance) and the observed scores on the three test parts 1, 3 & 6. The standard error of estimate in the regression equation was found to be,

$$\sigma_{J.136} = 8.9153$$

indicating that the chances are 2 in 3 (66 in 100) that the estimated score will not miss the actual score the person earns by more than $\pm 8.9153$. The significant regression coefficients or the weights of the test parts
further adds to our knowledge that using the test performance scores on parts 1, 3 & 6 and the constants (Table-40), a fairly accurate prediction of the job performance scores of each person can be made from the regression equations.

With the help of the Taylor-Russell table, 1939 (Appendix XXI), the percentage of improvement in forecast for job success can be found out. The table considers a base rate of .60 which means that in any selection procedure, irrespective of the use of psychological tests, it can be assumed that on a strict evaluation of employees' job performance, 60% of them will reach satisfactory level in particular job categories. Across the top of the table are given different values of selection ratios (the proportion of vacancies available to the total number of job applicants) and along the side are the test validities. The entries in the body of the table indicate the proportion of persons selected after the use of the tests. Thus the difference between .60 and any one table entry shows the increase in proportion of successful selections attributable to the test. From the estimated coefficient of correlations between the test scores on parts 1, 3 & 6 and the job performance scores, the extent to which improvement could be effected over and above the base rate in actual selection programme, are given in
Figure 4 (pp. 117) at different selection ratios. It may be noted from the figure that if the selection ratio is low, improvement in forecast affected by the test parts 1, 3 & 6 in the actual selection procedure would be more.

Thus this study suggests that for both the clerical and the supervisory technical personnel the prediction of job performance scores based on the test performance scores on parts 1, 3 & 6 could be made fairly effectively. Addition of any of the other four GATB parts (2, 4, 5 & 7) might not improve the accuracy in prediction for job performance scores.
FIG. 4: PERCENTAGE OF IMPROVEMENT IN FORECAST FOR JOB PERFORMANCE FOLLOWING TAYLOR RUSSELL TABLE (1939), AT BASE RATE OF 0.60, FOR THE TEN GROUPS.

(a) GROUP I

(b) GROUP II