RESULTS
Chapter 4

Results

The present research was conducted with the aim to examine executive processes mainly 'set switching' and its relation to other processes like mobility and lability of the nervous system, cognitive facilitation (or low interference) and set switching in numerical task and anagram solution task. The study further emphasized to examine the efficiency of intervention strategies on those Ss having difficulty in set switching (i.e. high switch cost). The objectives of the study have been presented in chapter 2.

After scoring of responses, the data were analyzed using the SPSS (Statistical Package for the Social Sciences) 18.0 version. The statistical significance level was taken at $p < 0.05$. Various facets of set switching and the generality of 'set switching' process among different tasks (verbal and non-verbal) was visualized by factor analysis (objective 1). Paired sample t test was computed for low demanding tasks and high demanding task to verify the first hypothesis that task demands shall modulate set switching. The relationship among various set switching processes, and correlates, such as mobility, lability and cognitive interference was verified (to 2nd hypothesis) by Pearson’s correlation. The effectiveness of intervention strategies was tested by applying t-tests (paired sample and independent sample). The results have been presented as per the objectives of the study.

First, the descriptive analysis involving means and SD was carried out (Table 4.1) on all the variables for 296 Ss sorted for the second phase of the study. The descriptives revealed heterogeneity among various variables. The table comprises 17 scores in total. The first ten were WCST measures conveying the subjects’ ability to form set, maintain set, switch set as per the demands of the task and also indicated their efficiency in doing so. WCST uses figural material. On the similar pattern a numerical task was also given to know their number of categories learned and perseverative errors. An anagram task was also used that yielded similar two scores. The remaining three scores indicated Ss’ cognitive facilitation/interference, Flexibility of...
attention (Mobility) and Flicker-fusion frequency (Lability). SDs of different variables also revealed vast variations among themselves looking to their sizes in relation to means.

Table 4.1 Mean and SD of 14 variables (N=296)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trials</td>
<td>111.52</td>
<td>18.99</td>
</tr>
<tr>
<td>Correct</td>
<td>71.16</td>
<td>9.84</td>
</tr>
<tr>
<td>% Error</td>
<td>34.29</td>
<td>13.53</td>
</tr>
<tr>
<td>% P Response</td>
<td>22.47</td>
<td>11.06</td>
</tr>
<tr>
<td>% P Error</td>
<td>20.62</td>
<td>10.00</td>
</tr>
<tr>
<td>% Non-P Error</td>
<td>14.16</td>
<td>8.22</td>
</tr>
<tr>
<td>% CLR</td>
<td>56.34</td>
<td>16.90</td>
</tr>
<tr>
<td>NOCC</td>
<td>4.84</td>
<td>1.44</td>
</tr>
<tr>
<td>TTCFC</td>
<td>21.60</td>
<td>16.98</td>
</tr>
<tr>
<td>FTMS</td>
<td>0.80</td>
<td>0.95</td>
</tr>
<tr>
<td>CF</td>
<td>85.30</td>
<td>16.91</td>
</tr>
<tr>
<td>FA</td>
<td>47.31</td>
<td>5.32</td>
</tr>
<tr>
<td>Fus. Freq.</td>
<td>34.80</td>
<td>2.00</td>
</tr>
<tr>
<td>NCC</td>
<td>1.53</td>
<td>0.58</td>
</tr>
<tr>
<td>NPE</td>
<td>1.33</td>
<td>1.08</td>
</tr>
<tr>
<td>ACC</td>
<td>1.27</td>
<td>0.71</td>
</tr>
<tr>
<td>APE</td>
<td>1.63</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Obviously, the data across variables did not appear to be normally distributed (Appendix-III) and that necessitated normalizing by transformation to fulfill assumptions of various analyses. The first hypothesis that the task demands will modulate set switching was verified by comparing the mean differences between tasks accounting set-switching in low demanding conditions and high demanding conditions. In other words, mean scores of high demand task, i.e. WCST (involved more complexity in terms of six categories) and low demand task, i.e. numerical and anagram (both involved less complexity in terms of only two categories) were compared, separately. WCST was a standardized test that involved six categories to be completed by participants, while other two tasks, i.e. numerical and anagram involved only two
categories each. WCST was considered as high demand task as it required more number of set formations, their maintenance and more set switching to complete all six categories, while numerical & anagram task were considered as low demanding tasks as they required fewer number of set formation, set maintenance and set switching to complete only two categories.

To examine the first hypothesis, all the Ss of second phase (N=296) were administered WCST, numerical and anagram task, individually and their respective mean scores were compared for the variable of % perseverative errors (for WCST, Numerical task and anagram task) that was considered as an important source/measure of set switching. Thus, three paired sample t test were done as-

1. WCST (High demand task) v/s Numerical (Low demand task)
2. WCST (High demand task) v/s Anagram (Low demand task)
3. Numerical (Low demand task) v/s Anagram (Low demand task)

First comparison was made for WCST and numerical task (Table 4.2), second for WCST and anagram task (Table 4.3) and third for numerical and anagram task (Table 4.4). First two comparisons of mean scores were as per the testing of our first hypothesis and third comparison was made with an aim to examine the significance of different tasks’ role in set-switching.

| Table 4.2 Paired Sample t test (High demand task - Low demand task) |
|-------------------------|--------------------|-------------|---------|--------|-----------|-----|
| Variable               | Task               | Mean        | Mean Difference | S.D.   | t-value  | Sig. (2-tailed) |
| % Perseverative Error  | WCST - Numerical   | 22.47       | 6.67             | 15.80  | 8.87     | 30.63 .01       |

| Table 4.3 Paired Sample t test (High demand task- Low demand task) |
|-------------------------|--------------------|-------------|---------|--------|-----------|-----|
| Variable               | Task               | Mean        | Mean Difference | S.D.   | t-value  | Sig. (2-tailed) |
| % Perseverative Error  | WCST - Anagram     | 22.47       | 5.46             | 17.01  | 9.58     | 30.53 .01       |

85
Table 4.4 Paired Sample t test (Low demand tasks)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Task</th>
<th>Mean</th>
<th>Mean Difference</th>
<th>S.D.</th>
<th>t-value</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Perseverative Error</td>
<td>Numerical</td>
<td>6.67</td>
<td>1.21</td>
<td>4.24</td>
<td>4.90</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>Anagram</td>
<td>5.46</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.2 shows significant mean differences between high demand task (WCST) and low demand task (Numerical) on the measure of set switching. Results are reported in Table 4.3, which revealed significant mean differences between WCST (high demand task) and Anagram (low demand task). The mean score were observed more for WSCT and less for both numerical and anagram task (Table 4.2 and Table 4.3). So from here, it is evident that as the complexity of task increased or higher demands of rule learning occurred, an increase in number of percent perseverative errors also occurred. However, significant differences were also observed for two equally complex different tasks, i.e. numerical and anagram (Table 4.4). It might be due to the diverse nature of tasks. However, it was found that numerical task had more percentage of perseverative errors in comparison to anagram task. So, from these findings, our first hypothesis that the task demands shall modulate set switching was accepted when complexity is in terms of number of categories in the task. Thus, it can be concluded that the demanding conditions (low vs. high) of a task modulates set switching, however, the nature of task is also of significant importance. Numerical processing happened to be complex than verbal processing despite same number of categories in the tasks.

To achieve the first objective, i.e. “to study various facets of set switching”, factor analysis was employed on tasks/measures of set switching, i.e. WCST, numerical and anagram tasks’ scores. KMO measure of sampling adequacy was 0.80 which falls in range of being great (value between .8 and .9; Kaiser, 1974). It denoted the adequacy of sample for factor analysis. Bartlett’s Test of Sphericity was also found to be significant at 0.001 level of probability. Principal Component (PC) analysis extracted three factors having Eigen value greater than unity (i.e. 1.00). Table 4.5 describes the unrotated component matrix. The extraction of all the variables ranged from 0.41 to 0.94, so all the 14 selected variables were relevant. The three components...
explained 74% (35% for 1st, 27% for 2nd and 12% for 3rd component on rotation, while 53% for 1st, 12% for 2nd and 9% for 3rd component on extraction) of the total variance among 14 variables. The remaining 26% comprised of error variances, unique variances etc.

The unrotated component matrix table (4.5) revealed that Component 1 was a set switching factor with an intermix of WCST, Numerical and Anagram variables. It depicted the generality of cognitive set switching phenomenon across tasks. Second factor was related to the inability of set maintenance (Failure to maintain set) with trials and correct responses. Third factor was also a set switch measure with higher loadings on anagram and numerical task variables with non-perseverative errors and set formation of WCST. This component matrix did not satisfy the

| Table 4.5 Sorted Unrotated Component Matrix\(^*\) (N=296) of task switching measures |
|-----------------------------------|-----------------|-----------------|-----------------|
|                                   | Component 1     | Component 2     | Component 3     | \(h^2\)          |
| Trials                            | .804            | .448            |                 | .888             |
| Correct                           | -.412           | .832            |                 | .863             |
| % Error                           | .950            |                 |                 | .948             |
| % P Response                      | .901            |                 |                 | .828             |
| % P Error                         | .911            |                 |                 | .848             |
| % Non-P Error                     | .577            | .470            |                 | .554             |
| % CLR                             | -.931           |                 |                 | .934             |
| NOCC                              | -.865           |                 |                 | .779             |
| TTCFC                             | .563            | .310            |                 | .414             |
| FTMS                              |                 | .871            |                 | .799             |
| NCC                               | -.616           | .394            |                 | .543             |
| NPE                               | .718            | -.437           |                 | .708             |
| ACC                               | -.605           | .457            |                 | .581             |
| APE                               | .650            | -.519           |                 | .693             |
| Eigen Value                       | 7.34            | 1.71            | 1.32            |
| Percentage of Variance            | 35.12           | 26.73           | 12.28           |
| Cumulative Percentage             | 35.12           | 61.85           | 74.14           |
| Extraction Method: Principal Component Analysis. |
| 3 components extracted. |
| Loadings less than .30 have been eliminated. |

The unrotated component matrix table (4.5) revealed that Component 1 was a set switching factor with an intermix of WCST, Numerical and Anagram variables. It depicted the generality of cognitive set switching phenomenon across tasks. Second factor was related to the inability of set maintenance (Failure to maintain set) with trials and correct responses. Third factor was also a set switch measure with higher loadings on anagram and numerical task variables with non-perseverative errors and set formation of WCST. This component matrix did not satisfy the
criteria of simple structure as 8 variables exhibited crossloadings on different factors (trials, correct, % non-perseverative errors, trials to complete first category, numerical categories completed, numerical perseverative errors, anagram categories completed and anagram perseverative errors). Therefore, the matrix was rotated through Varimax rotation with Kaiser Normalization technique. Varimax converged in 4 iterations and emerged with three principal components (Table 4.6).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trials</td>
<td>.76</td>
<td>.35</td>
<td>.41</td>
</tr>
<tr>
<td>Correct</td>
<td>-.30</td>
<td>.84</td>
<td></td>
</tr>
<tr>
<td>% Error</td>
<td>.85</td>
<td>.44</td>
<td></td>
</tr>
<tr>
<td>% P Response</td>
<td>.68</td>
<td>.57</td>
<td></td>
</tr>
<tr>
<td>% P Error</td>
<td>.69</td>
<td>.58</td>
<td></td>
</tr>
<tr>
<td>% Non-P Error</td>
<td>.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% CLR</td>
<td>-.88</td>
<td>-.38</td>
<td></td>
</tr>
<tr>
<td>NOCC</td>
<td>-.77</td>
<td>-.42</td>
<td></td>
</tr>
<tr>
<td>TTCFC</td>
<td>.63</td>
<td></td>
<td>.86</td>
</tr>
<tr>
<td>FTMS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCC</td>
<td></td>
<td>-.69</td>
<td></td>
</tr>
<tr>
<td>NPE</td>
<td></td>
<td>.79</td>
<td></td>
</tr>
<tr>
<td>ACC</td>
<td></td>
<td>-.73</td>
<td></td>
</tr>
<tr>
<td>APE</td>
<td></td>
<td>.81</td>
<td></td>
</tr>
<tr>
<td>Eigen Value</td>
<td>7.34</td>
<td>1.71</td>
<td>1.32</td>
</tr>
<tr>
<td>Percentage of Variance</td>
<td>35.12</td>
<td>26.73</td>
<td>12.29</td>
</tr>
<tr>
<td>Cumulative Percentage</td>
<td>35.12</td>
<td>61.85</td>
<td>74.14</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 4 iterations.

Factor loadings above 0.295 were considered as significant and accepted for interpretation. It was found that all variables loaded significantly at one of the three factors. From Table 4.6, it can
be seen that the first component was a pure measure of set switching related to WCST variables showing percent errors, trials, percent non-perseverative error, percent perseverative error, percent perseverative response and trials to complete first category took positive loadings on this factor while percent conceptual level responses, number of categories completed and correct responses took negative loading on this factor. Variables revealing positive loading are indicative of switch costs while variables exhibiting negative loadings are indicative of set switching. So it can be said that Ss who had high scores on variables having positive loadings, had more switch costs and less set switching, while Ss who had high scores on variables having negative loadings had low switch costs and high set switching. The WCST facet emerged as bipolar. Those who completed more categories had higher level of conceptual responses and attained more correct scores. They had on the other hand less trials in the WCST, took fewer trials to complete the first category (quick set formation) and committed less perseverative errors (set-switching) and even less overall errors and less non-perseverative errors. Thus, WCST performance is a dimension.

Second component was also a cognitive set-switch factor but with a mix of WCST, anagram and numerical task variables revealing generality of the phenomenon across tasks although the component overlapped with the first one. Cluster of variables with positive loadings are representative of switch cost while variables with negative loadings are representative of set switching. This pattern was parallel to WCST factor. The performance in figural, numerical and verbal tasks was similar though WCST had its unique cognitive processing too. This second component revealed generality of cognitive set formation and switching irrespective of the material to be handled.

Third component was a unidirectional factor showing failure to maintain set, correct responses and trials administered have positive loadings. It indicated that Ss who failed in maintaining set took more trials and quickly changed even not demanded for change. From the above rotated component matrix, three unique factors had emerged with different variables. Although, the phenomenon of set switching was observed across tasks, revealing some commonness between tasks measuring set switching. The obtained matrix or rotated did not though satisfy the simple structure, however, interpretable with common and factor specific variables.

For attaining the second objective of the study, i.e. “to identify the correlates (mobility, lability, cognitive interference) of verbal and non-verbal problem solving with set-switching”, factor analysis was employed on all measures of the study. KMO measure of sampling adequacy was 89
0.81 which falls in range of being great (value between .8 and .9; Kaiser, 1974). It denoted the adequacy of sample for factor analysis. Bartlett’s Test of Sphericity was also found to be significant at 0.001 level of probability. Principal Component (PC) analysis extracted four factors having Eigen value greater than unity (i.e. 1.00) and explaining a total of 70 % variance (Table 4.7). For reducing the number of factors having high loadings, and to simplify the interpretation of analysis, obtained matrix was rotated through varimax rotation with Kaiser Normalization technique. Varimax converged in 5 iterations and emerged with four principal components (Table 4.8).

<table>
<thead>
<tr>
<th>Table 4.7 Sorted Unrotated Component Factor Matrix (N=296) of all variables (with significant loadings)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Trials</td>
</tr>
<tr>
<td>Correct</td>
</tr>
<tr>
<td>% Error</td>
</tr>
<tr>
<td>% P R</td>
</tr>
<tr>
<td>% P Error</td>
</tr>
<tr>
<td>% Non-P Error</td>
</tr>
<tr>
<td>% CLR</td>
</tr>
<tr>
<td>NOCC</td>
</tr>
<tr>
<td>TTCFC</td>
</tr>
<tr>
<td>FTMS</td>
</tr>
<tr>
<td>CF</td>
</tr>
<tr>
<td>FA</td>
</tr>
<tr>
<td>Fus. Freq.</td>
</tr>
<tr>
<td>NCC</td>
</tr>
<tr>
<td>NPE</td>
</tr>
<tr>
<td>ACC</td>
</tr>
<tr>
<td>APE</td>
</tr>
<tr>
<td>Eigen Value</td>
</tr>
<tr>
<td>Percentage of Variance</td>
</tr>
<tr>
<td>Cumulative Percentage</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis
a. 4 components extracted
Quite a general first component emerged with 31.47% of the total variance converging all but two variables, one being failure to maintain set (FTMS) and Flicker-Fusion frequency (Lability). The variate represented set formation, mobility, cognitive facilitation across tasks. Variables named FTMS, Correct responses and trials have contributed from moderate to higher on 2\textsuperscript{nd} component. On factor 3, many variables like CF, % Non-P Error and others have made very moderate contribution. On factor 4, temperamental measures of mobility (FA) and lability (Fusion frequency) have made positive contribution. Yet the component matrix was not structurally simple. The obtained matrix displayed structural similarity with matrix in Table 4.6.

| Table 4.8 Sorted Rotated Factor Matrix (N = 296) of all variables (Significant Loadings only) |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| Factor 1 | Factor 2 | Factor 3 | Factor 4 |
| Trials | .769 | .323 | .433 |
| Correct | -0.336 | | .841 |
| % Error | .880 | .401 |
| % P Response | .741 | .512 |
| % P Error | .748 | .519 |
| % Non-P Error | .718 |
| % CLR | -0.900 | -0.335 |
| NOCC | -0.806 | -0.327 |
| TTCFC | .617 | |
| FTMS | | | .863 |
| CF | | -0.634 |
| FA | | -0.405 | .651 |
| Fus. Freq. | | | .820 |
| NCC | | -0.694 |
| NPE | .361 | .733 |
| ACC | | -0.678 |
| APE | | .722 |

91
Table 4.8 represented the factor loadings for each factor after rotation. The extraction of all the variables ranged from 0.42 to 0.94, so all the variables seem relevant and appropriate to selection of variables. Factor loadings above 0.295 were considered as significant for interpretation. It was found that every variable loaded significantly at at least one of the four factors. In order to interpret the obtained factors, sorted tables for each factor were prepared. These have been described factor wise.

**Factor I**

Table 4.9 describes the sorted factor loadings on Factor 1 extracted from rotated factor matrix (Table 4.8 Varimax extracted factor matrix).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Loadings (+ve)</th>
<th>Variables</th>
<th>Loadings (-ve)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Error</td>
<td>.88</td>
<td>% Conceptual Level Response</td>
<td>.90</td>
</tr>
<tr>
<td>Trials</td>
<td>.77</td>
<td>Number of Categories Completed</td>
<td>.81</td>
</tr>
<tr>
<td>% Perseverative Error</td>
<td>.75</td>
<td>Correct attempts</td>
<td>.34</td>
</tr>
<tr>
<td>% Perseverative Response</td>
<td>.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Non Perseverative Error</td>
<td>.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trials to Complete First Category</td>
<td>.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Numerical Perseverative Error</td>
<td>.36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This factor was outcome of switch cost measures showing - percent errors, trials, percent perseverative error, percent perseverative response, percent non-perseverative error, trials to complete first category and numerical perseverative error, took positive loadings on this factor,
whereas percent conceptual level response, number of categories completed and correct responses, took negative loadings on this factor. The first cluster was of those measures – where higher scores were positively correlated with this factor and second group was of those measures which were negatively related with this factor. This factor emerged as a group of variables which were related to WCST. So this factor was named as ‘WCST: Switch Cost - Set Switch’. Positive loadings on this group were remarked as measures of switch cost and negative loadings were remarked as measures of set-switch. Higher the conceptual level response lesser shall be the errors, is the salient aspect of emerged WCST dimension. Merging with other variables did not influence the uniqueness of WCST as the factor structure was similar to pure WCST factor analysis (Table 4.5 & 4.6).

**Factor II**

Table 4.10 describes the sorted factor loadings on factor two extracted from rotated factor matrix (Table 4.8).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Loadings (+ve)</th>
<th>Variables</th>
<th>Loadings (-ve)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerical Preseverative Error</td>
<td>.73</td>
<td>Numerical Categories Completed</td>
<td>.69</td>
</tr>
<tr>
<td>Anagram Preseverative Error</td>
<td>.72</td>
<td>Anagram Categories Completed</td>
<td>.68</td>
</tr>
<tr>
<td>% Preseverative Error</td>
<td>.52</td>
<td>Cognitive Facilitation</td>
<td>.63</td>
</tr>
<tr>
<td>% Preseverative Response</td>
<td>.51</td>
<td>Flexibility of Attention (Mobility)</td>
<td>.41</td>
</tr>
<tr>
<td>Overall % Error</td>
<td>.40</td>
<td>% CLR</td>
<td>.34</td>
</tr>
<tr>
<td>Total Trials</td>
<td>.32</td>
<td>NOCC</td>
<td>.33</td>
</tr>
</tbody>
</table>

This factor was emerged as general measure of Switch cost and Set-switch with a mix of other variables showing – numerical preseverative error, anagram preseverative error, percent
perseverative error, percent perseverative response, percent errors and no. of trails took positive loadings on this factor, whereas numeric categories completed, anagram categories completed, cognitive facilitation (non-interference), flexibility of attention (mobility), percent conceptual level response and no. of categories completed were negatively loaded on this factor. The first cluster was of perseverative measures – where higher scores were associated with switch cost. The second group consisted set switch in general and cognitive processes measures – where higher scores were associated with set formation and maintenance, flexibility in cognitive processes and cognitive facilitation. It was a factor verifying 2nd hypothesis and the second objective as the loaded variables confirmed that those who had high mobility of nervous processes, high cognitive non-interference they learned more categories be these figural, numerical or verbal and they too committed less errors and also took less total trials. The factor clearly exhibits the commonness of the WCST with numerical and anagram task that attests to the concurrent validity of both tasks loading with a standardized task (numerical and anagram tasks were prepared by the investigator).

**Factor III**

Sorted Component loadings on 3rd component are presented in Table 4.11

<table>
<thead>
<tr>
<th>Variables</th>
<th>Loadings (+ve)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to Maintain Set</td>
<td>.86</td>
</tr>
<tr>
<td>Correct</td>
<td>.84</td>
</tr>
<tr>
<td>Trial</td>
<td>.43</td>
</tr>
</tbody>
</table>

This factor emerged with a group of measures related to WCST showing - failure to maintain set, correct responses and trials, with positive loadings. High scores on this factor were related with an inability to set maintenance, more correct responses and more total trials taken. In their desperate attempts subjects took more and more trials, though they quickly picking the right category to make more correct responses but tended to change quickly and not maintaining set. Such performance is distinct to set-switching and therefore did not have common variance. It was otherwise observed that in WCST, some people fail to maintain set despite set formation and set switching.
Factor IV

Sorted component loadings on component IV are presented in Table 4.12

Table 4.12 Sorted Component Loadings on Factor IV

<table>
<thead>
<tr>
<th>Variables</th>
<th>Loadings (+ve)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flicker Fusion Frequency (Lability)</td>
<td>.82</td>
</tr>
<tr>
<td>Flexibility of Attention (Mobility)</td>
<td>.65</td>
</tr>
</tbody>
</table>

Fourth factor was a unidirectional factor with positive loadings on measures of fusion frequency and flexibility of attention. This factor was a temperamental measure of Lability with Mobility. Temperamental traits being separately represented attested that it had its own unique variance which was different to the cognition. Both measures tapping speed and showing correlations. Labiles are mobiles too or stabiles are inert too.

Thus, the overall factor structure though fulfilling the objective and confirming the domain and sub-domain structure as per theory but the convergence of components did not yield the simple structure. There was lot of overlapping among the variables across components.

Individualistic characteristics and Set-switching:

For testing the 2nd hypothesis of study, i.e. “people high on cognitive interference, low on mobility and lability will have greater difficulties in set-switching across tasks simple correlation matrix was accounted for variables measuring switch costs, personality and temperamental measures (Table 4.13). Though the obtained structure in Table 4.8 partly exhibited some correspondence but correlation coefficients further showed it more clearly at dyadic level.

<table>
<thead>
<tr>
<th>Table 4.13 Correlation Matrix (N=296)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% P Response</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>CF</td>
</tr>
<tr>
<td>FA</td>
</tr>
<tr>
<td>Flic. Freq.</td>
</tr>
</tbody>
</table>

**p< 0.01, *p< 0.05
From the correlation table, it is seen that significant correlations were observed among set switching measures, cognitive facilitation/low interference and temperamental dimensions of personality, i.e. mobility and lability. Cognitive facilitation (CF) revealed significant negative correlations with % PR, % P error, numerical and anagram perseverative error (0.30, 0.31, 0.35, 0.25, respectively) and significant positive correlation with NOCC, numerical categories completed and anagram categories completed (0.15, 0.36, 0.30 respectively) indicating that as the cognitive facilitation increases, there was an increase in completion of categories not only on WCST but also on numerical and anagram tasks as well reduction in errors. Similarly, mobility (Flexibility of attention) scores also exhibited significant negative correlation with % P responses, % P error, numerical and anagram perseverative error (.29, .28, .25, and 0.26 respectively) and significant positive correlation with NOCC, numerical and anagram categories completed (0.33, 0.25, and 0.27 respectively). It showed better set-switching among mobiles than stabiles. Lability (flicker frequency) scores were also in accordance to the interference and mobility results, which revealed significant negative correlation with % P response (0.28) and % P errors (0.29), NPE (0.22) and APE (0.15) while significant positive correlation with NOCC (0.22), NCC (0.14) and ACC (0.21). So, more labile the nervous processes, better was the set-switching than the inert processes.

The above stated correlations led to formulate following conclusions regarding cognitive interference, mobility and lability –

-Ss who had low scores on cognitive facilitation (i.e. high interference), mobility and lability dimension, committed more perseverative responses, perseverative errors not only on WCST, but also on numerical as well as anagram tasks. On the other hand, Ss who had high scores on these three traits had more number of categories completed and did less errors not only on WCST, as well as on numerical as well as anagram task. Thus from these findings our 2nd research hypothesis that, “people high on cognitive interference, low on mobility and lability will have greater difficulties in set-switching across tasks” was accepted.

Efficacy of intervention among high switch cost group:

To achieve the third aim of the study, i.e. to inspect the effectiveness of intervention strategies on Ss having difficulty in set switching, mean differences were compared. Ss, who exhibited a
general tendency of difficulty in set switching (N=70) were divided into two equal groups randomly. One group was presented explicit intervention while other group was given implicit intervention. Effectiveness of intervention strategies (both explicit and implicit) was verified by comparing the mean scores of different variables for the same group [i.e. paired sample t test, and for identifying which intervention strategy (explicit and implicit) was proved more effective] and mean scores of the same variables but for two different groups were compared (i.e. independent sample t test was applied). In simple words, paired sample t test was exercised for comparing the mean differences in scores of pre-intervention group and post intervention group while independent sample t test was applied for comparing the mean scores of same variables but for two different groups (explicit and implicit group).

Two paired sample t test one for explicit intervention group (Table 4.14) and other for implicit intervention group (Table 4.15), were done.
Table 4.14 Paired sample t test Pre-Post Explicit strategy Group (N=35)

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<tr>
<th>Variable</th>
<th>Condition</th>
<th>Mean</th>
<th>Mean Difference</th>
<th>S.D.</th>
<th>t-value</th>
<th>Sig. (2-tailed)</th>
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<td></td>
</tr>
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</table>

Where, I - Pre; II - Post
The above paired statistics showed the mean of each variable. From the table (4.14), it is seen that statistically significant mean differences for all the variables were obtained. All the measures of WCST included in study (i.e. trial, correct, percent error, percent perseverative response, percent perseverative response, percent non-perseverative error, % conceptual level response, no. of categories completed, trials to complete first category and set failure) exhibited significant mean differences in two testing sessions (Before intervention-After intervention). Verbal tasks, e.g. numerical and anagram also exhibited statistically significant mean differences between pre and post intervention testing sessions. In other words, intervention (explicit) improved performance on all variables by decrement in perseverative responses/errors and increment in number of categories completed.

Table 4.15 Paired sample t test Pre-Post Implicit strategy group (N=35)

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<tr>
<th>Variable</th>
<th>Condition</th>
<th>Mean</th>
<th>Mean Difference</th>
<th>S.D.</th>
<th>t-value</th>
<th>Sig. (2-tailed)</th>
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</table>
The above paired statistics exhibited the mean scores of each variable. From the Table 4.15, it can be seen that statistically significant mean differences were observed for all variables. Significant results for all measures of WCST and Verbal tasks i.e. numerical and anagram tasks, clearly revealed that differences in mean scores of two testing (Before-After intervention) were notable and were indicative of performance enhancement (decrement in switch costs) as a result of intervention (implicit) strategy. Hence, our research hypothesis that ‘explicit and implicit intervention will reduce difficulty in set switching’, was accepted/proved.

<table>
<thead>
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<th>Std. Dev.</th>
<th>Mean Difference</th>
<th>t</th>
<th>Significance</th>
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<td>Explicit</td>
<td>.03</td>
<td>.17</td>
<td>-.05</td>
<td>-1.02</td>
<td>.31 (Ns)</td>
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<tr>
<td>Implicit</td>
<td>.08</td>
<td>.28</td>
<td></td>
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<td>Anagram Categories Completed</td>
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<tr>
<td>Explicit</td>
<td>1.80</td>
<td>.40</td>
<td>-.17</td>
<td>-2.30</td>
<td>.02</td>
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<tr>
<td>Implicit</td>
<td>1.97</td>
<td>.17</td>
<td></td>
<td></td>
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<tr>
<td>Anagram Perseverative Error</td>
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<tr>
<td>Explicit</td>
<td>.20</td>
<td>.47</td>
<td>.06</td>
<td>.57</td>
<td>.57 (NS)</td>
</tr>
<tr>
<td>Implicit</td>
<td>.14</td>
<td>.355</td>
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For evaluating the degree of effectiveness between explicit and implicit intervention, mean scores of both groups for all variables were compared by applying independent sample t test. From Table 4.16, it is clear that explicit intervention group had more mean scores on various variables (e.g. trials, correct, percent error, percent perseverative response, percent perseverative error, percent non-perseverative error, trials to complete first category, failure to maintain set and anagram perseverative error) than implicit intervention group and significant mean differences observed for all (except trials to complete first category) variables, clearly indicated the effectiveness of implicit intervention over explicit intervention (except correct scores, all other variables are indicative of poor performance or switch costs; so more mean scores means more switch costs and vice-versa). Implicit intervention group yielded more mean scores for percent conceptual level response, number of categories completed, numerical categories completed, numerical perseverative error and anagram categories completed than explicit group and statistically significant mean differences were observed for percent conceptual response, numerical categories completed and anagram categories completed. The results were more supportive for implicit intervention’s usefulness over explicit intervention (as these variables were indicative of set switch, so high mean scores represent high set switch and vice-versa; except numerical perseverative error which exhibited non-significant mean differences). From here, it is evident that implicit intervention group had more enhancement in performance in comparison to explicit intervention group. Hence, our research hypothesis that, ‘explicit and implicit intervention will have different effect’ was accepted.

Outcomes of the present research clearly revealed that the executive processes mainly set switching, was a general phenomenon that was observed in various verbal and non-verbal tasks/conditions measuring this aspect. But the extracted factors were not independent; rather some commonness/sharing was exhibited by them. Principal component analysis extracted four factors, having Eigen value greater than unity (i.e. 1.00) and explained a total of 70 % variance. Varimax rotation converged in 5 iterations and emerged with 4 principal components. Out of four factors, two factors i.e. Factor 1 and Factor 3 were WCST switch cost measures with other variables, whereas second factor was a measure of set formation and set switch with a mixture of many variables and fourth factor was a pure nervous system measure in form of mobility and lability. Task demands (low vs. high) were found to be modulating set switching across different