Chapter V

Results and Discussion

The obtained results have been presented and discussed in the following section, to determine whether they confirm or reject the hypothesis formulated in Chapter III.

As mentioned in Chapter IV, a multigroup design with four groups was employed to test these hypotheses. The obtained results are shown in the following table:

Table 1 Showing the meantime scores and mean errors committed by the CPZ and saline injected subjects.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>CPZ mg/kg</th>
<th>NaCl 0.25 ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>0.65</td>
<td>0.95</td>
</tr>
<tr>
<td>I</td>
<td>60.303</td>
<td>280.951</td>
</tr>
<tr>
<td>II</td>
<td>0.0165</td>
<td>0.071</td>
</tr>
<tr>
<td>III</td>
<td>0.0165</td>
<td>0.071</td>
</tr>
<tr>
<td>IV</td>
<td>0.0165</td>
<td>0.071</td>
</tr>
</tbody>
</table>

From the means it appears that the animals
injected with a low dose of CPZ (Gr. I - 0.65 mg/kg) had the least mean time score while that of the group injected a high dose of CPZ (Gr. III 1.25 mg/kg) is the maximum. Similarly the animals of group I committed the least number of errors while the errors of group III are the most. In order to test whether these differences were significant, 'Duncan's Range Test was applied. Although Analysis of variance (ANOVA) could also have been used, the present investigator preferred DRT since this technique is less cumbersome and less time consuming. McGuigan (1978) also regards DRT as the most appropriate statistical test for the multigroup design.

Table 2  Showing the significance of the difference between the mean time scores of the CPZ and saline injected subjects by using DRT.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Group</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPZ 0.65 mg/kg</td>
<td>I</td>
<td>60.303</td>
</tr>
<tr>
<td>NaCl 0.25 ml</td>
<td>IV</td>
<td>98.585</td>
</tr>
<tr>
<td>CPZ 0.95 mg/kg</td>
<td>II</td>
<td>280.951</td>
</tr>
<tr>
<td>CPZ 1.25 mg/kg</td>
<td>III</td>
<td>383.875</td>
</tr>
</tbody>
</table>

F < .01
FIG. 2. SHOWING THE MEAN TIME SCORES OF THE CPZ (0·65, 0·95, 1·25 mg/kg) AND NaCl INJECTED GROUPS
From the above tables it is evident that the difference between the mean time score of group I (CPZ 0.65 mg/kg) is significantly different from that of group II and III (CPZ 0.95 mg/kg and 1.25 mg/kg P < .01). Further comparison of these three groups with the saline injected group indicate that although the two higher dose groups required more mean time to reach the criterion (P < .01) the lower dose group animals were faster than the saline treated group also. However this difference between group I and group IV was not significant even at the .05 level. From figure two it is evident that the group I subjects learnt faster than any of the other groups. In fact this group reached an asymptotic level of performance after the second day while the saline group reached after the seventh day. Even then the mean time score of group I was lower than that of the saline. Although the two other groups which received higher doses of CPZ also reached an asymptotic level of performance after the seventh day. Their mean time score was 87.37% higher than that of the saline. The mean time scores of these two groups was lower than that of the saline injected group during the initial trials. However this increased steadily on each subsequent trial and during the last few days the
animals hardly showed any movement. The present inves-
tigator had hypothesised that acquisition would be faster in group I as compared to other groups, since the facili-
tatory effect of low doses of CPZ would be supplemented by the advantage occurring from the fear reducing property of this drug leading to a substantial saving in the overall learning time on the pipe walking task which involves a great amount of fear. This hypothesis is supported by the results of present investigations.

A number of researches (Davis, 1963; Lapore et al, 1974; Lolonde et al, 1982) have reported that CPZ reduces anxiety and fear. Since in the pipe-walking task acquisition was retarded due to development of fear, therefore reduction of fear due to CPZ adminis-
tration facilitated retention. This is evident from the fact that the mean time score of all the CPZ injected subjects was lower than that of the saline injected subjects. On the first day of training, the lower doses of CPZ has an overall facilitated retention while the two higher doses have inhibitor effects. Similar dose dependent effects have been observed by Canen et al. (1976), Baturin (1977), Hartley et al. (1978),
Holtzman et al. (1979) and Davis et al. (1979). Sin
in the present investigation a fear inducing task w
used in which the fear element was effective only during
the initial stage of acquisition the facilitation due to
reduction of fear was observed only on these few trials.
Acquisition did not improve even in the higher dose
groups in the subsequent trials, since now due to the
absence of the fear element only the impairing effects
were observed.

Thus the second hypothesis which predicted
that the facilitatory effect of EPZ on acquisition would
be limited only to the initial trials when higher doses
of CPZ are used is verified by the results of present
study. Since CPZ has an inhibitory effect on memory
consolidation when administered in high doses (Gibb Mark,
1973; Castelleno et al., 1977), this disadvantage due
to the retarding effect of CPZ overcome by reduction of
fear leading to the better acquisition. But this effect
is observed only during the initial stages, that is,
until the fear element of the task is functional. Similar
results were observed by Salthia and Muhar (1978).
FIG. 3. SHOWING THE MEAN ERRORS COMMITTED BY CPZ (0.65, 0.95, 1.25 mg/kg) AND NaCl INJECTED GROUPS
Further analysis of the mean errors committed by the CPZ and saline injected subjects does not support for these hypotheses.

Table 3. Showing the significance of difference between the mean errors committed by the CPZ and saline injected subjects by using DRT.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>0.65mg/kg</th>
<th>0.95 mg/kg</th>
<th>0.25ml</th>
<th>1.25mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>CPZ I</td>
<td>CPZ II</td>
<td>NaCl IV</td>
<td>CPZ III</td>
</tr>
<tr>
<td>Mean</td>
<td>0.0165</td>
<td>0.071</td>
<td>0.1161</td>
<td>0.151</td>
</tr>
<tr>
<td></td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td></td>
<td>_P &gt; .01</td>
<td>__</td>
<td>___</td>
<td>___</td>
</tr>
</tbody>
</table>

The difference between the mean errors committed by group I is found to be significantly different only from group III (1.25 mg/kg P > .05).

From figure 3 it is clear that although the difference between the mean errors committed by the other three groups was not significant, the saline injected
animals committed more error as compared to group I (CPZ 0.65 mg/kg) during the initial trials. The errors decreased and were completely eliminated (Gr.I and Gr.IV) by the sixth trial.

In case of the other two groups there is no consistency in the mean error score/day. Here also the number of errors on the first two days of training is lesser for these groups as compared to saline. Although the number of errors decrease steadily for the saline group there is no decrement in the errors of the two CPZ groups (Gr.II and Gr.III).

Thus the results of the present investigation indicates the CPZ has a dose dependent effect on retention. CPZ has a facilitative effect on acquisition of fear inducing task is used even when administered in high doses, although this effect is limited only until the fear element tasks.

The present investigator was well aware of the fact that pretraining administration of CPZ would have a varied effect on the behaviour of the animals. It has been reported that CPZ depresses locomotor
activity (Davis, 1963; Blough, 1958; Block et al., 1973 and Telner et al., 1976) impairs attention (Allport et al., 1964; Stolerman et al., 1971) reduces anxiety and fear (Davis, 1963; Lepore et al., 1974; Lolonde et al., 1982) and block the transmission across the noradrenergic, dopaminergic and serotonergic synapses, it would be difficult to determine whether the observed amnesic or facilitatory effect is due to an influence of specific memory consolidation processes or because the other effects. Inspite of this drawback the drug was not administered after training, since it is absorbed very slowly into the system and it is effective from 30 minutes to 8 hours after administration. Thus if CPZ had been administered after training memory consolidation would be affected after 40 minutes thereby resulting in some retention during this initial stage.

Another problem faced by the present investigator was that prolonged administration of CPZ (specifically in the case of higher dose groups) had a detrimental effect on the animals. The activity level and appetite of the animals were adversely affected, while confusion developed. Immobility was also observed
in the animals (this has been shown in the photographic plate on the facing page). This was most apparent in the case of animals of group II (0.95 mg/kg) who tended to freeze in the posture in which they were placed.

We may now sum up the findings of present investigation. An experiment based on a multigroup design with four groups was conducted to study the effect of CPZ on acquisition of a fear inducing task. It was hypothesised that the low doses would have a facilitatory effect on acquisition and retention of a pipe walking task whereas this effect would be limited only to the initial few trials. Results (comparison of the mean time scores) support both these hypotheses. Thus it appears that CPZ does influence specific information processing mechanism, the effect being dose dependent. Also reduction of fear during the acquisition of fear reducing task has a beneficial effect on learning.