Chapter II

METHODOLOGY
In the present study the researcher explores developmental psychopathology in the context of Epilepsy which is a neuropsychological disorder. Also, the cognitive functions like Memory and Intelligence is evaluated and compared among children with LD, Epilepsy, Epilepsy with LD and ADHD, Epilepsy with LD and a comparison group who are normal. In this chapter details are furnished regarding how the researcher approached the problem and the tools used to reach a conclusion. Initially a brief pilot study was conducted, based on which the sample for the study was finalized and data was collected randomly from clinical population and normal children. Based on the sample and the hypotheses statistical analyses was planned. A detailed description of the sample, tools, procedure for administration and statistical analyses is give below.

2.1. SAMPLE:

In the present study initially, a trial study was conducted (pilot study) to assess the number of cases available in the general population and also to know the time required for administering the tools to get information from an individual case. When the pilot study was conducted the researcher encountered certain difficulties and the methodology and approach was modified with the help and guidance of experts in the field of developmental psychopathology and research.

The sample for the pilot study included five children of which three were girls and two were boys with epilepsy. Both boys were identified as LD but only one girl had learning difficulties. Out of the five only two had partial epilepsy, rest of the three had general seizure. It was thus understood that it could be difficult to get the quality and quantity of data planned initially by the researcher to collect information. Also from
This pilot study it was understood that it will take two to two and a half hours on a single case. To reduce the time and unnecessary effort the confirmatory test for LD was not used by the researcher if the assessment was already been done by an expert in the field (Eg. A special educator, clinical psychologist, psychiatrist etc.) thus reducing the time spend on a child to one hour forty-five minute on an average.

After the pilot study CPM was confirmed for assessing IQ of children between the age 6-12 years and SPM for children up to an age 15 years. Memory test for Children was administered and DPCL was administered to parents. Appropriate rest intervals were provided so that it was not a burden for children as well as for their parents. Data was collected from about 235 children and their parents, of which usable data was obtained only from 105. The final sample of 105 children belonged to the four different categories namely,

I. Epilepsy group (Group I, Epi) which included children with TLE and OTLE,
II. Epilepsy + developmental psychopathology (Group II, Epi+Depath.),
III. Children with Learning disability (Group III, LD)
IV. The control group (Group IV, N).

The sample distribution of 105 children included for the study is given in the table (2.1).

Table 2.1: - The distribution of sample for the final study.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Description</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>Epilepsy-TLE</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Epilepsy-Other than TLE</td>
<td>15</td>
</tr>
<tr>
<td>Group II</td>
<td>Epilepsy+LD+ADHD</td>
<td>15</td>
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<tr>
<td></td>
<td>Epilepsy+LD</td>
<td>15</td>
</tr>
<tr>
<td>Group III</td>
<td>LD</td>
<td>15</td>
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2.1.1. INCLUSION AND EXCLUSION CRITERIA

The groups included in the study were selected based on the following inclusion and exclusion criteria. Detailed criteria for each group are given in different headings.

2.1.1.a. Developmental Psychopathology

*Inclusion criteria*

- Age of the child to be included was between 5-15 years.
- No mental retardation.
- No psychiatric illness.
- No physical handicap.
- Confirmation of LD, Epilepsy+ LD+ ADHD and Epilepsy+ LD was done with the help of neurologist for Epilepsy and for associated LD and ADHD was confirmed by the investigator or by an expert Clinical Psychologist working in the institution where the data was collected based on ICD classification.

*Exclusion criteria*

- Other childhood disorders.
- Any Medical conditions which are chronic or acute.
- Age below 5.
• Age above 15.

2.1.1.b. Epilepsy

*Inclusion criteria*

• Confirmation of epilepsy by a qualified neurologist.

• Age 5 - 15.

• No Mental Retardation.

• Only partial seizure (TLE & O TLE)

*Exclusion criteria*

• Classification of seizure if not specified such cases were excluded.

• At least the child should have undergone 6 months of treatment.

• Other disorders or co morbidities including neurological or other health related disorders.

• Age above 15 & below 5.

• Drug abuse

2.1.1.c. Control Group

*Inclusion criteria*

• Age 5-15 years

• Participants who are matched with the clinical population based on age, education, SES etc.

*Exclusion criteria*

• Children who had a history of medical conditions which affects their cognitive skills.

• Presence of a History of psychiatric problems.
- Drug abuse.
- Mental retardation.

Based on the demographic variables the sample split up is given in table 2.2.

<table>
<thead>
<tr>
<th>Table 2.2: Sample split up based on demographic variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
</tr>
<tr>
<td>5-10</td>
</tr>
<tr>
<td>10-15</td>
</tr>
<tr>
<td>SEX</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>SES</td>
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</tbody>
</table>

2.2. TOOLS:

Standardized tools were used to evaluate the cognitive skills like Intelligence, Memory and developmental psychopathology of children with epilepsy and children with LD, ADHD and the control group. The following tools were used.

1. Epilepsy Performa.
2. CPM or SPM
3. DPCL.
4. Memory scale for children

Details of the tests used in the present study are given below.

2.2.1. Epilepsy Performa:

It consisted of 17 items which was given to the medical practitioners who diagnosed cases for the investigator who conducted the study. The medical practitioners categorized the specific type of epilepsy into GTCS or partial seizures and confirmed the
site of origin of the seizure as TLE or OTLE. The age of onset, general performance in
education etc. were some of the interesting areas covered by the performa. Of this, five
items (2, 14, 15, 16 & 17) was filled in by investigator itself. This helped the investigator
to establish a good rapport. During this time the appointment was provided so that the
other tests could be administered. This was done in the presence of the medical
practitioner. This Performa was developed based on the discussion between the
investigator and the Guide.

2.2.2. (a) CPM

Colored Progressive Matrices (CPM): Developed by Raven, JC (1956). This is
designed for use with young children and clinical population and old people. The test as
a whole is described as a test of observation and clear thinking. The percentile scores
indicate the intellectual capacity of the person. There are three sets of 12 problems which
consist of the colored matrices, are arranged to assess the chief cognitive processes which
children under 11 years of age are usually capable of. The three sets together provide
three opportunities for a person to develop a consistent theme of thought, and the scale of
36 problems as a whole is designed to assess as accurately as possible, mental
development up to intellectual maturity. Mental development in children does not
progress gradually but is rather unpredictable with sudden leaps. It is these running leaps
in a child’s intellectual development which the colored progressive matrices can
elucidate.

CPM is constructed for children between five and eleven years. In the 1956 edition,
36 problems constituting Set A, Ab and B was revised and rearranged to provide a more
uniform increase in the order of difficulty. During the preliminary conversation the particulars of the child to be tested are filled in on the record form.

**Administration:**

The psychologist then opens the book to the first illustration, A.1, and says:” Look at this” (pointing to the upper figure)”you see, it is a pattern with a piece cut out of it. Each of these pieces (pointing to each in turn) is the right shape to fit the space, but only one of them is the right shape, but is not the right pattern. No.2 is not a pattern at all. No.3 is quite wrong. No.6 is nearly right but it is wrong here (point to the white piece). Only one is right. Point to the piece which is right.” If the child does not point to the correct answer continue explanation. Once the problem is solved turn to problem A2 and say: “Now point to the piece which came out of this pattern.” If the child fails to do A2, re demonstrates A1. If the problem is solved then proceed to A3. In test A4, before the child has time to answer, say;” Look carefully at the pattern”(move the finger across it)”only one of these pieces is quite right. Be careful, look at each of them first” (point to all six alternatives given below). “Now point to the right one to go in here.” (Point to the space). When the child has pointed to one of the pieces, whether it is right or wrong the psychologist says: “Is that the right one to go in here?” If the child says “Yes” the psychologist accepts his choice with approval, whether it is right or wrong. The same method is employed for Set Ab and Set B. Always begin with A1 till B 12. No additional assistance in the method or solving the problem, or comment on child’s decisions, is permissible.

**Scoring:**
Using the key provided number of right responses given by the child is noted. Discrepancies in a person’s score composition can be assessed by subtracting from a person’s score on each set and the score normally expected from the same total score on the scale. This shows the validity of the data. Based on the total correct responses percentile can be calculated. Finally the subject can be classified into 5 groups.

-Intellectually superior
-Above average
-Intellectually average
-Below average
-Intellectually defective.

2.2.2.(b) Standard Progressive Matrices (SPM): J. C. Raven

The scale consists of 60 problems divided into five sets of 12. In each set the first problem is self-evident. The problem that follows becomes progressively more difficult. The five sets provide five opportunities for grasping the method and five progressive assessment of a person’s capacity for intellectual activity. The scale is intended to cover the whole range of intellectual development from the time a child is able to grasp the idea of finding a missing piece to complete a pattern, and to be sufficiently long to assess a person’s maximum capacity to form comparisons and reason by analogy without being unduly exhausting.

A person’s total score provides an index of his intellectual capacity, whatever his nationality or education is. Test retest reliability ranged within 0.83-0.93. Validity was found to be 0.86 with Terman-Merrill scale.

Administration:
A booklet, Record form and a pencil is given to the child and is asked to open the 1st page. “At the top it says Set A and you have a column A here, on your scoring form. This is A1. You see what it is. The upper part is a pattern with a bit missing. Each of these bits below (he points to each in turn) is the right shape to fit the space, but they do not all complete the pattern. Number 1 (he points to the bit and then to the pattern) is quite the wrong pattern. Number 2 and 3 are wrong- they fit the space, but they are not the right pattern. Ask the subject to write the correct answer against Number 1 in Column A on the record form. Ask the subject to continue the same procedure till the end (E 12).

Scoring:

Using the stencil provided and the correct responses are found. Then the discrepancies are found, if it deviates above plus or minus 2 the data is considered invalid. Based on the total score percentiles can be calculated and the participants can be classified in to any of the five categories mentioned above in CPM.

2.2.3: Developmental Psychopathology Check List-DPCL

Kapur, M., Barnabas, I P., Reddy, M V et al. (2002) constructed the test as an Indian Version of Child Behavior Check list (CBCL) by Achenbach and Edelbrock. It consisted of 6 subsections:

Developmental History, Developmental Problem, Psychopathology, Psychosocial factors, Temperament, Social support and assets of the child.

Description of the check list:
**Developmental History** (Items 1-10): This consists of pre-peri and post natal problems, possible brain injury, sensory motor handicaps, developmental delays in motor, language, cognitive, emotional and social development.

**Developmental Problem** (11-28): This section elicits developmental problems like clumsiness, breath holding spells, habits, speech and language problems, feeding, elimination, sleeping and sexual problems.

**Psychopathology** (29-78): Externalizing problems of hyperactivity and conduct disturbance, scholastic problems and internalizing problems of the emotional, somatic and neurotic kind and psychosis are elicited.

**Psychosocial factors** (79-101): In this section, the family history of illness, interactions within the family, child rearing practices, child’s relationship with parents and siblings and relationships in school setting are explored.

**Temperamental Profile** (102-118): This part is a simple version with 3 major categories with special focus on the resilient or competent child. The dimensions measured are: manageability, trust, dependence, sleep, appetite, activity level, emotionality, sociability and aggression. The dimensions go beyond western conceptualization of temperament and comprises of the ancient Indian model of “TRIGUNAS”.

**Social supports and assets of the child** (119-124): In this section details regarding the presence of helpful people within and outside the family, friends and special interests, talents, hobbies, the child may have, are elicited.

Reliability of the entire check list was tested by interclass correlation coefficient (ICC) via Analyses of Variance. The ICC was 0.965. Validity was found against CBCL
which was found to be significant. DPCL goes beyond CBCL, by providing importance to disorders relevant to the Indian context. This is one of the simplest tools that can be used across disorders, age and gender. The test is available in regional languages.

**Administration:**

The Mother, Father or the significant caretaker was asked to report to the investigator on the appointed date. They were seated comfortably and were interviewed based on the checklist. The responses given were appropriately represented in the checklist by the investigator. After completing the checklist they were thanked for the cooperation they extended for the study.

**Scoring:**

One point was provided if there was a deviance. Each section had a separate total. From the norms provided in the manual cut off scores are found. The scores which fall above the cut of scores were interpreted as deviant.

### 2.2.4. Test of Memory for Children (TMC)

The test was constructed by Barnabas, I et al. (2002). The test is intended to measure memory skills of children in Indian context. Here Memory is considered as a process by which information stored is brought into awareness when required. It does not refer to a single process or structure or an isolated skill; rather it refers to the processing-storage-retrieval function of the mind that must be seen as embedded in a context. The test is constructed, based on this perspective.

The test consists of the following 14 subtests.
**Personal information** (PI-5 items): This is a measure of remote memory which constitutes recall of past events of personal life.

**Mental control** (MC-5 items): These verbal automatisms learned by rote in early childhood and frequently used throughout in life are normally recalled without thinking consciously with accuracy and less effort.

**Sentence Repetition** (SR-5 items): This measures sequential reproduction of the sentences in verbatim.

**Logical Memory** (LM-18 facts): Measure the immediate and delayed recall of the logical material in the form of a passage of 18 facts.

**Word Recall Meaningful** (WR (M)-10 items): Recall of 10 meaningful words after 2 minutes following the exposure for 30 seconds.

**Digit Span** (DSF & DSB-18 items): This comprises of span for digits forward and backward and measures attention and concentration.

**Word Recall Non Meaningful** (WR (NM)-10 items): Recall of 10 non meaningful words after 2 minutes following the exposure for 30 sec.

**Delayed Response Learning** (DRL-4 items): This is essentially a response given in order to arrive at a final solution. There are four sets of fairly simple arithmetic problems each consisting of two parts.

**Picture Recall** (PR-4 items): It is designed to assess the ability to revisitualize pictures of common objects presented in groups.

**Benton Visual Retention Test** (BVRT-10 items): The test measures visuo-spatial perception, visual and verbal conceptualization and immediate memory span. It has 10
designs on 10 cards, each design is exposed for 10 seconds and the participant is asked to reproduce the design immediately from memory.

**Paired Association Learning Test** (PAL-30 items): The test measures well learned verbal association and retention of new, unfamiliar verbal material.

**Cattell’s Retentivity Test** (CRT-10 items): Recall of 10 complex and unfamiliar geometrical figures after 2 min. following the exposure for 30 seconds. Thus the battery includes 147 items in the form of 12 subtests.

*Reliability*: Internal consistency ranged between 0.36- 0.78 for sub tests with P<0.01 for each. Test retest reliability of the subtests ranged between 0.51- 0.98 with a time gap of 6 weeks.

*Validity*: Content validity, Construct validity and clinical validity was found which is high.

**Administration and scoring:**

The 12 subtests have separate administration and scoring patterns. Initially for helping the investigators a personal data part is presented which helps in establishing rapport with the participant. In the present study this was not that significant as the rapport was established initially. But this helped in getting the confidence of the participant. The detailed procedures for administration for the 12 subtests are given below.

**Personal Information** (PI), each item was read distinctly and slowly at a steady rate. If the subject failed to understand the item, it was repeated. Each correct answer was given a score of one. Maximum possible score is 5.
Mental Control (MC), the time taken and error or omissions made by the subject on each of five subtests were noted down in verbatim. Maximum possible score is 15.

Sentence Repetition (SR), each sentence was presented one by one to the subject for immediate reproduction. Each sentence was read out slowly, distinctly and at a uniform rate during presentation. The subjects recall was either noted verbatim or each of the correctly recalled clauses was ticked. If the subject made any error, omission, in recalling the sentence, then while presenting the subsequent sentences the subject was reminded once again to be attentive and careful and to reproduce the sentence as exactly as possible. One mark is given for each correctly reproduced clause. Thus the maximum possible range of scores on each sentence is given below.

Sentence 1-1

,, 2-1
,, 3-2
,, 4-2
,, 5-3

Thus making the maximum score 9.

Logical memory, there are two sections or parts. Story recall immediate and story recall delayed. In the first part, that is, story recall immediate the participant is instructed as follows, I am going to read a short story, listen carefully, because when I finish reading I want you to tell me every thing that I told you. Do you understand? Now the story given in the booklet is read. After reading the story, say, “Now tell me everything thing that you can remember of the story, start at the beginning of the story and tell me all that happened.” The separate items in the story are indicated by slash mark (/). As the
subject re tells the story indicate the number of ideas recalled. Immediately following the first trial, the examiner says, “In a little while I am going to ask you to tell me how much of the story you can still remember. I am going to read the story to you again now so that you will have it fresh in your memory for the next time.” Ask the participant to recall the story after approximately 20 minutes of testing involving verbal materials. Scoring for this sub test is done as follows: The story recalled by the child is recorded verbatim and scored according to the number of ideas as marked off. The final scoring is the number of ideas correctly reproduced. Maximum possible score is 18.

Word recall meaningful (WRM) before administering story recall delayed. Here the subject is instructed as follows:” I will be showing you a card, on which some meaningful words have been written. Look at them carefully (for 30 seconds) after some time (2 min.), I will show you a second card from which you have to show me the meaningful words you have already seen.” Each meaningful word correctly identified and named was given a score of one and thus making the maximum possible score 10.

Digit Span test (DST) : This test also has two division digit span forward (DSF) and digit span backward (DSB). In the first part the participant was instructed as follows:” I will be saying some numbers listen to me carefully, when I finish saying them, you will have to repeat them in the same order.” The investigator after instructing the child gives an example, “If I say 3 7, you should say 3 7”. The investigator reads out the digits at the rate of one digit per second to the child. Immediate responses of the child are noted as correct or incorrect. In the second part, the child is further instructed as follows,” I will be saying some numbers again; you should listen carefully and repeat them after me in a reverse order. Eg: If I say 2 5, you should say 5 2. Scoring is done as per the manual,
which counts the longest series correctly reproduced in the case of digit forward and the longest series correctly reproduced in the reverse order. Summation of scores earned on digit forward and backward is the score for this subtest. Maximum possible score is 15.

**Word recall non meaningful:** The subject is instructed as follows, ”I will be showing you a card, on which some nonsense syllables have been written, look at them carefully (for 30 sec.), after some time (2 minutes) I will show you a second card from which you have to show me the nonsense syllables you have already seen.” Each correct response or recognition is given a score 1, so the maximum possible score is 10.

The subject was asked to recall the story for delayed recall and the response were noted verbatim.

**Delayed Response Learning:** The child was instructed as follows: “I will tell you a small arithmetic problem, you keep the result of it in your mind, use it to solve another problem 10 seconds later.” If the subject gives the correct answer for each problem a score one is given, thus making the maximum possible score four.

**Picture recall:** It is a very simple task. The participant is instructed as follows: “I am going to show you a row of little pictures. After I cover the pictures, I want you to tell me each time exactly what pictures you saw, start at one end of the row each time and tell me all the pictures you saw. Try to recall them to me in the same order they were in a row”. Exposure time for each card is different. Exposure time for Card 1 is 2 second, Card 2 is 3 second, Card 3 is 4 second and finally for Card 4 the exposure time is 5 seconds. As far as scoring is concerned, recalling the pictures in the same order within a row suggests adequate visual memory. If the child recalls pictures in the same order, they are given one point and the maximum possible score is four.
**Benton Visual Retention Test-A** (BVRT): This subtest is administered next to the participant and the instruction given to the child is as follows: “I will be showing you some cards one by one. Look at them carefully, after some time (10 seconds) I will take back the card and then you have to draw on paper the same figures which you have seen”. The participant is provided with 5½ X 8½ inches paper and pencil with an eraser. Designs are first scored as either correct or incorrect. One credit for each correct response is assigned.

Errors are identified based on the criterion given below

- Omission
- Distortion
- Perseveration
- Rotation
- Misplacement
- Size Error

Maximum possible score is 10.

**Paired Associate Learning** (PAL): Here the participant is asked to remember the words that are paired with the stimulus word. The subject is instructed as follows:” I am going to read to you a list of words two at a time. Listen carefully because I will expect you to remember the words that go together. For example, if the words are “big”, and “small”, when I say “big” you will have to say “small”. After the subject understands the instructions, read the 1st presentation at the rate of one pair every 2 seconds. After reading the 1st presentation, test for recall by presenting the first recall list. Give the first word of a pair and allow five seconds for a response. If the subject gives a correct
response, say, that it is right and proceed with the next pair. If the subject gives an incorrect response, say, “No” provide the correct association and proceed to the next pair. After the 1st recall has been completed, a 10 second interval is allowed and a second presentation list is given proceeding as before. Scoring for PAL is done by giving one credit for each correct response, if given within 5 second. Final score is calculated as follows. Add all credits obtained on easy associations and divide the score by two. Add credits on hard association. Total each column separately. Score on entire test is the sum of both easy and hard association scores. Maximum possible score is 21.

The Cattell’s Retentivity Test: This is the last subtest, recognition is evaluated for non verbal stimuli. The instruction is as follows: “I will be showing you a card on which some geometrical figures have been drawn. Look at them carefully (for 30 second) after some time (two minute). I will show you a second card from which you have to show me the geometrical figures you have already seen”. Each geometrical figure correctly identified was given a score of one. Maximum score is 10.

The child and parents were informed about the general performance of the child and suggestions were given such that the child’s environment could improve and there by excel in academics. Thus the child could be a person who is mentally healthy and grow towards the goal that they are useful individuals to the society.

Those who wanted a report were asked to meet the Medical Professional who was in charge of that unit. Compiled scores and interpretation was given to the in charge.

2.3. PROCEDURE:

The following general procedure was followed for the administration of all the tests:-
The investigator first visited the different institutions and got the permission of the authorities. Responsible persons in the department (HODs) were met and they directed the investigator to the concerned medical staff. The cases were identified by the experts who introduced the investigator to the concerned clients and appointments were fixed. They were given a briefing regarding the assessment to be done and the average time that they will have to spend with the investigator. The clients who were willing to cooperate agreed to come on the date given by the investigator and the neurologist or the medical practitioner. Informed consent was sought before administering the tests to parents and children. This initial session worked as a phase to establish rapport. The medical practitioner filled the epilepsy Performa, based on which the cases were selected. When the clients met the investigator they were asked to read the consent form and sign it. The clients and the parents were made to sit comfortably in a calm place. The child was given SPM or CPM based on their age. Then the child was let free till the DPCL was administered to the principal care taker, mostly mothers. In some cases the principle care taker was grand mothers. Memory test was administered individually in a calm and quite room with out much distraction. Each session extended to about two to two and a half hours at an average. This included also the time for rest interval. At the end of each session suggestions were provided with regard to their academic performance. Effort was also taken by the investigator to motivate the children as well as guide parents in providing a congenial and supportive environment for their children. The question book lets for each of the tools used is presented in Appendix I

2.4. ANALYSES:
Usable data was analyzed quantitatively to yield descriptive results. Descriptive analyses were done so that specific difference and cause effect relationship between variables could be understood. The data was collected from clinical population so the investigator felt that quantitative analyses alone will bring out the desired results. To bring out the clear picture descriptive analyses was also done.

Quantitative analyses was done with the help of PASW version 17.5(Trial version). ANOVA (one way & two way) was done to find whether there is any significant difference between the different groups on different variables. If significant difference was found multiple comparison test of significance were used to explore the groups that differed. There are different methods to do this; some of them are Fisher’s LSD, Turkey’s HSD, Duncan and Scheffe’s test. In the present study Scheffe’s test is used as this is most widely used test, and can be used with unequal and equal sample size and also it is recommended when complex contrasts are of interest.

The Student t test was used to find whether there is significant difference between means when there were only 2 groups that had to be compared.

Chi square analyses is the non parametric statistical analyses that was done when the scores were of the nominal type.