METHODOLOGY

The present study was proposed to validate the BEOS findings related to participating and witnessing activities and compare the findings with polygraph recording using guilty knowledge paradigm or concealed knowledge paradigm used in regular forensic lie-detection tasks.

A) Objectives of the study-

1. To compute the sensitivity and specificity of the BEOS profiling technology by administering the test to normal volunteers who have participated in an experimental study and those in a control group who only had knowledge of the details of the experimental study.

2. For computing Sensitivity and specificity, false positive and false Negativity of the BEOS procedure for identifying persons who have participated in an activity.

3. To compare the profile of witnessing the activities carried out by another participant executing the activities in the experimental room.

4. To compare the results obtained from BEOS testing with lie-detection test results on selected issues tested by guilty-knowledge test using a deception simulated conditions.
5. To compare the BEOS profile obtained by presentation of regular probes referring to participation in the experiment with the BEOS profile obtained by presenting the same probes as negative statements.

B) Alternate Hypotheses

1. The mean EK score indicating the BEOS profile of the PG will be significantly greater than the mean score of EK of the control group.

2. Probes negatively stating the participation of the participant have the same cueing effect as the positively stated probes in eliciting Experiential Knowledge responses.

3. Probes presented with negative assertion will have the same effects as probes presented indicating positive involvement in an activity.

4. Participants in the PG show significantly greater deception responses in polygraph compared to participants in the control group, if they are instructed to respond negatively to questions inquiring about their participation in acts, which they indeed carried out.

5. BEOS profile of the experimental study can significantly differentiate the perpetrator group from the witness group.
and the control group on the probes requiring recreation of motor imageries.

6. BEOS profile of the simulation study will not significantly differentiate witness group from the perpetrator group on probes requiring recreation of visual imageries.

C. Measuring Sensitivity and Specificity

A simulation study was conducted in which volunteers were requested to participate. Two volunteers were allowed to enter in the experimental room together. The volunteers from the PG group were asked to carry out some task in experimental room and WG were asked to simply witness the PG group subjects carrying out the assigned tasks. The tasks assigned to the PG group were different from the everyday life. The experimental room was specially designed to fulfill those tasks. There was a control group, which was only provided with the knowledge of the actions being carried out by the PG group and witnessed by WG group. After the time gap of 2-3 weeks, BEOS and Polygraph recordings were carried out in the Psychology division of DFS Mumbai.

Sensitivity of BEOS profiling is determined by its ability to correctly identify the subjects who had carried out the task assigned, who had just witnessed the task being carried out by other subject and who had only the knowledge about the simulation. It is expected that BEOS will elicit Experiential Knowledge (EK) for those probes which refers to
various components of the activities related to task executed by the subjects. The ability of a BEOS test to differentiate in between the PG and WG groups, indicate the “sensitivity” of the test. If the BEOS test wrongly elicits EKs in the subjects of Control Group for the activities they have not executed, it will refer to as “negative specificity”. The sensitivity and specificity of the test in current research will talk about its ability to correctly identify the Perpetrator, a witness and an innocent person. The statistical method used to assess sensitivity and specificity is “Receiver Operating Characteristics Curves” (ROC).

D. Receiver Operating Characteristic Curves (ROC Curves)

ROC curves were developed in 1950’s as a byproduct of research into making sense of radio signals contaminated by noise. More recently it’s become clear that they are remarkably useful in medical decision making. The diagnostic performance of a test, or the accuracy of a test to discriminate diseased cases from normal cases is evaluated using Receiver Operating Characteristic (ROC) curve analysis (Metz, 1978; Zweig & Campbell, 1993). ROC curves can also be used to compare the diagnostic performance of two or more laboratory or diagnostic tests (Griner et al., 1981).

ROC is a graphical plot of sensitivity Vs specificity for a binary classifier system as its discrimination threshold is varied. It is a tool for
diagnostic test evaluation. True positive rate (Sensitivity) is plotted in function of the false positive rate (100- specificity) for different cutoff points of a parameter. When consequences observed in a test of two populations, one population with the disease and another one without the disease. A complete separation is rarely between the groups. The distribution of the tests generally overlaps as shown in figure.

![Graph](image)

For every possible criterion value, there will be some cases with the disease correctly classified as positive (TP = True Positive fraction), but some cases with the disease will be classified negative (FN = False Negative fraction). Then again, some cases without the disease will be correctly classed as negative (TN = True Negative fraction), but some subjects without the disease will be classed as positive (FP = False Positive fraction).

The different fractions (TP, FP, TN, FN) are shown in the following table.

<table>
<thead>
<tr>
<th>Test</th>
<th>Disease Present</th>
<th>n</th>
<th>Disease Absent</th>
<th>n</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>True Positive</td>
<td>a</td>
<td>False Positivity</td>
<td>c</td>
<td>a+c</td>
</tr>
<tr>
<td></td>
<td>(TP)</td>
<td></td>
<td>(FP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>False Negative</td>
<td>b</td>
<td>True Negative</td>
<td>d</td>
<td>b+d</td>
</tr>
<tr>
<td></td>
<td>(FN)</td>
<td></td>
<td>(TN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>a+b</td>
<td></td>
<td>c+d</td>
<td></td>
</tr>
</tbody>
</table>

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Sensitivity: probability that a test result will be positive when the disease is present = a / (a+b).

Specificity: probability that a test result will be negative when the disease is not present = d / (c+d).

Positive predictive value: probability that the disease is present when the test is positive = a / (a+c).

Negative predictive value: probability that the disease is not present when the test is negative = d / (b+d).

However, sensitivity and specificity are determined in the present study using simple statistical measures, after grouping the subjects in the Experimental groups, with the “Mean +2SD” value of EK scores of the Control group as cutoff score.

E. Sample selection

The sample consisted of participants randomly recruited to be part of the study, from the employees and eligible relatives of the employees of the Directorate of Forensic Science Laboratories, Mumbai. Both male and female participants were chosen for each group. Each participant was requested to provide their informed consent (Annexure I) in writing before they were chosen for the study. Each participant was screened using the General Health Questionnaire (Annexure II) and found to have no mental health related problems. The participants were not compared
on socioeconomic status or education. After identification of a prospective participant, he/she was randomly assigned to the Experimental (PG and WG) and Control group. Total sample size proposed is 60, with 20 participants in each group. (120 recordings).

There are three groups, which will participate in the study. They are Perpetrator Group (PG) and Witness Group (WG), and Control group. Subjects in PG will be instructed to carry out specific actions in the simulation room. Subjects in WG will only be made familiar with the objects in the room with instructions that they can voluntarily decide what they want to do and carry out the same.

F. Plan of work

There were three groups: 1. PG, 2 WG and 3. Control group. A participant of the PG was paired with a participant in the WG. The selections of the participants in the two groups were done randomly. The PG participant was requested to carry out specially designed activities, which were to be witnessed silently by the other participant. Each participant of the pair was taken up for BEOS profiling and Lie detection test, after 2 weeks they completed the initial assessment and had participated in the specially designed task. The control group participant was only being informed about the simulation study after the initial assessment and before BEOS profiling.
A simulation study

Crime is not always bound with constrains of time, planning, modus operandis. It’s not that only those who commit the crime are the only knowledge holders of the crime. Knowledge can be gained via other sources, like print media and electronic media and from third person/party. A crime scene may be witnessed by another intentionally or accidentally. The simulation study is to introduce more variables such as witness participation other than the perpetrator and Knowledge holder, which involve the introduction of the third group of subject. To find out intentional participation along with participation according to instruction given to the subjects. The study was designed like a treasure hunt. After finishing one given task, the participant finds the instructions for the second task. The study includes total 5 numbers of tasks.

The study instructed the participants to open a closed room using the key given by the examiner with a room number written on it. Participants were required to go to the room and open it. Play a short numerical game, finds two sets of number and use the numbers to open the number lock of cupboards. Search for the doll inside the cupboards and pull out the key hanging from the nipple placed inside the mouth of a doll, and also the hand of the doll to find out another instruction list to carry out task further. Use the key hanging from the nipple to open another cupboard and search for some tools and use it to break a beautiful
flower pot for collecting the coins and other things kept inside flowerpot, disposing off the broken pieces of flower pot, locked the room and handed over the key to the examiner.

The simulation study was not a real crime scene. The acts carried out are routine as they have not led to a crime or personally significant act. Further the participant does not have any fear of being caught or found out and punished. In this manner, the simulated activities cannot be compared to a real crime. However, it was proposed that BEOS will still show significant difference between the response patterns elicited in the experimental and control groups. Each participant was taken up for BEOS profiling 2 weeks after the simulation. The probes were grouped in scenarios, each scenario consisting of probes referring to activities in a sequential manner and contextually specific to a specific event in the experimental situation.

The purpose of this research is to enhance the understanding and versatility of BEOS profiling and Lie detection for forensic application. Since BEOS is a test of “Experiential Knowledge” Therefore, the BEOS test should be able to distinguish the subject who has participated in a simulation and acquired experiential knowledge from the participant who has just witnessed the participation. The study required the participants to open a closed room, play a short numerical game, opening of a number locks, search for the doll and a key placed inside a doll, pull out the
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nipple from the mouth of doll and also the hand of the doll to find out another key to carry out task further. Search for some tools and use it to break a beautiful flower pot for collecting the coins and other things kept inside flowerpot, disposing off the broken pieces of flower pot, lock the room and hand over the key to the examiner. The same simulation is used for lie detection test also. Separate lie-detection test was carried out in the Directorate of Forensic Science Laboratory, Mumbai using the facilities provided in their Forensic Psychology division. The lie-detection test will be carried out after the BEOS profiling is done. Each participant was required to tell a lie or negate what each has done in the simulation study or in the control condition only before the lie-detection test is carried out. The lie-detection test uses a recording of respiration, heart rate/pulse rate, blood pressure, and skin resistance. Automated analysis program available in the equipment will be used for the analysis of the data. Questions for lie-detection will be prepared according to standard procedures.

**Steps involved in a simulation study**

- Sample selection.
- Introduction to the research to the selected participants.
- Obtaining informed consent from the participants.
- Assigning the participants to different groups.
- Instruction to the Subjects of PG and WG Group.
• Simulation of PG and WG Group subjects.
• BEOS and Lie Detector Recordings after the delay of 2 – 3 weeks.
• Memory recall.

Details of the simulation.

Simulation consisted of a set of specifically designed routine tasks which one participant was instructed to carry out and second participant silently witnessed the activities of the first participant, with both of them in the activity room. A set of activities was specially designed as a test in a specially arranged room in the Directorate of Forensic Science Laboratory, Forensic psychology division using their facility. The participants form experimental group was paired with the participants of witness group and were asked to be carried out the specially designed activities in the simulation room. The participants from the WG group were instructed to observe the participant from the PG group.

1. An Album kept in a table drawer with pictures and a paper set of numerical game
2. A Briefcase Kept inside the cupboard with few articles, envelopes and a doll. Fear-evoking and some interesting picture kept inside envelopes.
3. A Hammer, two gift packs and black plastic bag kept inside a larger gift packed in another cupboard.

4. A wooden box with a Lizard inside in one of the two gifts.

5. A beautiful flowerpot inside another gift packet containing a silver coin, chocolates and a pen inside.

6. One wall picture of a tiger, a hammer and a sword hanging on the wall.

7. Fruit juice and glasses kept on the table.

8. Cleaning materials – Brush for cleaning the table and a dustbin for the disposal.

9. Instrumental music in the background during simulation.

**Instructions to the Subject.**

The participants were given printed instruction in the language most familiar to him. The participants were requested to go inside the room together. One participant is identified as the one who will carry out the tasks where as the other one will only witness the actions of the former. Participants are given a key having a room number on it and are asked to find the room and use key to open the room. Participants are also instructed to read the instruction lists carefully and act accordingly. Once they are done with the simulation, they are instructed to switch off the lights and lock the room and hand over the key to the examiner while leaving.
Detailed Instruction given to the participants.

“I welcome you to participate in this research. You are requested to perform few tasks according to the instruction given in the leaflet given to you. Kindly read the instructions carefully and perform accordingly. Once you will follow this instruction and have done with the task as per the instructions, you will find another instruction list. Likewise, you will find five sets of instruction lists. After 2-3 weeks I will examine you by BEOS and polygraph recording.

Instructions 1

Read the instructions and proceed accordingly.

• Open the lock on the door.

• Open the door.

• Enter the room.

• Switch on the lights.

• Observe the articles in the room.

• Take mental note of the articles in the room.

• Sit in front of the table marked AA

• Open the drawer of the table.

• Find an album

• Go through the album
• Try recognizing the individuals from their photographs in the album.
• Find a paper inside the album.
• Play short numerical game given on a sheet of paper kept in the album.
• The game will end with two sets of number.
• Note down the two sets of number on a small piece of paper.
• Open the table drawer below.
• Find an envelope.
• Open the envelope and find an instruction list (No 2).
• Read the instruction and carry out rest of activities as per the instruction.

Instructions – 2

• Go near a cupboard marked XXX.
• Open the lock using one set of numbers from the two sets of numbers you got earlier.
• Open the cupboard.
• Search the cupboard.
• Take mental note of the objects inside it.
• Take out the briefcase.
• Take the briefcase to the table marked BB.
• Open the briefcase using the other set of numbers.
• Look for article inside the briefcase.
• Make mental note of the articles.
• Take out the plastic doll.
• Look for another instruction form (No. 3).
• Find three envelopes.
• Take out envelops (3 nos.) in the briefcase: open and see which one has the instruction form.
• Take out the instruction form.
• Close the briefcase.
• Keep the briefcase back inside the cupboard.
• Close the cupboard.
• Open the instruction form and proceed accordingly.

Instructions - 3

• Go to the table marked BB.
• Take the doll with you.
• Find a nipple in the mouth of the doll and a key hanging from the nipple.
• Pull out the key.
• Remove the key.
• Replace the nipple.
• Pull out the neck of the doll.
• Look for another instruction form (No.4).
• Read instructions and Proceed accordingly.

Instructions - 4

• Open the cupboard marked ZZZ.
• Observe the articles inside.
• Take out a paper box from it.
• Open the paper box.
• Make mental note of the articles inside.
• You will see 2 gift pack, a hammer, and a plastic bag in the paper box.
• Take out the gift packs.
• Take out the hammer.
• Take out the plastic bag.
• Open blue color Gift pack.
• Find an instruction form (No 5) inside the gift pack.
• Read the instructions and carry out the rest of the tasks.

Instructions – 5

• Take gift pack, hammer and a plastic bag and go back to the table marked BB.
• Open the gift pack.
• Find a flowerpot.
• Use the hammer to break the flower pot
• Find the objects inside the broken flower pot.
• Find a gift pack inside the broken flower pot.
• Open the gift pack.
• Find the object inside.
• Take the objects as they are gifts for you.
• Collect broken parts in plastic bags.
• Clean the table with the brush.
• Dispose the plastic bag in dustbin in the corner of the room.
• Switch off the light.
• Lock the door.

G. **BEOS Recording**

BEOS recording was conducted in the Forensic Psychology division of DFSL Mumbai. The subjects were instructed in advance to come for the recording with head washed with shampoo.

**Probe Recording**

Probes were recorded in languages most familiar to the subject. Probes were recorded in a uniform and stable tone, in English, Hindi and Marathi languages. The English list of probes is provided in the Annexure III.
• **The Probes**

The probes were divided into 10 scenarios. The first scenarios had neutral probes, which were not related to the simulation. They were meant for semantic processing. Scenarios 2 to 9 were probes sequentially designed about the various tasks and acts which the participants were expected to carry out in the test room. Scenario 10 had denial probes. More than 150 probes of which 63 were used to trigger visual remembrance and 77 aimed at triggering remembrance of actions. Each probe is given an ID as per the list provided in the manual of Neuro Signature System (NSS). The ID indicates what the program must look for during analysis. The IDs are important for indicating if the probe must look for experiential knowledge with motor or visual imagery or without either of them. The probe ID also trains the user to define what exactly the user expects the probe to provoke during the presentation. This helps to design the sequence of the components of the events and affix the right context of occurrence of the event in the subject. The scenarios and probes are designed as per the “Guidelines for Designing Scenarios and Probes” by the manufacturer of NSS (Annexure IV). The witness subjects were also tested with the same list of probes.

• **BEOS Laboratory**

The laboratory consists of two adjacent sound protected rooms, one for the subject and the other for housing the BEOS equipments. The subject
rooms has comfortable lean back specially designed chair for the subject to sit comfortably. The chair is placed in the middle of the room with a computer monitor about a meter away from the chair to present visual probes. There are speakers also placed in the room for presenting auditory probes and to instruct subject at the start of the new session of BEOS recording. All the equipments are monitored from the adjacent room known as equipment-recording room, by the experimenter. This equipment recording room has a separate entrance and houses the BEOS equipment and the power supply system. The subject sits with his legs resting on a leg rest on the floor in the room. These two rooms are separated by a one way mirror so that the subject could be monitored from the equipment-recording room. There is also a door between the two rooms which is kept closed during recording. A dimly lit light is kept turned on in the subject’s room for recording while the recording is in progress.

- **BEOS Equipment**

The BEOS profiling was carried out by the Neuro Signature System (NSS) manufactured by Axxonet Solutions India, and it consists of two major systems, one for the acquisition of electrical activity and the other called Visual and Auditory Stimulus Programming (VASP) system for the purpose of recording the auditory and visual probes and their presentation while interacting with the data acquisition system. The data
acquisition system consists of a head box which houses the electrode amplifiers and is kept next to the subject in the subject’s room. The cables from the head box are brought into the recording rooms and are connected to the main BEOS equipment, which consists of amplifiers, computers for data acquisition, and computer for probe presentation and for acquisition of EEG.

- **Electrode placement**

The Electrocap system is used for the placement of electrodes, electrodes are small metal discs placed on the Electrocap as per the international standard. Medium or large size Electrocap is used as per the head size of the subject’s head. The electrodes used in the BEOS recording are
following the 10-20 international system of electrodes. The electrodes are placed at points that are 10% and 20% of the distance.

Each electrode is labeled with a letter and a number on the head box as per the brain areas initial names (F, T, C, P, O stands for Frontal, Temporal, Central, Parietal and Occipital), even numbers (2,4,6,8) refer to the right hemisphere and odd numbers (1,3,5,7) refer to the left hemisphere and Z refers to the electrode placed in the mid line. Total
The numbers of electrodes are as follows: Fp1, AF3, F7, F3, FT7, FC3, T3, C3, TP7, T5, CP3, P3, O1, Fp2, AF4, F8, F4, FT8, FC4, T4, C4, TP8, T6, CP4, P4, O2, Fz, FCz, Cz, CPz. Linked ear lobe electrodes A1 and A2 were used as the reference electrodes. Horizontal eye movements were recorded using two electors placed 2 cm laterally away from the extreme edge of the eyes and two electrodes placed 1 cm vertically above and below the right eye. The electrode contact with the scalp was made by depositing electrode gel though the aperture on each electrode between the electrode and the scalp.

- **Calibration**

Before the EEG recording starts, the NSS is switched on 40 – 45 min prior to the recording, so that system automatically restores its settings according to the outer environmental conditions. Calibration involves synchronizing the gains of the amplifier with an inbuilt peak to peak 100 μV, 8 Hz sine wave signal and providing adjustments for DC shifts, being allowed to stabilize over the next five minutes. The calibration is automatically carried out on assigning the subject details for a recording. The calibration details are saved and used by the system for measuring the signals in the channel during the data acquisition.

- **Electrode Impedance measurement**

Electrode impedance is one of the major factors in EEG recording for acquiring good quality of EEG data, because it measures the electrode...
contact with the individual scalp. The electrode impedance of each contact should be below 10 K ohms to have a proper recording. In the NSS system, the impedance is measured and shown, as well as displayed as a color change from red to green. The impedance could be high if either there is no proper contact on that particular channel with the scalp or there is insufficient jelly. Each of these points can be addressed and the impedance rechecked if the measurement display indicates higher value.

- **Online monitoring of EEG and Probe Presentation**
  The EEG of the subject is monitored online and analyzed for computing the energy levels in the frequency bands of 1-4 Hz, 5-7 Hz, 8 – 13 Hz, and 14-30 Hz. An auditory probe is presented by the VASP computer only when the energy levels in above frequency ranges are within predefined limits.

- **Data Acquisition Phase 1**
  The first phase of recording consisted of requesting the subject to sit comfortably with eyes open and looking straight, without any movements of the body. Continuous EEG of 3 minutes was acquired in this phase.

- **Data Acquisition Phase 2**
  In the second phase the subject was asked to keep the eyes closed and sit with chin slightly lowered. Continuous EEG of 3 minutes was acquired during this phase.
Data Acquisition Phase 3

The auditory probes were presented in the third phase. Prior to the recording session, the subjects were told that they don’t have to make any sort of behavioral response to the probes. They are instructed to sit quietly without body movement during the test. The subject was asked to sit with eyes closed and listen to the probes carefully. The NSS analyzed the incoming EEG and sent a trigger to the VASP system if the EEG poser in the different frequencies were within the range specified. Upon receiving the trigger the VASP system presented the probes through the speaker system in the subject room. The NSS captured the auditory probe along with the event markers and store them along with the data. The orthographic details of the probe was simultaneously transferred from the VASP system to the NSS and stored alone with the EEG. The video of the subject was also online monitored and the continuous video was captured along with the data. The EEG data, video, orthographic and audio probes along with the event markers were encrypted to generate the final data file, which was saved in the hard disk. The encrypted data file can be opened only in a licensed NSS and it cannot be altered in any manner by any program. At the end of the acquisition of continuous data along with the audio and video files, the data file was converted into an epoch file and saved. The epoch file contained 10 Sec of EEG, in which the EEG if the first 3 seconds were that of preprobe stage. The probe was
presented at the end of the 3 Sec and next 7 Sec contained EEG with the probe and a period after the probe but together of maximum 7 Sec. The beginning and the end of the probe were marked with red markers. There was one epoch for each probe and the total number of epochs was 91 for a subject. Once the data file is created no option is present to play or delete the file. The NSS analysis is automated and the analysis is carried out as per the analysis protocol designed.

- **Data Analysis**

At the end of the automated analysis the system produces an automated PDF report, which contains the list of the probes, probe ID used, and the result arrived by the analysis program. The number of probes which produced Experiential Knowledge and other results are counted from each of this report for further statistical analysis.
Polygraph recording was done in the Forensic Psychology division of DFSL Mumbai. Subjects were informed in advance about the Separate lie-detection test. The lie-detection test was carried out after the BEOS profiling. The Subjects were specifically instructed to tell a lie or negate what each has done in the simulation study or in the control condition.
only before the lie-detection test was carried out. The lie-detection test uses a recording of respiration, heart rate/pulse rate, blood pressure, and skin resistance. Automated analysis program available in the equipment will also be used for the analysis of the data. Questions for lie-detection will be prepared according to standard procedures.
• Polygraph Equipment

The Polygraph profiling was carried out by the Polygraph instrument of Limestone Technologies supplied by Axxonet Solutions India. It consists of Limestone DataPac (data acquisition system), two respiration Pneumatic Transducers, EDA electrodes, Pneumatic blood pressure cuff, Electronic countermeasures cushion. The data acquisition system consists of a head box which houses all other parameters in it and is connected to the system.

• Parameters placement

Respiration Pneumograph Transducers: To record thoracic and abdominal respiration, partially inflated rubber tube is fastened around thoracic or abdominal region of the participants.
It is the devices which record thoracic movements or volume change during respiration. One of the pneumograph tubes is strapped around the chest and the other is placed around the abdomen. Each pneumograph has an air-filled rubber tube connected to the machine. When the subject breathes in and out, the air pressure inside the tubing changes and is recorded by the polygraph machine.

**Sphygmograph:** A blood pressure cuff is fastened around the right arm for a recording of blood pressure.
The cuff is filled with air and connected to the polygraph machine through air-filled tubes. Changes in blood pressure modulate the air pressure in the cuff. These changes are recorded on a polygraph chart.

Plethysmograph: To assess the pulse rate plethysmograph is attached to the right hand index finger.

Galvanograph: A complete set of EDA electrodes is attached to the index finger and the ring finger of the left hand for recording of GSR.
The measurement of sweat, which is scientifically known as the measurement of galvanic skin resistance, is borne by a two-piece galvanometer attached to two of the subject's fingertips.

**Countermeasures:** The participant is asked to sit on electronic countermeasure Cushion to avoid artifacts.

**Datapac box**- All parameters attached with this Datapac. This Datapac is further attached with the system and all the parameters can be seen on the screen in as a graphical representation.
Data Acquisition

The questionnaire technique used for Polygraph was Guilt Knowledge test (Annexure V). Before the polygraph examination the subjects were familiarized with the equipment and explained about all the parameters used in Polygraph. Sitting instructions was given to them. Two pneumotubes (one on the chest and another in the abdomen) to record respiration; pulse rate; and two electrodes (one on the ring finger and one on forefinger) to record the galvanic skin reflex were attached on the subject for polygraph examination.

Before starting the test, the normal physiological parameters of the subject were recorded prior to the administration of the questionnaire. After recording the normal physiological parameters, all the questionnaires were reviewed with them and they were instructed to answer the questions as ‘No’. The questionnaires were reviewed to avoid any further misunderstandings related the understanding of the questions, reviewing revealed that the subjects were able to understand the questions properly and was able to answer all the questions. A normal physiological response (in order to assess whether the introduction of questions has affected the physiological recordings) was recorded. The questionnaire was administered three times in a sequence in which it was reviewed with them. While asking the questions on the equipment, each question was asked after a gap of 25 seconds. Total three rounds of
administration of the questionnaire were taken, after this the subjects were informed that the examination was over and only post test recording will be done without asking questions for some time. Finally normal recording of physiological functions of the subject was recorded. The accessories of the polygraph equipment were removed from him.

• Data Analysis

After the completion of polygraph recording, data analysis was done. The analysis was based on a 3 point rating scale. Since Sphygmograph was not considered during analysis to as few of the participants were not comfortable with the pressure and their recording was done only with Pneumograph and Galvanograph. To avoid further problems in analysis and results, Sphygmograph was not analysed. The baseline was observed and after observing the baseline on all the parameters, recording of each parameter on each relevant question was compared with baseline recordings and recordings on control question. The final conclusion was based on average of all three rounds.