THE EFFECTS OF USING OCULAR MOTOR METHODS FOR SCREENING ON JOB APPLICANTS DURING PRE EMPLOYMENT INTERVIEWS AT CORPORATE AGENCIES

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Abstract

Investigation process plays a very crucial role not only in the criminal justice system, but also in various organizations to prevent the risk and harm and also to maintain the peace and order in the society and often it is shown that there are no such direct evidences present in the crime scene. Hence to investigate properly and accurately scientists are continuously trying to develop various Forensic Psychological investigative tools and techniques, which focus only on the psycho-physiological activities to detect deception, such as Polygraph, Narco Analysis, and Suspect Detection System etc. Nowadays there is an instrument which is very new in the Indian Environment, known as Eye Detect Technology, which measures very small and slight changes in our eye movements, especially pupil dilation. The technology is already an award winning technique with 90% accuracy level, but still it is unknown how reliable the instrument is in the Indian setup especially in the corporate sector as a screening tool. Hence it is needed to perform or to conduct the research on this instrument to check the reliability. Therefore this research will focus on the reliability and the applicability of eye detect instruments as a screening tool in various corporate sectors to distinguish between truthful and deceptive applicants during Pre Employment screening. Hence for seeking the answer, first suitable samples were collected and then basic interviews were conducted for knowing the background of each and every participant. At last the experiments were conducted in a controlled condition and also in a controlled manner. The main goal behind this experiment is to check whether it is reliable enough to detect deception in deceptive individuals or not and if it is reliable enough then what are the future applications of using this instrument in investigative as well as screening purposes etc. Hence this research is trying to find its future applicability as a screening tool in corporate sectors because; in this generation employees are the biggest threat of their own organization and to prevent the risk it is important to introduce a new system which is reliable enough to detect deception.

Keywords: *Investigative Tools and Techniques, Eye, Pupil Dilation, Eye Detect, Calibration, Pre employment Screening, Corporate Sectors, Cognitive Load, Deception.*

INTRODUCTION

"Fear follows crime and is its punishment" – that means, criminals always tend to keep crimes secret but still - fear always surrounds them and this fear often leads them towards punishment, and it was said that fear or anxiety in man often lead to an extreme level of saliva. Hence during the ancient period there was an experiment or technique which was used to distinguish between the truthful and deceptive persons. In that era all the suspects were made to chew rice. If the rice remained dry then it was proved that the suspect was guilty. This was the belief which was used in ancient times, but in current days these processes are not enough to detect deceptive individuals especially for those cases where physical evidences are absent. Hence scientists are developing several investigation tools and techniques to detect deception and most of these techniques are able to detect deception by measuring psycho-physiological responses during interviews such as Suspect Detection System, Polygraph etc (Killgrove, 2018). Apart from that one can also detect deception by simply measuring eye movements, because eyes are one of the most expressive organs and most of the time cognitive workload puts an effect on the eye. Therefore if the brain gives the signal that one needs to lie towards particular stimuli, then this creates an effect on the eye and apart from that when someone is trying to deceive, one can observe the continuous blinking rate, lack of attention, fast eye movements etc. According to Neuro Linguistic Programming research, gaze direction can be an effective indicator to distinguish whether the person is telling the truth or trying to deceive. The theory specifically mentions that human beings often move their eyes to the left direction when they are trying to visualize and memorize their past events while they often move their eyes towards the right direction when they are trying to construct the false events. Based on this theory there is a special investigative technique invented, known as Eye Detect Technology (Bessonova & Oboznov, 2017).

Eye Detect Technology is considered as the next generation lie detector which helps to measure very small and slight changes in eye behaviors to detect lies. The award technology is highly accurate and it can be used in both screening as well as investigation purposes. The technology has it's own importance to test job applicants, employees, patients, paroles, drug users, athletes, criminal suspects and others about specific issues or crimes in just 15 minutes or maximum 30 minutes. The entire technology is based on just one phrase – "Eyes don't lie ''. Therefore when someone wants to deceive or tell a lie, then their brain has to work harder. So, the greater the consequences of the lie, the greater the workload and this affects the eyes. Hence Eye Detect measures the slight changes in pupil diameter, eye movements, continuous blinking, fixations and other things. While performing the test, subjects has to answer simple true/false questions on the monitor with a high speed camera records eye behaviors and movements and when the test is finished the all the eye measurements will be uploaded to the web server for immediate analysis and scoring, after that an automatic report will be generated and one will be able to see the result that whether the subject was truthful or deceptive (Converus, 2021). The whole instrument comprises of -

1.   One laptop in which an eye tracker device will be attached. This tracker device will continuously monitor our eye movements.
2.   A chinrest will be there, during the test; participants have to place their chin on the chinrest, along with that a headphone.
3.   One mouse.

LITERETURE REVIEW

There are certain researches which show the previous field researches based on Eye Detect Technique.

Rational and Theoretical Assumptions to shape Ocular Motor Deception Test

The research describes the assurance that this technology can be used in pre- employment screening programs in government agencies which are primarily focused in the safety and law enforcement and national security. The inventor of Ocular Motor Deception Test, Cook et al. stated that in contrast to Polygraph test, ODT is also auto generated and within 30 to 40 minutes the whole test will be completed. There is an automatic system voice, written instructions present which gives certain instructions on how one should answer the questions. For example there are only true / false based questions present, hence one doesn't need to speak but he /she needs to press the green or left mouse button for true and red or right button for false, along with that it warns that if one would not give answers accurately within a given time limit then they might fail the test. After completion of the test there will be a small three to five minutes scoring process based on the subject's recorded eye movement and then it would declare whether the subject is truthful or deceptive. Researchers of this paper also talked about the RCT Test Model. In RCT or Relevant Comparison Test, one can involve only two relevant issues. It could be anything such as, consuming illicit psychotropic drugs, Stealing, Bribery, Data Theft etc. and it also includes neutral questions which are basically based in the form of general knowledge. It measures the difference between two relevant sets to check whether the subject is truthful or deceptive. The two relevant sets always present as control of one another. Researchers discussed the assumption behind the lying. As per them lying is more cognitively demanding than the truth in Ocular Motor Deception test? During the test deceptive people first identify the questions, which he/she wants to answer truthfully or deceptively. Simply if one finds a particular question as an inculpatory, inhibits pre-potent truthful response and this is the reason that one is capable of giving answers quickly and accurately. On the other hand, deceptive persons give responses in a slow manner and also they are found to be making several mistakes during the whole tests. There are some investigators who claim that emotional stimuliare the reason to evoke the pupil's responses. To support the theory behind the Ocular Motor Deception Test, researchers conducted a lot of laboratory and field studies to measure whether ODT is capable of differentiating between truthful or deceptive individuals or not. Therefore they conducted realistic mock crime experiments which can put an effect on electro dermal, cardiovascular and respiration reactions which are already present on the criminal suspects. Hence they took participants from the university campus and gave instructions to the guilty participants to commit a fake 'scene of incident', for example stealing the exam question paper from a faculty member and stealing 20 dollars from the office secretary and all the participants instructed to give deceptive answers on ODT about that issue. In general for Relevant Comparison Test, there are only sixteen true/false statements based on the stealing of 20$ and sixteen true/false statements based on stealing of question paper from the secretary's office along with that there are also sixteen neutral true/false statements. There are 5 relevant sets and each set has a total of 48 statements. In between relevant sets, neutral sets are there, which is based on simple arithmetic problems (Raskin, 2016).

Relationship between Ocular Motor Techniques andbehavioral approach

In ODT technology, there is a device named Eye Tracker device which measures both horizontal gaze positions and vertical gaze positions. The device measured eye movements and calculated the mean of measures from both eyes. After giving the exam it was shown that guilty subjects strongly reacted and exposed towards the statements related to   stealing of a question paper and stealing 20$, but in contrast to guilty subjects innocent

subjects showed very little differences in comparison to the questions related to stealing of question paper and 20$. In ODT technology Behavioral approach includes response times and error rates of each and every participant. It also measures blink rates for each item. According to Walrath and Goldstein, if there is a decrease in blink rate present then participants will be highly focused to incriminate the statements but if there is an increase in blink rate then participants will be less focused to incriminate (Raskin, 2016).

Measurement of Reading Reveal Deception by usingOcular Motor Technology
Another Research paper by Cook et al widely describes how Ocular-Motortechnology is successful in screening purposes.. Therefore they invented a test procedure which will be able to detect deception by measuring ocular motor responses, especially pupil dilation. Hence they conducted Experiment no. 1 where participants within the University were randomly taken to the guilty group and to the innocent group to commit a mock crime scene. In Innocent group participants only knew about the crime, nothing else. All the participants have undergone the test procedure, which is based on computer administered questions and questions were related to the involvement in possible crime scenes. In Experiment number 2, researchers instructed all the participants to pass the test. After completing these two experiments researchers explained that in both experiments guilty participants showed greater pupil responsesto answer deceptively towards particular questions which were asked about their involvement in the crime scene. After the experiment they explained that there are mainly two cognitive processes responsible for deception. The first one is Vigilance and the second one is Strategy and these two processes put a reflection during the Ocular Motor test (Cook, et al., 2012).

Cultural and Linguistic Differences to detect Deceptionby using ODT Technology
Here, researchers developed a new method for detecting deception called the ocular-motor deception test.In comparison to polygraph, this method will detect the eye movements and with the help of this, the method will be successfully able to detect thedeception. The subject reads test statements presented individually by the computer and uses a keypad to answer while a remote eye tracker continuously records eye movements and changes in pupil dilation. The computer processes the ocular-motor data, combines its measurements in alogistic regression, and classifies the individual as truthful or deceptive on the test. Cognitive resources should inhibit the truth, fabricate the lie, and maintain the consistency, coherence, and believability over time. Basically, inhibiting proponent truthful responses, maintaining credibility over time, and self-monitoring for signs of leakage are cognitive processes that always require mental effort. Over the past four decades, psychophysiological studies have shown that the pupil provides a sensitiveindex of cognitive effort. If cognitive load is greater than it will automatically increase pupil size. Deception requires more mental effort than telling the truth, psychophysiologists also have found that pupil responses discriminate between truthful and deceptive individuals during polygraph examinations (Patnaik, et al., 2016).

METHODOLOGY

➤ Participants - The research focuses only on Pre Employment Screening, and therefore the research participants will be final year students who have already an internship or workplace experience. For carrying out this experiment maximum 70 subjects were taken.

➤ Sampling - Sampling was Purposive Sampling. In Purposive Sampling researcher uses his/ her own judgment while choosing the participants from the population for carrying out the experiment. Similarly, my research is focused on the effective use of Ocular motor technique for Pre Employment Screening. Therefore one need only final year students. Hence my sampling will be strictly Purposive Sampling.

➤ Protocol
Maximum 70 subjects were taken from final year, and also a pretest interview was conducted to each and everyone for the ground information, or to gain more information that whether the subject is really truthful or he/she has a certain involvement.

➤ A written consent was taken from each and everyone. The consent paper collect the socio demographic details from each participant and then the participants was asked that – 'Do they willingly want to be part of the research study or not?' – At the same time they were given certain information about the test procedure, such as all the question will be based on multiple choice questions, type of the questions etc. If participants want to be a part of the study then they have to tick on – yes, but if no then they have to tick on – no. After that the signature of the participants was taken. Before carrying out the actual test, the type of the questionnaires was already present in the software. The questionnaires were based on – Audio Multi Issue Comparison Test in which there were total – Two hundred Eight questions. There were total 5 sessions but first there was a practice test and each sessions had 32 relevant statements (8 R1 statements – 4 true and 4 false and the R1 type was based on questions from illegal drugs, 8 R2 statements – 4 true and 4 false and this type was focused on – work related discipline, 8 R3 statements – 4 true and 4 false and the type was based on – stealing information or data theft, 8 R4 statements – 4 true and 4 false and the issue was focused on confidentiality breach) with 32 neutral questions (the neutral questions was focused on mathematical equations).

➤ Next step was the – Actual Interview process. According to the Eye detect manual, one need to conduct

a minimum of two experiments per day. Before conducting the experiment experimenter have to inform all the participants about the instrument and the test procedure and there will be some instructions such as, no movements during the whole test procedure when you are answering the questions, no eye make ups when you are coming for the test etc and this way the interview conducted.

➢
- Eye – Detect Interview Process

1. First, the subject has to sit on the chair and place their chin on the chinrest. The eye tracker device will be connected. The device is used to track the eye movements during the whole test.
2. The next process is called **Telemetry**, by which proper distance between laptop and subject will be maintained. After Telemetry there is **Calibration**. It is the key factor which defines the accuracy of eye detect. Before starting the test it must be calibrated for each user. The process is usually done by showing a number of calibration points on the screen and asking the user to consecutively fixate at these points one at a time. After completing the calibration process, one should check the validate for maintaining the accuracy. This accuracy rate should be below 1, for example - 0.67, 0.45 etc. but if it is above 1 then one should reject the data and recalibrate.
3. At last the actual test will start. No body movements will be allowed, the subject has to sit still and answer the true/false question by clicking the mouse button.
4. After finishing the test, the monitor will show certain instructions, such as - "End of the test", "Report to the Administrator"

➢ After completing the test, one needs to save the test. Therefore one should click on the test button and then select save. So after selecting the save button – a small box will open and there will be a total of four options – such as Confession no, Confession yes before the test, during the test and after the test. So no indicates that the subject didn't make any confession. Yes before the test means the subject has made confession before the test, similarly confession during test indicates that subject has made confession during the test and confession after test means subject has made confession after the test. So one should select the appropriate option according to the subject's statement after finishing the test and then click on the save button.

➢ After that one needs to score. Hence one has to click on the test and need to go to the score option. So scoring will take some minutes. After completing 100% scoring a report will automatically be generated and in that report it will mention whether the subject was truthful or deceptive, credible or not credible.

RESULT AND DISCUSSION

Eye Detect Technology is already an award winning technology with 90% accuracy rate in most of foreign countries but to establish this technology as a screening and investigative tool in India, it is necessary to check the reliability rate. The research is strictly trying to establish its application in the corporate sector, hence there are certain questionnaires made, known as Audio Multiple Comparison Test Model, Which is basically having an application during Pre Employment Screening at Corporate Level to differentiate between real truthful candidate and deceptive candidate. To check the reliability of Ocular Motor techniques, total 70 samples were collected and out of 70 samples the total number of outcomes were four, which is given in below –

Outcomes	Credible / Truthful	Not Credible (Deceptive)	Not Credible (Inconclusive result)	Not Credible (Random Responses)
Sample no.	51	15	2	2
Total Percentage	73%	21%	3%	3%

Table 1: Total percentage of outcomes

Out of all 70 samples, approximately 73% subjects are totally truthful and credible, 21% subjects are not credible and deceptive, 3% subjects are not credible (Inconclusive Response) and rest 3% subjects are also not credible due to Random Responses. The results are not only based on the test report but also matched with the information that was collected during pre test interview process. Now the outcome is present and the only thing that needs to be settled, to check the reliability. Therefore there is no better method than using **Cronbach Alpha**. Cronbach Alpha is considered as the reliability test, which measures the **internal consistency**, for example [reliability of the measuring instrument, questionnaire]] within SPSS (Statistical Package for Social Sciences). The acceptable reliable value of Cronbach Alpha is .6. Therefore if the alpha value is greater than .6 then the respective questionnaires or scale will be considered as good and reliable. To check the reliability Cronbach Alpha Test performed over 70 samples on SPSS and the Alpha Value for the test model was **.887**, which is highly good, accurate and highly reliable.

From the test, one can get four possible outcomes -

a.   Credible (Truthful): This outcome indicates that the subject was truthful during the whole test and he / she passed all relevant issues that were asked during the test. It also gives the explanation that there are no significant differences in pupil dilation. For better understanding one should take a look in attached picture -

b.   Not Credible (Deceptive): This outcome indicates that the subject was deceptive during the whole test and he /she failed all relevant issues that were asked during the test. It also shows that there are significant differences present in the pupil dilation, because greater workload always increases pupil size.

c.   Not Credible (Confession): This indicates that the subject was not credible, because he/she has already confessed about his/her involvement in the relevant issues that would be asked during the test.

d.   Not Credible (Random Responses) : This outcome includes several possibilities, such as - Subject could be deceptive, was trying to deny his/her involvement in relevant issues by giving random responses, also if subject was truthful but not attentive and giving answers randomly, then also this outcome can be generated.

There are various chances or possibilities of getting -not credible result and the chances are given below -

1.   If the participant behaved deceptively during the test, such as looking away from the computer screen continuously, blinking often and continuously trying to close his/her eyes, along with that if the participant is totally uncooperative, then there would be a chance of getting 'Insufficient data'.

2.   Sometimes participants are cooperative but due to difficulty in tracking eye movement, one can get 'Insufficient data' during eye detect and the possible reasons may be -

➢   Excessive glance on the glasses
➢   Excessive amount of light or lack of light in the testing room
➢   Distance between eye tracker device and participant is not appropriate.
➢   Sometimes there is a problem in the subject's eye, such as lazy eye, excessive blinking, and excessive squinting.

3.   If the subject fails to respond quickly and accurately in relevant questionnaires more than 25% then there will be no chance of scoring. Sometimes participants have poor reading skills or poor comprehension skills. Therefore they aren't able to give answers quickly and accurately. Hence participants automatically fail the test. To prevent this problem, the examiner should include an optional reading test before starting the actual lie detection test.

4.   Sometimes participants aren't able to understand the double negative remarks. Therefore they aren't able to give accurate answers, which often lead to successful results.

5.   If there is a high percentage of an incorrect response present, then it means that the subject has an involvement in respective relevant issues. There the possible outcome is deceptive or not credible and ultimately eye detect technology is a lie detection technology, which detects deception in deceptive persons.

6.   Sometimes not credible results occur due to Random Responses. Researches describe that average persons are always giving 11% incorrect answers in relevant issues due to lack of patience and attention and if the credibility score in relevant issues are more than 50, then also there would be chance of getting Random Responses and the most possible reasons behind are -

 a) If the participants randomly answer questions without concern for accuracy, then   there would be the possibility of getting random responses.

b) Participants with poor reading and poor comprehension skills will definitely give random responses during the lie detection test.

c) If the participant who has already poor comprehension skill and at the same time he or   she misses some questions during lie detection test, then also there will be a chance of getting undeserved outcomes.

7.   If a participant gives a test under the consumption of alcohol, drugs or medications from an eye doctor, the outcomes can be affected.

8.   Some participants are not able to understand the test language fully, participants only understand their native language, and then also there would be a chance of increasing cognitive load on subjects, which often leads to get undeserved outcomes.

9.   If the subject takes the similar test during the short period of time, then there would be a chance that they are already familiar with those questions, which may affect the scoring process and hence false outcomes can appear.

Hence it is proved that Eye Detect is the most reliable tool and it can be used as a screening tool in corporate agencies during pre-employment interviews to prevent crime and internal organizational risk. Apart from that there are certain limitations that one should know about the instrument.

The lie detection test is very time consuming. Sometimes the test continues for at least 30 -45 minutes. So, during the test participants have to place their chin on the chinrest and no movements are allowed. So, sometimes it creates back pain for the participants.

Due to the long process, sometimes participants lack attention and they tend to give random responses, which can actually affect the result. For example, the subject may be truthful but due to the lack of patience and lack of attention, false results may arrive.

Interrogation room should be quiet and normal (No Decoration), and no excessive light should be present. The examiner should maintain all of these instructions, because without these concentrations the subject may get

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affected and also excessive amounts of light may put an effect on the subject's eyes, hence the eye tracker device wouldn't be able to detect pupil dilations and other eye movements. These are certain limitations that one should not ignore while conducting lie detection tests using eye detect technology.

CONCLUSION

The relationship between science and investigation technique is not new. It was present in the ancient period also, the only thing changes is that the techniques and the relation between science and investigation evolves day by day. But in earlier period some of the investigation techniques are so hard and torturous in nature. Hence scientists developed several new techniques to detect deception, such as Polygraph, Suspect Detection System, Layered Voice Analysis, Eye Detect Technology, Brain Electrical Oscillation Signature profiling etc. All these technologies have the unique feature to detect deception. Eye Detect Technology is very new to India, compared to all of the investigative tools, which is able to detect deception by simply monitoring eye movements. Hence, it is necessary to establish its importance not only in corporate sectors as a screening tool but also as an investigative tool in the Criminal Justice System. The technology has a wide future scope because it's high accuracy and high reliability and one of the best advantages of using this technology is - experimenters can use either one relevant issue (crime category) at one time or four relevant issues at one time to detect deception. Therefore it can be used for those investigations where there might be three or four crimes involved. Apart from that the technology can be used in airports in drug, gold smuggling cases. The whole instrument is easily transportable. Hence it can be used anywhere. There is no better way to use this instrument in Border Security Force during recruitment along with that it can be used as an investigation tool to prevent crime and risk in border areas and the instrument should be used in Criminal Justice System in future as a most trusted investigative tool.

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