Research Paper

Exploring Probable Patterns of Deception Using Simulated Stress in the Layered Voice Analysis, Suspect Detection System and Polygraph

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ABSTRACT

The study of the relationship between stress and deception is not new. The current preliminary study through a mock crime scene has examined the responses that are brought out by simulated stress on the three forensic psychological instruments – Layered Voice Analysis, Suspect Detection System, and the Polygraph. Simulated stress is stress that is created under certain conditions that exist in real life usually for study or training purposes. Numerous laboratory studies on mock crimes have used the concept of simulated stress to study deception. The responses collected were then examined for analysis to understand the presence or absence of a relationship between the results generated by the three instruments. The study was also a preliminary attempt to explore the recognition and probable patterns of detection of deception or the lack thereof. The findings of the study that involved three suspects, revealed a potential pattern of deception wherein one suspect was identified as perpetrator ("suspect") by all the three instruments. Yet another suspect's results indicated "suspect" on two out of three instruments. In the last case, all the three instruments identified the suspect as "not a suspect". The identification of a "suspect" is indicative of deception and perhaps knowledge of a crime (guilty knowledge). Although the modes of analysis of the three are distinctly different from each other, the final results depicting deception or truth paves the way for further research in the area. The study however, is not without its limitations. The most significant limitation of the current study is its sample size. A sample size of seven, out of which only three were tested on the instruments, is a major limitation to surmise the results.

The history of the study of stress dates back to early 20th century when Hans Selye defined it as a "non-specific" response of the body to any demand ((Fink, 2009, Tan and Yip, 2018). He enriched the definition later when he included the cardiovascular,

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pulmonary, and renal systems as amongst the highly affected organs by stress, after having initially focused only on the neuro-endocrine system (Szabo, et. al., 2012 citing Selye, 1956, 1971, 1974). His early model of stress did not differentiate between the cause and effect of stress but later he came up with the word stressor to define the cause of the stress response. He explained his idea about stress as a response through different stages and named it the General Adaptation Syndrome (GAS) and that included the alarm stage, stage of resistance and the stage of exhaustion (Fink, 2017). Simply put, the GAS explains the response of an individual when faced with a stressor: there is first a stage of alarm or shock when the individual is not prepared, followed by a stage of resistance when there is an attempt to resist or fight the stressor and culminates in a state of exhaustion when the struggle ends. Since stress has thus been defined as a response it may be safe to assume that a human body will always experience stress because demands on it are inevitable.

The current preliminary study takes into consideration this demand and through a mock crime scene has examined the responses that are brought out by simulated stress on the three forensic psychological instruments – Polygraph, Layered Voice Analysis, and Suspect Detection System. The responses collected were then examined for analysis to explore the recognition and probable patterns of detection of deception or the lack thereof.

Simulation in psychology is also known as self-projection and it involves the movement of a present state of mind or existence into another time, place, person or a hypothetical reality (Waytz, et.al, 2015). In simple words, simulation is a state of pretense where an individual plays a role or character required in a time and space assigned for it. Simulated stress is stress that is created under certain conditions that exist in real life usually for study or training purposes. Numerous laboratory studies including mock crimes have used the concept of simulated stress to study deception (Tripathi and Vaya, 2020, Honts and Carlton, 1990).

In a study on the cues to deception, deception was defined as a "deliberate attempt to mislead others" and the term was interchangeably used with lying (DePaulo et. al., 2003). However, when lying was studied in the context of its relationship with deceiving and misleading, two observations were made: one, that lying can be done without any intention to deceive and that there is no actual "moral" difference between "lying and merely misleading" (Stokke, 2013). These processes were studied particularly during the process of interviewing as part of the study given the fact that it was based on simulated stress and as such these are likely to appear.

The study of the relationship between stress and deception is not new. The mind-body relationship or Psychophysiology is defined by Lykken (2002) is the "study of mental or emotional processes as revealed through involuntary physiological reactions that can be monitored noninvasively from an intact subject". Involuntary changes can be detected in a body under stress. Such a body may be faced with physiological or psychological or even a combination of both types of stressor and consequently exhibit changes. Thus, even in the case of simulated stress there will be involuntary changes mostly because of the psychological stressors that are introduced in the environment. This is consistent with the numerous studies that have been conducted on simulated stress. One of the most significant contributions of the psychophysiological reaction to stress has been made in the detection of deception.

The psychophysiological measures can be divided into four broad categories (Dawson and Schell, 2001). The first comprising the responses of the autonomic nervous system (ANS) that regulates the body's response under stress as well as when relaxed, also includes the sympathetic and the parasympathetic branches that are responsible for the "fight or flight" actions. For this reason, heart rate (Blood Volume Pulse) or palmar sweating (Electro dermal activity) can be used as a measure to determine the level of anxiousness in an individual in a given situation. The Polygraph, amongst other parameters takes these two into account. The Suspect Detection System which also works on the principle of psychophysiology measures electro dermal activity (Hussain et. al., 2022). The second category considers the activity of the skeletal system as indicated by motor activity which accounts for the overall muscle tension that reflects arousal or activation and even states of emotion. The third category of psychophysiological measures consists of electrophysiological indices of central nervous system activity, primarily electroencephalogram (EEG) and evoked response potential (ERP) measures. Instruments such as the Brain Electrical Oscillation Signature (BEOS) function on this principle. The last category of responses is derived from brain scanning techniques such as positron emission tomography (PET), magnetic resonance imaging (MRI), or functional MRI scans. Forensic psychology that combines psychology and law uses instruments such as the Polygraph, Suspect Detection System, BEOS, and Layered Voice Analysis to name a few, to assess and examine suspects (Vaya, 2015). While the above mentioned instruments work on the principle of psychophysiology, the Layered Voice Analysis (LVA) uses voice stress and modulation for voice frequency analysis. The LVA was designed to automatically detect both stress and deception in speech, among other psychological states (Srivastava et. al., 2022).

MATERIALS AND METHODOLOGY

It is seen that the study of detection of deception using a combination of three forensic psychological instruments, namely Polygraph, Layered Voice Analysis (LVA), and Suspect Detection System (SDS) in one study has not been explored as yet. Thus, the understanding of such patterns of deception, if any, might provide a better insight in forensic psychological examination of suspects.

The aim for the current study is thus to distinguish and analyze the patterns of deception generated by the results of simulated stress in the three instruments.

Although the modes of analysis of the three are distinctly different from each other, the final results depicting deception or truth paves the way for further research in the area.

Study Design
- **Study Layout**: The study layout was a laboratory based mock crime scene.

Sample: 7
- **Sampling Technique:** The convenience sampling technique was used in the study. There were a total of seven (N=7) participants. Two (02) participants were assigned to be the experimental managers and 03 (three) were suspects. There was an eyewitness and one (01) victim.

Tools
- **Socio-demographic sheet:** This included personal information such as name, age, sex, marital status, religion, educational qualifications and work experience.

- **Informed Consent form:** This included the consent given by the participants to participate in the study after being explained the purpose, nature, and procedure of the study through an informal interview.
- **Computerized Polygraph System:** It works on the principle of psychophysiology and measurements like respiration, heart rate, blood pressure, electro-dermal response (electrical conductance at the skin surface), and movements are analyzed during the examination that involves questioning.
- **Layered Voice Analysis System:** This instrument that involves only speech identifies various types of stress levels, cognitive processes and emotional reactions that are reflected in different properties of voice. It relies on voice frequencies that are affected by "psychological versus physiological" bodily reactions to the stress of telling lies.
- **Suspect Detection System:** This instrument focuses on the Galvanic Skin Response as a psychophysiological reaction to questioning.

Procedure

The study was carried out in two phases.

Phase I: Layout of mock crime scene

The mock crime scenario was designed for the study. It was conducted at the Forensic Psychology division of the Central Forensic Science Laboratory, Kamrup (R). A scene depicting a store and three customers who visit the store was conceptualized. There was a storekeeper (victim) assigned to sell her products. There were three customers {suspect 1(S1), suspect 2(S2), suspect 3(S3)} who were given the task to engage the storekeeper in a conversation and keep her preoccupied in another section of the store for a certain period of time. During that brief period one customer (out of the three customers) was to steal item(s) from the counter that was easily accessible to him/her. There was a bystander who was witness to the entire scene from outside the store.

1. *Briefing of participants*

   The participants were briefed about the study by the researchers. Roles of Experimental managers (EM1 and EM2) were assigned to two participants by the researchers.

2. *Briefing of Experimental Managers (EM 1&2) by researchers*

   The task given to EM1 was to explain the scene to the participants along with their respective roles and tasks. EM1 was asked to randomly assign a participant (S1/S2/S3) to be the perpetrator. The task of the perpetrator was to commit the crime which was known only to the EM1 and him/her (S1/S2/S3). This was done to avoid bias and ensure objectivity during the process of examination. EM2 was assigned the role of an Investigating Officer (IO) to interview the participants (S1/S2/S3, storekeeper and eyewitness) and take their written statements after the conduction of the experiment and submit a compiled report of the interviews to the researchers.

3. *Briefing of participants by Experimental Manager 1*

   EM1 briefed the participants and assigned roles (storekeeper, eyewitness, three customers out of which one is perpetrator) to each.

4. *Conduction of experiment*

   The mock crime scene began with the storekeeper arranging and laying out her goods on the shop counter. The customers (S1, S2, and S3) entered the shop and enquired about certain goods that they wanted to purchase. A conversation ensued engaging the storekeeper during which the perpetrator committed the crime. An

eyewitness was positioned outside the store to observe what was happening inside. At a time pre-decided by EM1, the three customers left the shop.

The storekeeper on discovery of certain missing items from the shop after the exit of the customers reported the crime to IO (EM2).

Phase II: Interviews and examination of participants
1. *Experimental Manager 2:* The EM2 initiates a series of interviews with the S1, S2, S3 (customers) as well as the witness who provides the EM2 with the eyewitness testimony after the case was reported by the victim (storekeeper).
2. *Researchers:* The researchers conducted interviews with the EM2, S1, S2, S3, and the eyewitness regarding the incident. Individual accounts of the case were taken in the interviews. The interviews were followed by examination of the eyewitness, S1, S2, and S3 on the Layered Voice Analysis, Suspect Detection System, and the Polygraph.
3. *Analysis, scoring and results*
   The three instruments used in the study generate different results with respect to the technologies used to measure different parameters. These results are always in the form of statistically generated data and graphs. The subsequent analysis was done by comparative examination of the graphs and final results of the patterns of deception generated by the three instruments.

Socio-demographic details of all the participants
The total number of participants was 7. The socio demographic data included the age of the participants, community and religious affiliations. It also included the level of education and the work experience. The minimum age in years was 27 and maximum, 31. There were five males and two females in the study. Barring one, all the other participants were from a nuclear family setting. There were five post-graduates and two graduates. Six participants had a work experience of more than one year while one participant had worked for less than a year.

Socio demographic summary of suspects
Out of these 07 participants, only 03 were assigned the role of suspects. All the three participants were postgraduates having had work experience of over a year. The age group was 27 – 31. There were two males and one female playing the role of the suspects. The family set up of two participants was nuclear while the third one's was a joint family arrangement.

Layered Voice Analysis (LVA)
The results with reference to the graphs of Layered Voice Analysis are given below in Table 1.1.

Table 1.1. LVA analysis

Segments	S1(1528)	S2(1696)	S3(1533)
Truth	73	91	48
Stress	370	436	405
Inaccuracy	151	149	193
Highly suspected (Med-high risk)	95	34	96

Segments	S1(1528)	S2(1696)	S3(1533)
High Risk – False	02	02	11
Average lie probability	33	28	33

The LVA analyzes voice samples and breaks them up into different segments. Each voice segment reflects specific emotional reactions, stress levels and cognitive reactions. It relies on voice frequencies that are affected by "psychological versus physiological" bodily reactions to the stress of telling lies (Harnsberger, 2009). As can be seen in the table, out of the total 1528 voice segments for S1, 73 were 'truth', 370 'stress', 151 were 'inaccuracy', 95 were 'highly suspected', 02 were 'high-risk-false' segments. The 'average lie probability' was 33. In the case of S2, the total voice segments were 1696 out of which 91 were 'truth', 436 were 'stress', 149 were 'inaccuracy', 34 were 'highly suspected', 02 were 'high risk-false' segments. The 'average lie probability' was 28 was S2. The total number of voice segments was 1533. There were 48 'truth', 405 'stress', 193 'inaccuracy', 96 'highly-suspected', and 11 'high-risk false' segments. The 'average lie probability' was 33.

Suspect Detection System (SDS)
The result with reference to the graphs of Suspect Detection System is given below in Table 1.2.

Table 1.2. SDS analysis

Suspect	**Relevant Question Set 1**	**Relevant Question Set 2**	**Relevant Question Set 3**	**Relevant Question Set 4**	**Relevant Question Set 5**	**Relevant Question Set 6**
S1	No Peak of Tension	No Peak of Tension	*Peak of Tension*	*Peak of Tension*	*Peak of Tension in NRQ*	No Peak of Tension
S2	No Peak of Tension	No Peak of Tension	No Peak of Tension	No Peak of Tension	-	-
S3	*Peak of Tension in NRQ*	No Peak of Tension	No Peak of Tension	No Peak of Tension	-	-

The Cogito SDS uses the Guilty Knowledge Test to ascertain recognition and knowledge of a crime. An examinee is put through an initial series of question sets that include relevant and non-relevant questions. Relevant questions include topics/themes that are directly related to the issue being examined whereas non-relevant questions are composed of themes that are not directly related to the issue but include factual details about (or known to) the examinee. Thereafter the system calculates the strongest reaction in each set of questions, and then decides whether to provide additional questions. The Peak of Tension (POT) algorithm compares the signal altitude. The peak-of-tension algorithm identifies a pattern of responsiveness that increases as the relevant question occurs, and decreases when the question passes.

As can be seen in the table above, S1 went through 6 sets of questions. Out of six sets, POT on the relevant question was seen in two sets and on a non-relevant question in an additional

set. S2 displayed no POT in any of the sets while S3 had a POT in a non-relevant question on the first set of questions.

Polygraph
The result with reference to the graphs of Polygraph is given below in Table 1.3.

Table 1.3. Polygraph analysis

Suspect	Relevant Question 1 (R1)	Relevant Question 2 (R2)	Relevant Question 3 (R3)	Relevant Question 4 (R4)
S1	*Significant Reactions*	*Significant Reactions*	Inconclusive	*Significant Reaction*
S2	*Significant Reactions*	*Significant Reactions*	Inconclusive	Inconclusive
S3	*Significant Reactions*	*Significant Reactions*	Inconclusive	Inconclusive

The Polygraph works on the principle of psychophysiology. The Polygraph uses two types of questions other than irrelevant questions – control and relevant. While the control questions are capable of evoking emotion about an act of wrongdoing of some general nature as the main issue under investigation, but not related to the issue under investigation. Relevant questions on the other hand are directly related to the issue under investigation and are based on the facts of the case. Irrelevant questions are not related to the issue and include general facts about the examinee or generic topics.

Each set of questions has one relevant question which may or may not elicit a significant reaction. A significant reaction is considered as an unfavorable opinion regarding the outcome of a polygraph examination based upon test data analysis for at least one relevant question in a completed test series. As can be seen in the table above, in Set 1 significant reactions were seen in the readings of S1, S2, S3 on the relevant question and this was repeated in set 2 as well. In set 3, the relevant question did not produce any significant reaction and was therefore inconclusive for all the suspects. In set 3, a significant reaction was produced by S1 on the relevant question while S2 and S3's reading were inconclusive.

Summary of results generated by the LVA, SDS, and Polygraph
The final result generated by the three instruments indicating 'Suspect' or 'Not a suspect' is summarized in the Table 1.4 below.

Table 1.4. Summary of results of LVA, SDS, and Polygraph

S.No.	Suspect	Layered Voice Analysis	Suspect Detection System	Polygraph
1.	S1	Suspect	Suspect	Suspect
2.	S2	Not a suspect	Not a suspect	Not a suspect
3.	S3	Suspect	Not a suspect*	Suspect

Table 1.4 summarizes the final test results of the three instruments. S1 is indicative of possible deception as it can be seen above. The result for S1 on all the instruments has shown "Suspect". The results of S2 depict possible non-deception since the final results

have concluded S2 as "Not a suspect". The results of S3 on the other hand indicate probable deception on two instruments and no deception in one (marked with *). This is discussed in a subsequent section.

Summary of the working principles of the LVA, SDS, and Polygraph
The underlying principles behind the three instruments are voice frequencies for the Layered Voice Analysis, and Galvanic Skin Response for the Suspect Detection System. The Polygraph measures respiration, galvanic skin response and blood volume pressure and monitors any movement that an examinee might make. It is important to note that in the LVA and the Polygraph the examiner is directly involved in the process of examination implying that the physical presence of the examiner is necessary during the course of the examination. In the SDS however, the examiner can initiate the examination and leave the examinee alone to complete it. Then they can come to terminate the examination. The active presence of an examiner during examination may have an influence on an examinee and consequently the test results.

RESULTS AND DISCUSSION

LVA uses an open ended response method from the subject, the version of the subject is always detailed and the subject could be probed further on the relevant issues. The results of the LVA as shown in table 1.1 indicates that the number of truth segments is highest in S2 (91) followed by S1 (73) and then S3 (48) with the least number of truth segments. This can be interpreted as the number of times a suspect was being truthful or spoke statements which were identified as truthful statements by the instrument. As the study worked on simulated stress, the total number of stressed samples were also taken into the account for analysis. S2 showed the highest number of both 'stressed' (269) and 'highly stressed' (167) segments followed (total of 436 segments depicted the in table) by S3 with 'stressed' (200) and 'highly stressed' (205) segments (total of 405 segments depicted in the table) and S1 with 'stressed' (343) and 'highly stressed' (27) segments (total of 370 segments depicted the in table). Since the study was based on the simulated stress, this data also ascertains the presence of stress in all the suspects.

The three major indicators of deception are 'Inaccuracy', 'Highly Suspected' and 'High Risk- False' segments. The inaccuracy of a segment often indicates deception but could also show inconclusive results. S3 shows the maximum number of inaccurate statements (193). There is a slight difference between inaccurate statements of S1 (151) and S2 (149). The total number of deceptive statements out of these inaccurate statements differs since few results as inconclusive. The 'Highly suspected' statements often pose medium risk but are deceptive. S2 has a minimum number of 'Highly suspected' segments (34) whereas there is a marginal difference in S1 (95) and S3's (96) segments. Similarly, 'High risk- False' statements are the segments with the highest risk of deception. These segments often become the major indicator of a deceptive subject. The total number of 'High Risk- False' segments of S1 (02) and S2 (02) are same while S3 (11) has the most number of 'high risk' segments. From the above result, it can be concluded that S2 could be least deceptive and pose less risk than S1 and S3. However, S1 and S3 both pose medium to high risk and could be deceptive. Along with this, the Average Lie Probability (ALP) that is depicted on the table, denotes the chances of the current subject being deceptive and is calculated by using basic parameters in a standard fixed statistical equation. The ALP of S2 is 28 whereas both S1 and S3 have the same ALP of 33. S1 as compared to S3 only indicates medium risk since

the number of 'truth' segments of S1 is higher than S3 and 'High Risk- False' segments are less than S3.

The Cogito SDS' basic algorithm is responsible for analyzing the human psycho-physical signals through the sensors and studying the signal analyzing the reaction of each relevant stimulus (question) and comparing it to other non relevant stimulus (question). The Peak of Tension (POT) technique helps to identify the strongest reaction. This algorithm compares the signal altitude and thereby identifies a pattern of responsiveness that increases as the relevant question occurs, and decreases when the question passes. For S1, POT on the relevant question was seen in two sets and on a non-relevant question in an additional set. When an individual performs an affectively evoking act either guilt or fear will be present known only to the perpetrator or person involved. This could imply that in all likelihood S1 had knowledge of the crime that was committed or is even guilty of committing a crime himself. A POT appeared on a non relevant question in set 5 and no POT in set 6 for S1. As Cogito SDS draws its conclusions by comparing each reaction to a specific question to all other reactions to all other questions, this could be the reason that there was no POT seen in the relevant question in sets 5 and 6. As can be seen in table 1.2, S1 went through 6 sets of questions. This is in itself an indication of deception as the system is designed to add two additional sets of questions to the existing four sets based on the strongest reactions in the other questions.

S2 displayed no POT in any of the sets while S3 had a POT in a non-relevant question on the first set of questions. The readings of S2 are indicative of the possibility that she may not possess knowledge of the crime committed. The reactions to a specific event will be different from a suspect than a person not involved in the event (or crime) and this could explain the difference in the reactions between S1 and S2. The POT was seen only in a non-relevant question for S3. This may lead us to assume that S3 too may not have had knowledge of the crime for his final result declared him as non-suspect as well. However, we cannot rule out the possibility of impact of weather conditions and sweating as the instrument works only on the skin conductance. The final results that are generated by the SDS thus compile the data from fourteen parameters and bring out the resultant 'Suspect' or 'No Suspect' answer.

The analysis of Polygraph is concerned only with control and relevant questions. Each relevant question is measured against its closest control question. As mentioned in Table 1.3, 'Significant reactions' to these questions helps in determining the truthful and deceptive subjects. These significant reactions are calculated using Spot Scores which gives the p-value or the probability value of a relevant question. A non-deceptive or a truthful subject will generate no significant reaction but a deceptive person always generates significant reaction. The final result of the analysis could be deceptive, non- deceptive and inconclusive. In the case of significant reactions to a relevant question, it is understood that the psychophysiological reaction to that relevant question as compared to the nearest control question (difference from the baselines) is more.

As the table shows, S1 has significant reactions to three (R1, R2 & R4) out of four relevant questions. S2 and S3 have significant reactions to only two relevant questions (R1 & R2) out of four. The relevant questions were directly related to the crime that happened enquiring about involvement in the crime and knowledge about the crime. The significant reactions are measured and calculated through the Objective Scoring System- Version 3 by Raymond

Nelson, Mark Handler and Donald Krapohl (2007) the probability of S2 being the perpetrator was less than S1 and S3. There was a marginal difference in the significant reactions of S1 and S3 and this could be indicative of either both are involved in the crime or both have knowledge of crime.

Table 1.4 summarizes the final results generated by the three instruments. From the table it can be concluded that S1 is most likely the confirmed suspect making him the perpetrator or culprit of the crime. His test results show him as a suspect in all the three instruments. This is suggestive of deception. The test results of S2 asserting "not a suspect" as seen in the table indicate non-deception. This rules out the possibility of S2 possessing knowledge of the crime committed (guilty knowledge) and the unlikelihood of her committing the crime. S3 has shown deception in two instruments as has been identified as "suspect" in the LVA and the Polygraph. His result on the SDS has established him as a non-suspect. Since he was identified as "suspect" by two of the three instruments, the results of S3 suggests that he may have had knowledge of the crime and/or the perpetrator of the crime. There may have even been attempts to withhold information or mislead the examiners.

The three instruments used in the study work on different principles and their software produce results accordingly. The presence of examiners in the process of examination is significant and may have an impact on test results. The Layered Voice Analysis and the Polygraph are required to have the presence of the examiner during the examination. An individual suspected of wrongdoing or a crime, or even withholding information, may be anxious around an individual who is there to check the veracity of his/her statements and actions while undergoing a test to prove oneself as not guilty. An examinee could also be more attentive with the intention of performing well, given the presence of such an individual. Referring to the previous section it is recalled that S3 was identified as a non-suspect in the Cogito SDS. The process of examination on the instrument does not necessarily require an examiner to be present while it is ongoing. This absence may make an individual feel relaxed and comparatively less attentive knowing that he/she is not under direct observation.

CONCLUSION

Through this study an attempt is made, to contribute to the understanding of the connection between simulated stress and deception, to find out the probable pattern of deception. This preliminary study did not reveal a consistent pattern in the results of the three instruments even though there are similar results seen amongst two. There are many factors which have impact on the final results such as the sample size, questioning technique, background of the subject, history of case and also an examiner's direct/indirect involvement. The active involvement of examiner during the examination process might be more stressful than the indirect involvement of examiner. The result of S1 and S2, ascertain them as 'suspect' and 'not a suspect' respectively, indicates how well the psychophysiological reactions could be used through different tools like LVA, SDS and Polygraph using different methods for measuring such reactions like blood pressure volume, galvanic skin response, respiration, voice frequencies, etc. The combined usage of the three instruments could help in screening and investigation effectively. Since the stress is simulated and generated through a mock crime scene, it is important to acknowledge the effect of deterrence during such examinations. The stress though present and indicated deception still lacks the fear of punishment. This could also be taken into account while analyzing the results of the study.

At the end, it may be safely concluded that with a larger sample size, more patterns eliciting such information could be obtained and studied.

Limitations

A significant limitation of the current study is its sample size. A sample size of seven, out of which only three were tested on the instruments, is a significant limitation to surmise the results. The ideal conditions (soundproofed room) required in a testing (examination) environment were absent and therefore distractions could not be eliminated. It has been found that such interferences do influence the process of examination and consequently the results. Additionally, the participants were scheduled for examination during the working hours of the office. An individual may, during an examination, not be able to focus completely if he/she is preoccupied with thoughts pertaining to existing tasks at the workplace. This affects the ability of an individual to pay attention to the task at hand.

Future Implications

Although the three instruments work differently and measure different parameters, they share a common goal of distinguishing between an individual guilty of a crime (either participating, abetting, or witnessing) and one who is innocent of any wrongdoing. An investigation that can incorporate all the three instruments to answer queries will be able to provide a comprehensive answer based on the results of these tests as they consider voice as well as psychophysiology. An extended study employing different types of mock crimes or taking real life cases with a larger sample size conducted in the ideal settings would yield more findings.

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Exploring Probable Patterns of Deception Using Simulated Stress in the Layered Voice Analysis, Suspect Detection System and Polygraph

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