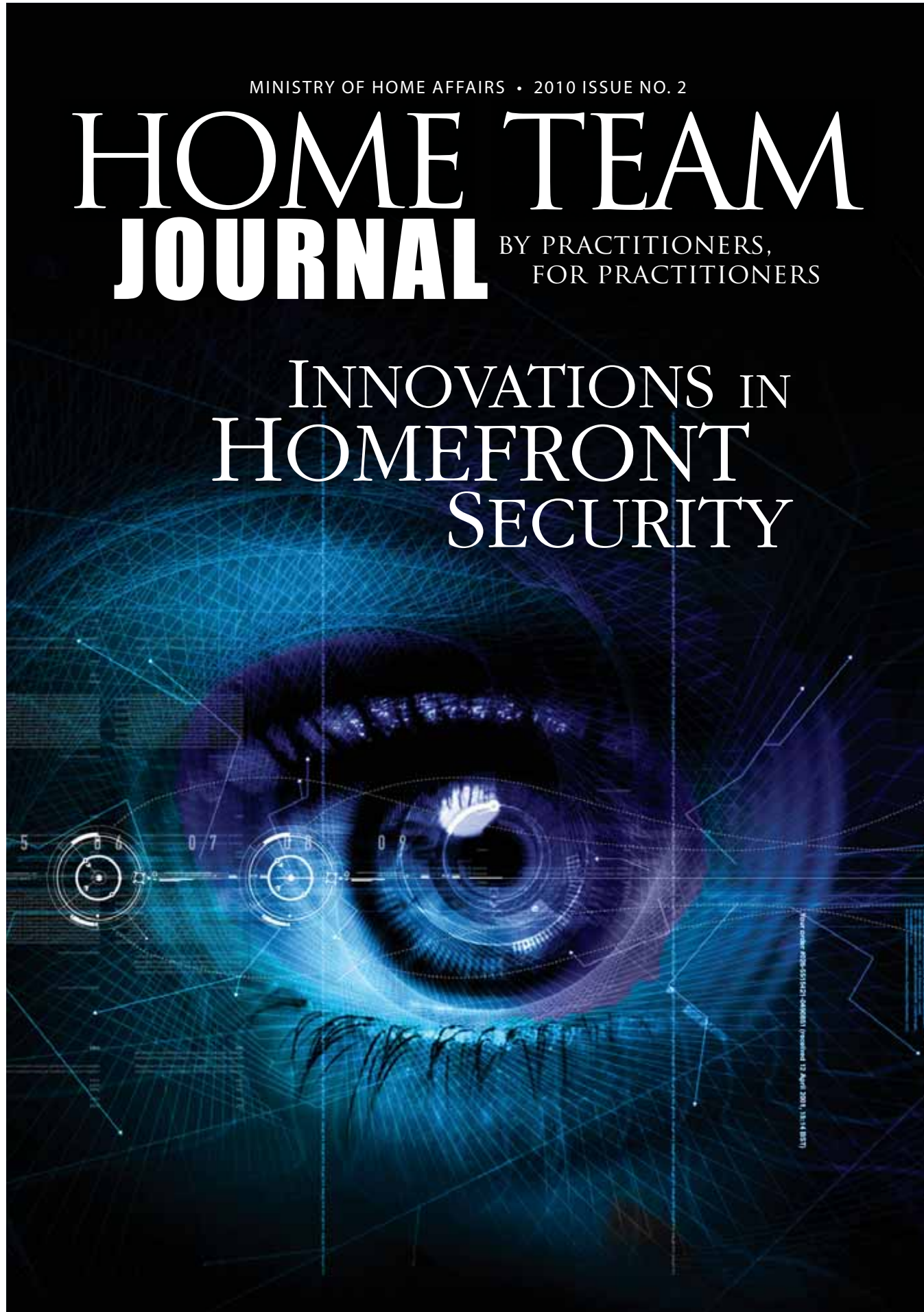


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## INNOVATIONS IN HOMEFRONT SECURITY



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# Suspect *Detection* System:

A Detective and Preventive Forensic Tool

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IN THE LAST two decades, rapid advancement in the field of information technology and overall growth in the economy has led to significant changes in the quality of life. At the same time, changes in the nature of crime including heinous terrorist attacks reflect the change in the attitude and mindset of the perpetrators. Growing terrorist attacks have become both a national and international concern as the cause is of either an ‘ideological’ or ‘organisational’ nature. That is to say, perpetrators carrying out these attacks may not have any criminal history which can render them as suspects to the law-enforcement agencies on the basis of their history. They may enter a country with just an intention to carry out an attack (without carrying any arms or ammunitions on them) and execute the group’s intention with their local network once they are inside the country. Secondly, the

attacks may be intended mainly to seek the attention of masses, thus the target may not be specific. Therefore, it is essential that security agencies are well-equipped with advanced technologies to nab these people with ill-intentions, and it is the need of the hour to master this art.

Forensic psychologists play a key role in aiding crime investigations. Past experience has shown that in order to prevent or tackle an organised crime, ways and means adopted by the perpetrator as well as the strategies designed for the execution of criminal activity must be understood. The work experience of [forensic psychology division at the Directorate of Forensic Sciences (DFS), Gandhinagar, India] handling nearly 5000 suspects referred for various psychological techniques of investigations in the last three decades has helped in understanding how the mind of a perpetrator works,

how it can be assessed and last but not least, how the perpetrator also needs psychological help for handling his own conflicts, and managing his thoughts and emotions in a way the prevention can be done.

Apart from working with criminals, a forensic psychologist carrying out his/her role in crime prevention efforts also requires technological help for the purposes of:-

**Identification:**

**T**HIS WARRANTS A technology capable of identifying the motivation, intentions, and behaviour of a person by focusing on the thought structure, process and pattern (formation) and preceding ideas before they crystallise to clear thinking. This process is like a blueprint of intentions. In the initial stages, if “thought blueprint” can be tracked and identified by the technology, a halt can be put to the thought process before it is coloured with emotions and ready for ignition by the belief system of the person. If adequate preventive forensic care is given by way of counselling during this state, it can save a person from becoming a probable perpetrator of crime.

**Prediction:**

**I**N CASE OF failure to identify them at the initial stage, crystal clear thoughts coloured with emotions

may become “passion” waiting to be ignited by the individual beliefs for a congenial opportunity for outbursts. Where approvers are found with similar thoughts and beliefs in the social milieu, an intention with ignited emotions drives like-minded people for action. By then, the intentions are crystal clear and ill-driven by the belief, culminating in negative emotions. Approval in the individual’s social milieu motivates the planning of the outburst and decides the target. The transformed crystal clear ill intention entailed with negative emotions supported by the social milieu provides a sense of belonging and helps in strategically designing the plan of action.

**Prevention:**

**I**F TECHNOLOGY HELPS in detecting at this stage, the impending outburst can be prevented, aborted or thwarted by not allowing the ill-intent to become ripe for an action. This can help in preventing the person from becoming a perpetrator. It can also help in unearthing the future course of action (i.e. identification of planned strategies and/or involved persons).

**Detection:**

**I**N CASE OF failure to identify these thoughts at the aforementioned stages, and there is a catastrophic attack, investigation starts and a

useful technology should be capable of detecting only the perpetrator from large number of suspected persons in a short span of time in a reliable and accurate manner. The technology should have proven scientific base, and be user-friendly without any discomfort for the examinee undergoing the test. It should be capable of giving direction to the investigation by correctly identifying the perpetrator. This calls for a technology capable of screening the intentions to identify the ill intentions in the mind.

### **Predicting future course of action:**

**I**F IN SPITE of all preventive measures, when an attack takes place, it is essential to detect individuals harbouring hostile intent in real time to change the probability in favour of law enforcement agencies. From the suspects harbouring hostile intentions, detailed investigation should help in unearthing strategies and plans of likely targets which can be verified and helps in achieving crime-related intelligence.

Different types of polygraph instruments, Electroencephalograph (EEG)-Event Related Potentials (ERP) instruments adjunct to forensic psychological assessments are used for eliciting physical correlates for comprehensive forensic evaluation of the suspects.

The scientific base involves either psychophysiology, electrophysiology, or neuropsychological methods for eliciting physical correlates for forensic purposes.

Recently, a high tech, handy, portable, user-friendly screening device from Israel was technically evaluated at (DFS), Gandhinagar. It is an Autonomic Nervous System's (ANS) reactions-based suspect detection instrument. It is established that various ANS parameters such as the Galvanic Skin Responses (GSR), Heart Rate, Blood Volume Pressure (BVP), respiration rate and so forth react to the conscious efforts of deception (Lykken, 1959; Raskin, 1989; Bartol & Bartol, 2004). Among these, the GSR and BVP measures are used by Suspect Detection System (SDS). The SDS is based on the assumption that an individual can be stimulated to generate psychophysical reactions to crime-related triggers (e.g., words or sentences). Furthermore, those with a desire to hide a criminal intent will have different Stimulated Psycho Physical Reactions (SPPR) from the SPPR of people not having such intent. The SDS can be used for the purposes of identifying a perpetrator of a criminal act from the group of suspects. For this, it uses the Guilty Knowledge Test (GKT) paradigm (Lykken, 1959, 1960) which is based on the assumption that if an individual has committed a crime,

then his SPPR of the triggers related to the Relevant Stimulating Objects (RSOs) will be different from the SPPR of the RSOs of non-involved or innocent persons.

### **DETAILS OF THE SYSTEM**

**S**DS IS A compact, user friendly tool. It includes a briefcase consisting of a laptop, headphones, and skin-conductance sensor. This feature gives mobility to the user so that it can be used in various settings. It includes the software which analyses a galvanic skin response of the individual and also provides results on the basis of analysis. It does not require any other external device or tool for analysis.

The examinee is requested to sit comfortably, place his or her palm in a sensors cradle, put on headphones and answer several sets of questions. Questions are presented both in text and audio mode by the system, while the sensors measure psychophysiological responses.

Two types of questionnaires are prepared, one for screening and the other for investigation. These questions are prepared and fed to the instrument in advance. There are six sets of questionnaire in each screening test and each set comprises six questions. Initially, only four sets comprising 24 questions are used to stimulate examinee's unconscious reactions. Questions are different in

terms of the individual's involvement. The examinee is instructed to answer the questions accordingly depending upon the nature of the questionnaire. Even if the examinee does not wish to respond verbally, the system picks up the signals of GSR from the finger. The test process takes about five to seven minutes and after the completion of the test, the decision will be made to classify the individual as suspect or non-suspect. In cases where the examinee is found to be a suspect, further information for directions of investigation is provided by the system and the system will automatically present an additional two sets of questions in order to reduce false positive cases. In the investigation mode, there are four sets of questions. The system records both audio and video inputs during the test. The procedure of using this questionnaire is akin to that of the screening mode. The basic input which is required to analyse the guilty knowledge is the individual's skin conductance. Through Galvanic Skin resistance sensor, the individual's responses are picked up by the system.

Responses collected by the system are analysed by the software, on different parameters. These parameters pick up signals of tension, response delay, latency and amplitude of the response, and the individual's biofeedback mechanism. These are unique sophisticated parameters of the system which make it more

sensitive for forensic purposes. The responses collected are intended to compare between baseline reactions and reactions to incidence-related questions. While analysing, the related questionnaires are compared with non-related questions. All these parameters are analysed using algorithms; Fuzzy Logic, Neural Networks and Pick of Tension, which are effective in measuring biofeedback and psychophysiology. This algorithm combines the results of all these parameters and offers the following results:

- The strongest reaction and the second strongest reaction generated by stimulus
- The strength and validity of each reaction
- Tampering attempt by the subject

The result of the system is given on the basis of the analysis of 14 different parameters. Additionally, software also validates the responses and informs on the validity of that specific response to the specific question. The validity helps in understanding the physiological as well as external factors affecting the results.

The tool also helps in understanding the results when a person is under influence of any substance, or trying to tamper the result. As it is based on neural network mechanism and biofeedback, the instrument measures

baseline on the basis of the individual's responses given to the questions. Any substance or tampering is not taken into consideration while analysing the final results, which is in a way measure of validity while measuring output result that is suspect or non-suspect.

## SDS AS A SCREENING TOOL

**W**HEN AN INVESTIGATOR is not clear about the role of the examinee in the crime, the screening which takes less time and helps in minimising the investigation can be done instead. Investigation is more specific to the crime or incidence.

To identify the role of a suspect, investigation is done. It helps in understanding the information about the crime which is known not to others but the perpetrator only.

Technical evaluation of the SDS was done at the DFS, Gandhinagar, India, focusing upon the feasibility of its use for security purposes. Simulated experiments were conducted using the SDS to see its efficacy in detecting suspects and non-suspects (Wagh & Vaya, 2009). Twenty college students aged between 20 to 25 years, who volunteered for the study, were included and randomly distributed in two groups – experimental and control groups with both having an equal number of subjects. The

experimenter who had to assess the subjects on the SDS and to decide on the basis of the SDS results about a subject's suspect or non-suspect status was blind to the group status of the subjects.

The experimental group subjects were briefed about the task they were supposed to perform. The task comprised of first watching a video clip about the procedure to prepare an explosive. After watching the video they had to go out of the lab premises, prepare a fake explosive (with dummy materials) and place it in the premises without others' knowledge. The control group was not exposed to any video and were not instructed for the task that the experimental group had to do.

After the completion of the task by the experimental group, subjects of both the groups were assessed on the SDS. The results indicated that the instrument was successful in detection with almost 95% accuracy.

Furthermore, when five to six suspects were subjected for screening in blast cases, the system suggested probable belongingness of the identified suspects to a specific organisation, probable source of funding, future course of action, probable time and places of future terrorist attacks. The results of these suspects suggested that it is a useful and time-saving method to gathering intelligence. Timely screening can help in preventing the catastrophes,

aborting the course of action by thwarting the ill intentions. The preventive forensic aspect of detection helps in saving an individual from becoming a criminal.

## CONCLUSION

**T**HE SDS IS an effective screening tool for the identification/detection of a person with ill-intentions which can be further investigated on the basis on the results and the gathered information can be used for the purpose of prevention of further crime as well as the perpetrators of crime.

## SUGGESTIONS

**F**UTURE STUDIES ARE required to validate its efficacy in countering the measures to suppress the ANS reactions to deceptions, often used by people undergoing these types of examinations.

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## EDITOR'S NOTES

Dr. Vaya Shivarathna L., Wagh Nilesh B. and Devvarta Kumar are part of the team at the Institute of Behavioral Science (IBS) of the Gujarat Forensic Sciences University (GFSU). IBS's mission in India is to impart education and to undertake research in clinical and forensic areas, while at the same time, provide the highest calibre in diagnostics, psycho-legal consultation to referral sources (clinicians, attorneys, the Courts, social service and criminal justice agencies etc.) and treatment and rehabilitation to clients.

Dr. Vaya is an Additional Director at the Directorate of Forensic Science (DFS) and Director IBS at GFSU. Her areas of research include work on the standardisation of psychological tools for the Indian context. Her other major research contributions in India include her work on Normative Data for Brain Electrical Oscillation Signature (BEOS) Profiling, the National Resource Centre (NRC) for Forensic Psychology and on the Competency to Stand Trial (CST) system. She has been invited to deliver lectures on forensic and investigative psychology by international, national and state investigating agencies. She is the first accredited officer for Polygraph Examination, Narco-analysis and BEOS Profiling at the Indian National Accreditation Board for Testing and Calibration Laboratories (NABL), She has a Diploma in Medical and Social Psychology, Bachelors and Masters Degree in Clinical Psychology and Doctor of Philosophy (PhD) in Psychology.

Mr. Nilesh is a Junior Assistant Professor in Clinical Psychology at IBS. Major research areas he is working on presently also include the BEOS and CST system as well as the Suspect Detection System (SDS). He has delivered lectures on forensic psychology for Indian judiciary and police officers. He is a recognised operator of the SDS as well as the Cogito Operator-Advanced (C.O.A) System. He has received his Bachelors and Masters Degree in Clinical Psychology and a Masters of Philosophy (M.Phil) in Medical and Social Psychology.

Mr Kumar is also an Associate Professor of Clinical Psychology at IBS. His primary research interests are memory and other cognitive impairments in schizophrenia, non-pharmacological intervention in psychosis, norm development of psychological tests and lie-detection. He is the author of about twenty articles in journals and books. His education includes a Ph.D. in Clinical Psychology and a M.Phil in Medical and Social Psychology.