

Biometrics-A Way of Brain Fingerprinting

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Abstract

The Farwell BF is a new computer-based technology to identify the perpetrator of a crime accurately and scientifically by measuring brain-wave responses to crime-relevant words or pictures presented on a computer screen. Farwell BF has proven 100% accurate in over 120 tests, including tests on FBI agents, tests for a US intelligence agency and for the US Navy, and tests on real-life situations including actual crimes.

Keywords

BF- Brain Fingerprinting, MERMER, Perpetrator, Information, Stimuli

1. Introduction

BF determines whether an individual recognizes specific information related to an event or activity by measuring electrical brain wave responses to words, phrases, or pictures presented on a computer screen. The technique can be applied only in situations where investigators have a sufficient amount of specific information about an event or activity that would be known only to the perpetrator or the investigator. BF measures electrical brain activity via a fitted headband containing special sensors.

2. Features of BF

- A. BF is said to be more accurate in detecting "guilty" knowledge distinct from the false positives of traditional polygraph methods, but this is hotly disputed by specialized researchers.
- B. It is based on EEG signals; the system does not require the tested to issue verbal responses to questions or stimuli.
- C. The technique can be applied only in situations where investigators have a sufficient amount of specific information about an event or activity that would be

known only to the perpetrator and investigator.

- D. General knowledge gained from a newspaper or television does not interfere with BF testing. A suspect is tested for details of the crime that only the perpetrator and investigators would know, but that have not been publicly released.
- E. In most of the cases BF is not affected by memory loss. If there is any non approval of testing then it is due to the non-participation in the crime rather than to some malfunction of the memory.

How BF Differs from Polygraph Methods?

The Polygraph methods include fingerprint detector lie-detector, DNA match etc. But above them BF testing provides an accurate, economical and timely solution to the central problem in the crime investigation. It differs from other Polygraph methods-

- A. BF uses cognitive brain responses and it is not affected by emotional responses. It is fundamentally different from the polygraph (lie-detector), which measures emotion-based physiological signals such as heart rate, sweating, and blood pressure. Also, unlike polygraph testing, it does not attempt to determine whether or not the subject is lying or telling the truth.
- B. Conventional fingerprinting and DNA match physical evidence from a crime scene with evidence on the person of the perpetrator. Similarly, BF matches informational evidence from the crime scene with evidence stored in the brain. Fingerprints and DNA are available in only 1% of crimes. The brain is always there, planning, executing, and recording the suspect's actions.

- C. In fingerprinting and DNA fingerprinting, evidence recognized and collected at the crime scene, and preserved properly until a suspect is apprehended, is scientifically compared with evidence on the person of the suspect to detect a match that would place the suspect at the crime scene. BF works similarly, except that the evidence collected both at the crime scene and on the person of the suspect (i.e., in the brain as revealed by electrical brain responses) is informational evidence rather than physical evidence.
- D. Polygraphy is a technique of interrogation and detection of deception Brain MERMER testing does not require any questions of or answers from the suspect. The subject neither lies nor tells the truth during the procedure, and in fact the results of MERMER testing are exactly the same whether the subject lies or tells the truth at any time.

3. Technique Used in BF

Farwell BF works as follows. Words or pictures relevant to a crime are flashed on a computer screen, along with other, irrelevant words or pictures. Electrical brain responses are measured non-invasively through a patented headband equipped with sensors. Dr. Farwell has discovered that a specific brain-wave response called a MERMER is elicited when the brain processes noteworthy information it recognizes. Thus, when details of the crime that only the perpetrator would know are presented, a MERMER is emitted by the brain of a perpetrator, but not by the brain of an innocent suspect. In Farwell BF, a computer analyzes the brain response to detect the MERMER, and thus determines scientifically whether or not the specific crime-relevant information is stored in the brain of the suspect.

A. MERMER Technique

In this a series of words, sounds, or pictures are presented via computer to the subject for a fraction of a second each. Each of these stimuli are organized by the test-giver to be a "Target," "Irrelevant," or a "Probe." The Target stimuli are chosen to be relevant information to the tested subject, and are used to establish a baseline brain response for information that is significant to the subject being tested. The subject is instructed to press on button for Targets, and another button for all other stimuli. The non-Target stimuli are Irrelevant, and are totally unrelated to the situation that the subject is being tested for.

The Irrelevant stimuli do not elicit a MERMER, and so establish a baseline brain response for information that is insignificant to the subject in this context. Some of the non-Target are relevant to the situation that the subject is being tested for. Probes, are relevant to the test, and are significant to the subject, and will elicit a MERMER, signifying that the subject has understood that stimuli to be significant. A subject lacking this information in their brain, the response to the Probe stimulus will be indistinguishable from the irrelevant stimulus. This response does not elicit a MERMER, indicating that the information is absent from their mind.

B. Four phases of Farwell BF

In BF the evidence collected both at the crime scene and on the person of the suspect (i.e., in the brain as revealed by electrical brain responses) is informational evidence rather than physical evidence. There are four stages to BF-

- 1) **BF Crime Scene Evidence Collection:** In the Crime Scene Evidence Collection, an expert in BF examines the crime scene and other evidence connected with the crime to identify details of the crime that would be known only to the perpetrator.
- 2) **BF Brain Evidence Collection:** The Brain Evidence Collections determine whether or not the evidence from the crime scene matches evidence stored in the brain of the suspect.
- 3) **BF Computer Evidence Analysis:** In the Computer Evidence Analysis, the BF system makes a mathematical determination as to whether or not this specific evidence is stored in the brain, and computes a statistical confidence for that determination.
- 4) **BF Scientific Result:** This determination and statistical confidence constitute the Scientific Result of Farwell BF: either "information present" – the details of the crime are stored in the brain of the suspect – or "information absent" – the details of the crime are not stored in the brain of the suspect.

The entire BF System is under computer control, including presentation of the stimuli and recording of electrical brain activity, as well as a mathematical data analysis algorithm that compares the responses to the three types of stimuli and produces a determination of "information present" ("guilty") or "information absent" ("innocent"), and a statistical

confidence level for this determination. At no time during the testing and data analysis do any biases and interpretations of a system expert affect the stimulus presentation or brain responses.

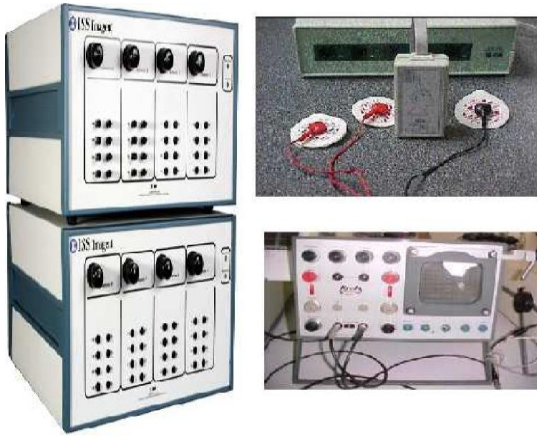


Fig 1. Device used in BF System

A Suspect is tested by looking at three kinds of information represented by Different colored lines:
Red: information the suspect is expected to know
Green: information not known to suspect
Blue: information of the crime that only perpetrator would know

A. Counter Terrorism

BF can help in the following critical situation:
Aid in determining who has participated in terrorist acts, directly or indirectly. Aid in identifying trained terrorists with the potential to commit future terrorist acts, even if they are in a “sleeper” cell and have not been active for years. Help to identify people who have knowledge or training in banking, finance or communications and who are associated with terrorist teams and acts. Help to determine if an individual is in a leadership role within a terrorist organization.

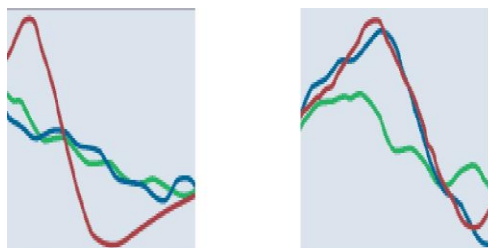


Fig 2. No Guilty

Guilty

In a terrorist act, there may or may not be peripheral evidence such as fingerprints or DNA, but the brain of the perpetrator is always there, planning,

executing, and recording the crime.

B. Security Testing

BF technology can play a significant role in Security Testing when investigators know specific details of a crime, training or group affiliation. It can also determine if a person has specific “classified” or confidential information stored in their brain. Typical applications include:

- 1) Visa Application II Level Testing
- 2) Polygraph “False Positive” II Level Testing
- 3) Security Clearances
- 4) Corporate Frauds
- 5) Computer Hacking

C. Criminal Proceedings and thus exonerate the innocent

BF testing does not prove guilt or innocence. That is the role of a judge and jury. This exciting technology gives the judge and jury new, scientifically valid evidence to help them arrive at their decision. DNA evidence and fingerprints are available in only about 1% of major crimes. It is estimated that BF testing will apply in approximately 60 to 70% of these major crimes.

D. Medical field

BF’ is the patented technology that can measure objectively, for the first time, how memory and cognitive functioning of Alzheimer sufferers are affected by medications.

BF Laboratories is now developing diagnostic and monitoring systems for Alzheimer’s using this exciting new technology that will be very cost effective and accurate. A patient diagnosed with Alzheimer’s will undergo a series of tests over a period of time to measure their progress and response to various treatments. The tests will be simple, non-intrusive and can be administered in a medical center or in a local physician’s office. The systems being developed by BF Laboratories will provide early identification Alzheimer’s and be able to detect changes in cognitive functioning on a short-term basis. This will allow physicians to more effectively evaluate the progress of individual patients and adjust treatments much more rapidly than what is possible today, improving the quality of care and the quality of life for the patients.

E. Media Effectiveness and Measuring Campaign

BF Laboratories will offer significant advances in measuring campaign and media effectiveness. This technology will be able to help determine what

information is actually retained in memory by individuals. For example, in a branding campaign do people remember the brand, the product, etc. and how do the results vary with demographics?

F. Industries

In the insurance industry, BF Laboratories will be able to help reduce the incidence of insurance fraud by determining if an individual has knowledge of fraudulent or criminal acts. This testing can help to determine if an individual has specific knowledge related to computer crimes where there is typically no witness or physical evidence.

4. Limitations

- A.** BF testing will determine if specific information is in the brain, but will not tell us how it got there. Likewise, In a case where there are two people at a crime scene and only one committed the crime, BF testing can narrow the search down to the two suspects. It cannot be used to distinguish why a person was at the crime scene. If only specific information is available about the planning or execution of a crime that a witness would not know, then BF testing may be able to distinguish between a witness and a perpetrator.
- B.** The cases in which BF can be applied are ones where the crime is recent and the suspect has not been exposed to information about it. Then only, the suspect can easily be tested for knowledge about the crime that only the perpetrator would know. But in cases where the suspect has already been tried and convicted, the suspect knows many of the details of the crime from the trial, whether he is innocent or guilty. In such a case, details about the crime that have not been presented in court and that an innocent suspect would not know need to be identified. Also a lot of information is available about the crime in the media, so information about crime is also known by the suspect by this mean.
- C.** There are several types of cases where this technology does not apply.
- D.** In a disappearance, all the authorities may know is that someone disappeared. They may not know if any crime has been committed.

- E.** BF testing is not applicable is when everyone agrees on what happened, but there is disagreement as to the intent of the parties. For example, in a sexual assault case the alleged victim and the alleged perpetrator may agree exactly on what happened, but disagree on whether or not it was consensual.
- F.** BF testing involves the length of time and effort that would be required to obtain an adequate number of probes in cases where the judicial process has run its course to a greater extent.

5. Conclusion

Even in its relative infancy, BF is poised to explode into and beyond the legal arena. Foremost among potential application is its use in criminal justice BF can be used to accomplish everything in the judicial system from identifying terrorists, members of gangs, and obtaining criminal and intelligence information, to exonerating the innocent, to discovering criminal espionage and terrorist plots. BF can provide authorities with “cost effective approaches to investigations,” allowing them to focus their efforts on the suspects who “actually” committed crimes, and thus increase rates of convictions. BF testing could be applicable in approximately sixty to seventy percent of major crimes (contrasted with only 1% for fingerprinting), and could save up to ten to twenty percent of overall costs of the criminal justice system by avoiding the prosecution of innocent individuals and freeing up governmental resources.

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