



Brain Fingerprinting

Picture-perfect crimes

By Tami Abdollah

It has been said there is no such thing as a perfect crime. This may especially ring true with the introduction of a new, though highly controversial method of determining a suspect's guilt - brain fingerprinting.

Brain fingerprinting was developed and patented in 1995 by Lawrence A. Farwell, Ph.D., chairman of the Brain Wave Institute in Fairfield, Iowa, and former Harvard University research associate.

Brain fingerprinting is based on the theory that throughout a crime, the brain plans, records, and executes all of the criminal's actions. Such details, all concealed within the brain, can now be revealed through brain fingerprinting. This technique measures how brain waves respond to crime-specific words or pictures flashed across a screen. Pictures, both relevant and irrelevant to the crime, are shown. The relevant images should trigger memories of the crime in guilty suspects.

Throughout the process, the subject wears a headband with sensors that measure electrical brain responses. According to Dr. Farwell, the sensors detect **memory** through an **encoding related multifaceted electroencephalographic response** (MERMER) emitted when the subject's brain recognizes a particular word or picture. The perpetrator's brain sends out a MERMER brain wave when the screen flashes a familiar detail. An innocent subject, on the other hand, will not emit a similar wave response.

Computers analyze the brain wave responses and determine if the details of the crime are stored in the suspect's brain. If they are, Dr. Farwell asserts that the

suspect is most likely the perpetrator. Dr. Farwell also argues that although the theory of the method is fool proof, it does not necessarily indicate guilt. "The science will tell us very definitively whether or not this information is stored in the brain," Dr. Farwell said. "We don't provide a legal answer, we just give more evidence the judge and jury can use in their decision."

Dr. Farwell's idea is derived from the P300 response seen on brain wave tests. He claims that the P300 response is a component of his larger MERMER technique. A subject generates a P300 when memory is triggered by a familiar stimulus. Stimuli irrelevant to either the crime or the subject's memory generate no P300 response, whereas a recognizable stimulus induces a strong wave response. Because the P300 response has been well accepted and documented in the scientific community, Dr. Farwell currently uses it for court evidence.

While the P300 testing results in at least 95 percent accuracy, MERMER can achieve a higher one. However, until the MERMER technique is widely accepted, Dr. Farwell conducts tests for court cases using P300 and then reinforces those results with MERMER.

According to the theory behind P300 testing, there are different brain wave responses to pleasant and unpleasant stimuli. "You can elicit different types of P300 with those different types of stimuli," said John Polich, M.D., with the Cognitive Electrophysiology Laboratory in the department of neuropharmacology at the Scripps Research Institute in La Jolla, California. In general, "negative stimuli tend to produce a stronger reaction." The strength of the reactions distinguishes the positive and negative responses. For example, a positive stimulus such as a picture of people vacationing creates a weaker brain wave response than a picture of someone being stabbed to death.

Dr. Farwell took the P300 response idea further by claiming MERMER as the specific brain wave that pinpoints a suspect's guilt. However, many in the scientific community remain skeptical about his methods. Emanuel Donchin, M.D., chair of the department of psychology at the University of South Florida argues that the science behind the method is

not the problem. Instead, the specific questions posed to the suspect are problematic. He argues that "the success of the technique depends on the construction of the stimuli and there is no analytic, systematic way of constructing the question. It depends on the subjectivity of the person. It's an art, not a science."

Dr. Polich supports the science behind Farwell's method, but he believes there is not enough research on brain fingerprinting through the MERMER response technique to use in court. Dr. Polich believes that "there's nothing theoretically stopping it. It certainly could be the case, but I doubt very much someone who would make a strong claim."

However, Dr. Farwell said investigators utilize skills they have gained throughout years of training to determine the stimuli and questions to be presented to the suspect. The stimuli selection process can be exhausting. "We examine all available sources to make sure the person doesn't know the details we're looking at," Dr. Farwell explained. In addition to this, the suspect is also interviewed before going through the process in order to ensure there is no previous knowledge of the details being used.

Dr. Farwell argues that his testing meets the Daubert Standard for establishing the scientific validity and subsequent admissibility of evidence into court. To meet the criteria of the Daubert Standard, the method must be testable, have a known potential rate of error, be subject to peer review, and be accepted in the relevant scientific community.

Though the scientific community is split on Dr. Farwell's method, he has succeeded in convincing at least one major judge and jury that brain fingerprinting works. In March 2002, an Iowa District Court Case established the permissibility and possible precedence of allowing brain fingerprinting as evidence in court cases. Dr. Farwell claims that brain fingerprinting has proven 100 percent accurate in more than 150 tests thus far.

However, this high accuracy rate is partly achieved by allowing about a three percent margin for inaccuracy. In three percent of the cases, the results are indeterminate, meaning that the test is unable to determine whether or not the subject has memory of a

crime stored in the brain. In these cases, the results are not used.

For the past century, the advent of fingerprinting, DNA testing, polygraphs, and other technology has greatly improved the scientific and technological base of the criminal justice system. One might remember that DNA testing led to a moratorium on the death penalty this past year.

Methods have improved; still, no method is perfect in determining guilt. Dr. Farwell hopes the quick and less invasive method of brain fingerprinting will help solve criminal cases with more accuracy. As the public witnesses the rise of new brain fingerprinting innovations, Robert Eaton, Ph.D., a spokesperson for the Brain Wave Institute commented, "It will be a real boon to the moral health of the nation when you can tell who's lying and who's telling the truth."

***Tami Abdollah** is obsessed with her miniature poodle, Winston, who thinks he is a retriever and loves to play ball.*

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