

## ANALYSIS:

# Science fact or science fiction? The police application of brain fingerprint technology

16th November 2022 | Andrew Staniforth | Policing Insight



Picture © [Gorodenkoff](#) / Shutterstock

**This month's ANZPAA Conference offered another opportunity to learn more about brain fingerprinting, and the potential for its use in law enforcement investigations and deception detection; Policing Insight's Andrew Staniforth looks at the background to this cutting-edge technology, research on its operational performance to date, and how it could benefit policing and criminal justice systems moving forwards.**

The theme for the 2022 Australia New Zealand Policing Advisory Agency (ANZPAA) conference earlier this month was dedicated to [Navigating the Next Generation of Policing](#), in which a series of future challenges and opportunities were presented and discussed by international experts gathered in Melbourne.

A fascinating input was provided by Future Trends Analyst [Michael McQueen](#), whose opening presentation on [Preparing now for what's next](#) highlighted the work of Dubai Police in solving a murder case using [brain fingerprint technology](#).

*“No longer science fiction, it seems brain wave technology is gaining interest from those charged with the responsibility of combatting future threats.”*

No longer science fiction, and a subject covered last year in [Policing Insight](#), it seems brain wave technology is gaining interest from those charged with the responsibility of combatting future threats.

Brain fingerprint technology has also gained interest from the European intelligence [NOTIONES](#) (iNteracting netORk of iTelligence and security practitiONers with iNdustry and acadEmia actorS) network, who have been exploring the potential of related brainwave tools and techniques.

## Research to reality

Research conducted by the NOTIONES network, being granted funding from the European Union's [Horizon 2020 Secure Societies](#) research and innovation programme, has revealed that brain fingerprint technology is based on decades of scientific development.



This follows the discovery in 1965 by a group of scientists who observed a distinctive surge of electrical activity in the brain when a person saw something familiar when conducting electroencephalogram (EEG) tests. The electrical activity in the brain arrived 300 milliseconds after the object or image was revealed, leading scientists to call the response 'P300'.

While the neurological origins of the electrical surge remain unclear, neuroscientific research has used the discovery of P300 to advance the field of brain fingerprinting which detects concealed information stored in the brain by measuring brainwaves.

Brain fingerprinting was invented by [Dr Lawrence A Farwell](#) in 1990, and was used for the first time in 1999 to help solve a 15-year-old murder case in the United States. A woodcutter named James B. Grinder [confessed to the murder](#) of a 25-year-old woman named Julie Helton.

During the 15-year criminal procedure, Grinder gave several different testimonies, recanting and contradicting himself over and over. The testimonies were invariably contradictory to the available material evidence.

*“After approximately 10,000 hours of unsuccessful investigation, including inconclusive forensic evidence, the local police decided to turn to brain fingerprinting to decide if Grinder had committed the crime.”*

After approximately 10,000 hours of unsuccessful investigation, including inconclusive forensic evidence, the local police decided to turn to brain fingerprinting to decide if Grinder had committed the crime. During the test analysis, Farwell showed Grinder specific details of the crime, and he concluded that all the critical information was stored in Grinder’s brain.

Following the principles of the method, the conclusion was that Grinder did commit the offence since his brain had ‘enhanced memory and encoding-related multifaceted electroencephalographic response’ ([MERMER](#)) to all relevant information.

Afterwards, Farwell tested the device on two other murder cases before founding his own [Brainwave Science](#) company. In 2013, the company made its first sale to Singapore’s police force.

To date, brain fingerprinting is considered a technique of proven accuracy for US Government tests, and it has been ruled as admissible in one US court as scientific evidence. The Brainwave Science device has been tested by several US federal government agencies, which found it to be almost 100% accurate.

## **Police application**

The investigation by NOTIONES to examine and explore the potential of P300-related cognitive technologies for deception detection by government agencies across EU Member States has identified the potential positive applications and operational challenges and considerations for intelligence disciplines.

It’s evident from these further investigations that brain fingerprinting provides a real and unique opportunity to profoundly impact upon intelligence operations and law enforcement investigations.

The application of brain fingerprinting testing in criminal cases broadly consists of four phases: investigation, interview, scientific testing, and adjudication. The first phase is undertaken by a trained law enforcement agency investigator or detective, the second by a trained interviewer, the third by a scientist, and the fourth by a judge and jury.

Although brain fingerprinting techniques, tools, technologies, and tactics are currently not commonly used or applied in the EU, there remains the potential for significant positive impact upon and within member states’ criminal justice systems.

## Body of evidence

The NOTIONES research conducted to date serves to dispel the myth that brain-fingerprinting is pseudo-science; it has found a growing body of evidence from real-world practice that adds value to the intelligence gathering phases and has potential for further investigative application.

*“Brain fingerprinting offers fascinating potential to increase the reliability and accuracy of deception detection methods currently operating within criminal justice systems in the UK and across the EU.”*

With any cutting-edge technology or technological advancement there will be those who dismiss their future potential; but the purpose of the NOTIONES is to prepare security and intelligence agencies to meet the future threats and challenges that lie ahead, including those recently identified in Europol’s [Policing the metaverse: What law enforcement agencies needs to know](#) report.

Brain fingerprinting and related P300 techniques and technologies should now be subject to further monitoring and analysis to scope the potential opportunities, applications and impacts upon intelligence operations and law enforcement investigations.

This scoping activity should inform a roadmap of research requirements providing an evidence base, as brain fingerprinting offers fascinating potential to increase the reliability and accuracy of deception detection methods currently operating within criminal justice systems in the UK and across the EU.



**Andrew Staniforth** is Director of Research and Innovation at SAHER (Europe), a security research, training and consultancy operating at a global level, supporting police forces and private sector organisations to identify and implement innovative security technologies to maximise impact. He is a Researcher of Cyber Threats at the Hillary Rodham Clinton School of Law and Criminology, University of Swansea. As a former Counter-Terrorism Detective, he has worked across the world and supported missions of the United Nations Terrorism Prevention Branch. [Andy@saher-eu.com](mailto:Andy@saher-eu.com)

---