STATE OF WISCONSIN : CIRCUIT COURT : MANITOWOC COUNTY

STATE OF WISCONSIN, Plaintiff, v. STEVEN A. AVERY, Defendant.	)	Case No. 05-CF-381 Honorable Judge Angela Sutkiewicz, Judge Presiding

AFFIDAVIT OF LAWRENCE FARWELL, PhD

Now comes your affiant, Lawrence Farwell, PhD, and under oath hereby states as follows:

1. I am of legal majority and can truthfully and competently testify to the matters contained herein based upon my personal knowledge. The factual statements herein are true and correct to the best of my knowledge, information, and belief. I am of sound mind and I am not taking any medication nor have I ingested any alcohol that would impair my memory of the facts stated in this affidavit.
2. I am a Harvard-educated forensic neuroscientist and founder of Brain Fingerprinting, LLC. I have published extensively on Brain Fingerprinting and other scientific topics in the scientific literature in forensic science, neuroscience, and psychophysiology. I have testified in court as an expert witness on Brain Fingerprinting. I have conducted research on Brain Fingerprinting at the FBI, the CIA, and the US Navy. TIME magazine named me one of the TIME 100: The Next Wave, the top innovators of this century who may be "the Picassos of Einsteins of the 21st Century." A copy of my CV is attached as **Exhibit A** to this affidavit.

3. I invented Brian Fingerprinting. Brain Fingerprinting is a scientific technology for determining with high accuracy whether nor not specific information is stored in a person's brain. Brain Fingerprinting has been tested and proven at the FBI, the CIA, the US Navy, and elsewhere. Brain Fingerprinting science has been peer-reviewed and published in the leading scientific journals. The technique has a known, and very low, error rate. It is applied according to specific scientific standards that have been published in the peer-reviewed scientific literature. The science underlying Brain Fingerprinting is well accepted in the scientific community.
4. Brain Fingerprinting has been applied in criminal cases and has been ruled admissible in court. See *Harrington v. State,* Case No. PCCV 073247(Iowa District Court for Pottawattamie County, March 5, 2001), as discussed below.
5. Brain Fingerprinting detects information stored in the brain — not lies, truth-telling, guilt, innocence, or any past or present action or non-action. Brain Fingerprinting is applied in forensic settings to determine whether not a suspect knows specific salient information about a crime that is known only to the perpetrator and investigators, and would not be known to an innocent suspect.
6. Brain Fingerprinting detects concealed information stored in the brain. The purpose of the Brain Fingerprinting test is to determine scientifically whether the record stored in the suspect's brain matches the record of what actually took place when the crime was committed.
7. In order for information detected in a suspect's brain to be useful to the trier of fact in determining whether or not the suspect was present when the crime was committed, a Brain Fingerprinting test must detect the presence or absence of information that is

known only to the perpetrator and investigators. This must be information that is not known to the general public, has never been disclosed to the suspect after the crime, and thus would not be known to an innocent suspect.

8. Brain Fingerprinting detects information stored in the brain. It does not detect how that information got there. Information that the suspect knows from reading a newspaper, from interrogations, or from hearing testimony at a trial is not applicable in a Brain Fingerprinting test. A finding that an individual knew such information would prove nothing about his participation in the crime. Knowledge of such information could be explained by his having read the newspaper, participated in the trial, etc.

I. How Brain Fingerprinting Works

9. Farwell Brain Fingerprinting is a real-time psychophysiological assessment of a subject's response to stimuli in the form of words or pictures presented on a computer monitor. As a forensic method, the test assesses the subject's knowledge of a crime scene or of the instrumentalities or fruits of a crime, and it can also be used to assess knowledge of the particulars of an alibi scene or sequence of events. In the homeland security field, it can be used to detect knowledge of specific training or inside information, e.g., knowledge of ISIS terrorist training or the internal workings and personnel in a particular terrorist cell.

10. Brain Fingerprinting uses electroencephalography (EEG) to measure a specific event-related potential known as the P300 (an electrical event beginning 300 milliseconds after exposure to a stimulus). The P300 is characteristic of the information processing that accompanies recognition of stimuli in comparison to a remembered context. I have extended the analysis of this event-related potential further in time to take account of

additional information. This extension of the P300 is known as a "MERMER" ("memory and encoding related multifaceted electroencephalographic response") or "P300-MERMER."

11. Just as a personal computer emits a characteristic sound whenever its central processing unit is transferring information from or to the hard drive or spinning up an optical drive, the human brain emits a characteristic P300 (and MERMER) electrical response whenever the subject responds to a stimulus by updating his memory context to take account of the stimulus. The P300-MERMER response is not evoked when the stimulus is irrelevant to the subject's memory context.

12. If the person is a witness to or perpetrator of the crime, his response to stimuli that embody accurate details of the crime will evoke a P300 response. These crime- or situation-relevant words, phrases, or pictures are referred to as "probes." Probes are selected such that they contain information that is known only to the perpetrator and investigators, and has not been disclosed to the public. Other items known to the person regardless of whether he was present at the crime ("targets") also evoke the response and permit the scientist to establish a baseline from which to compare the person's responses to the probes. Other stimuli that have no relevance either to the crime or to anything in the subject's memory ("irrelevants"), establish a baseline for a flat response (no P300 evoked), i.e., a response (or lack of a response) to unknown, irrelevant information. The signals obtained from the subject's response to multiple presentations of probes, targets, and irrelevant stimuli are averaged using analytical tools that are standard in the field of EEG psychophysiology. In this way, an overall result is obtained, demonstrating whether the probes have evoked a P300 recognition response or a flat

non-recognition response (i.e., the lack of a recognition response).

13. A similar test can be administered to probe the subject's alibi defense; however, in the case of an alibi, all that can usually be determined is whether the alibi story has validity as the subject's remembered experience: it is not usually possible to determine whether the exact timing of the alibi experience places the subject away from the crime scene at the time of the crime. In other words, a Brain Fingerprinting test that shows that the subject's brain contains a record of his alibi is of value only in that it shows that his memory for events at the time period of the crime is intact. Such a finding does not prove that his alibi is valid or exculpatory.

14. The availability of fresh, salient, and detailed probes is essential to the efficacy of the test. Indeed, it is anticipated that, since the reliability of the science underlying Brain Fingerprinting is well established, the principal line of attack for parties opposing the use of a Brain Fingerprinting test result in a trial will be to challenge the evidentiary value of the specific probes that have been employed. Note that this is a challenge not of the scientific process of Brain Fingerprinting testing, but of the investigation into the crime, a process that precedes the scientific Brain Fingerprinting testing and that discovers and specifies the crime-relevant information embodied in the probes. Brain Fingerprinting cannot be successfully applied in cases where the subject has been exposed, in circumstances unrelated to committing the crime, to all the known details of the crime scene, fruits, and instrumentalities. In such a case, no viable probes would be available, since probes by definition involve information that the suspect denies knowing by virtue of non-participation in the crime. Without such probes, a Brain Fingerprinting test would not be conducted.

15. The investigative phase of preparing the Brain Fingerprinting test, which discovers the salient features of the crime that are used as probe stimuli, depends on the skill and judgment of the investigator, and is not a scientific process. The scientific phase of Brain Fingerprinting testing begins after the investigation has identified appropriate probes. The science of Brain Fingerprinting testing determines whether the subject responded to the probes, providing an objective result: "information present" or "information absent." This result does not depend on the subjective judgment of the scientist conducting the test. The test result is then presented to the trier of fact to assist in the determination of guilt and innocence.

16. Brain Fingerprinting provides definitive, reliable, valid scientific evidence regarding whether specific information is stored in a particular brain or not. Brain Fingerprinting, like other forensic sciences, does not make a scientific determination of "guilty" or "not guilty." That is a legal decision to be made by the judge and/or jury. Brain Fingerprinting detects information, not lies, truth telling, or any past action or non-action. Brain Fingerprinting provides reliable scientific evidence that informs the trier of fact in their task of making a determination as to whether or not a suspect committed the acts in question, and informs the judge and jury in reaching their verdict regarding the suspect's guilt or innocence of a specific crime.

II. BRAIN FINGERPRINTING EVIDENCE IS NEWLY DISCOVERED

17. Although I originally published the basic Brain Fingerprinting technique in 1991 and 2001 and patented it in 1994 and 1995, the science and technology that I applied in the state-of-the-art Brain Fingerprinting test on Steven Avery ("Mr. Avery") in 2016 was much more advanced than the original technology disclosed in these prior publications.

The more advanced technology that I applied in the Avery case was not available at the time of Mr. Avery's trial in 2007. Mr. Avery was found guilty on March 18, 2007.

18. For national security reasons, I was not allowed to publish the details of the research conducted by myself and my colleagues at the FBI, the CIA, and the US Navy until 2012. (Abstracts and brief reports that were published prior to that time did not disclose the specific methods that produced the highly accurate and reliable results reported in these studies.)

19. The following major developments in Brain Fingerprinting science and technology took place after Mr. Avery's trial and were incorporated in my test on Mr. Avery in 2016:

    a. UK Patent #GB2421329, "Apparatus for a classification guilty knowledge test and integrated system for detection of deception and information" was issued on October 24, 2007. In order to issue this patent, the UK Intellectual Property Office determined that the science and technology described in this patent were novel, useful, and non-obvious, above and beyond what was contained in all prior patents and publications.

    b. The US Patent and Trademark Office (USPTO) issued US Patent # 7,689,272 "Method and Apparatus for Brain Fingerprinting, Measurement, Assessment and Analysis of Brain Function" to me on March 30, 2010. In order to issue this patent, the USPTO determined that the science and technology described in this patent were novel, useful, and non-obvious, above and beyond what was contained in all prior patents and publications.

    c. Farwell, Richardson, and Richardson (2013) reported on four studies: (1) a CIA-funded study in which Brain Fingerprinting detected concealed information regarding real-life events, including felony crimes; (2) A study in which Brain Fingerprinting detected information regarding real crimes with substantial consequences (either a judicial outcome, i.e., evidence admitted in court, or a $100,000 reward for beating the test); (3) a study in which Brain Fingerprinting detected concealed FBI-relevant information in FBI agents, distinguishing them from non-agents based on their brain responses to information known specifically to FBI agents due to their unique training; (4) a study in which Brain Fingerprinting detected information known to bomb makers (improvised explosive device [IED] explosive ordnance disposal [EOD] experts) and unknown to the general public, thus distinguishing bomb makers from other subjects.

    d. Farwell, Richardson, Richardson, and Furedy (2014) reported on a CIA-funded study in which Brain Fingerprinting detected concealed information characteristic of US Navy military medical experts. Like the FBI agent study and the bomb-

maker study, the US Navy study showed that Brain Fingerprinting can be applied to detect individuals with specific training, expertise, or organizational affiliation. This can be applied in using Brain Fingerprinting to detect trained terrorists, bomb makers, members of a terrorist cell, hostile intelligence agents, etc.

e. The *Wiley Encyclopedia of Forensic Science* (Farwell 2014) published a comprehensive review of new developments in Brain Fingerprinting science that I wrote as an invited contributor.

20. These two patents and five studies incorporated scientific procedures that were considerably more advanced than those reported prior to 2007. These more advanced procedures were the ones I applied in the Avery case. They resulted in the highly accurate, statistically confident, and reliable results that were obtained in my Brain Fingerprinting test on Mr. Avery.

21. These new methods allowed Brain Fingerprinting to make a definite determination in every case in all of these five studies, and all determinations were correct. Also, each individual determination was made with a very high statistical confidence. In my original study published in 1991 (Farwell and Donchin 1991), although all determinations were correct, the data analysis algorithm was unable to make a determination with a high statistical confidence in 12.5% of cases, so no determination was made. (The outcome was "indeterminate.") The more advanced methods applied in the studies reported after Mr. Avery's trial in 2007 resulted in eliminating indeterminate outcomes, and in achieving higher statistical confidences than those produced by the methods that had been available previously.

22. The scientific and technical advances that made possible my successful Brain Fingerprinting test on Mr. Avery are described in detail in the above referenced patents and peer-reviewed studies. A few of the specific advances are as follows. In the original Farwell and Donchin (1991) publication and all pre-2007 publications by other authors, target stimuli were inherently irrelevant to the crime or investigated situation, and were

made relevant only by task instructions given to the subject. The use of a different type of target stimuli was one innovation that allowed the method I applied in the above publications and in the Avery case to produce more accurate results and higher statistical confidences than were obtainable with pre-2007 methods. These new target stimuli, like the probes, were relevant to the crime, but, unlike the probes, were disclosed to the suspect in instructions prior to the test (and in some cases known to the suspect through innocent means). This made the targets more similar to the probes for an information-present subject, resulting in more accuracy and higher statistical confidences.

23. The data analysis program that I applied in the above publications and in the Avery case was more sophisticated than the previously available analysis methods. (For details, see the above publications).

24. The above publications specify 20 peer-reviewed, published scientific standards for Brain Fingerprinting tests. These standards are specified in my Brain Fingerprinting report on Mr. Avery, attached as **Exhibit B** to this affidavit. My test on Mr. Avery, and the tests in the above five studies, substantially met these standards.

25. A number of authors published studies prior to 2007 that used various techniques for brainwave-based detection of information. None of these incorporated the advanced methods that I applied in the above five studies and in the Avery case. The distinctions between the methods practiced in these new studies and in the Avery case on the one hand, and prior research by others on the other, are discussed in detail in the above referenced peer-reviewed publications on the CIA, FBI, US Navy, and other field studies and in the encyclopedia article referenced above.

26. One important distinction in methodology accounts for a tremendous difference in error rates and statistical confidences reported in the scientific literature. There are two fundamental methods for analyzing brain responses to detect concealed information: The classification concealed information test (CIT) and the comparison concealed information test. My colleagues and I originated the classification CIT. I applied the classification CIT in the Avery case. The classification CIT reliably produces less than 1% error rate and median statistical confidences of over 95% for individual determinations in all research to date that substantially meets the peer-reviewed, published Brain Fingerprinting scientific standards.

27. In published research, the comparison CIT has produced more than 10 times higher error rates than the classification CIT, and also produced median statistical confidences no better than chance (50%) for information-absent determinations. (This is in accord with the predictions of the comparison-CIT statistical model.) For this reason the comparison CIT cannot validly, reliably, or ethically be used in any real-world case or any situation with non-trivial consequences to the outcome. Several authors, including Peter Rosenfeld, Bruno Verschuere, and Ewout Meijer, published studies before 2007 applying the comparison CIT in various laboratory situations.[1] None of the methods published by these authors could have been reliably or validly applied in the Avery case, due to the high error rate and low statistical confidences produced by the comparison CIT. Their publications failed to meet even half of the 20 established Brain Fingerprinting scientific standards that were applied in the Avery case and in the valid and reliable Brain

[1] The comparison CIT has never been used in field conditions, or in any situation with non-trivial consequences to the outcome. Thus, the laboratory experiments conducted to date have not constituted the severe ethical transgression that would occur if anyone ever were to attempt to use the comparison CIT in a real-world case.

Fingerprinting tests described in the above publications. The differences between the classification CIT and the comparison CIT are discussed in more detail in my Brain Fingerprinting report on Mr. Avery, attached as **Exhibit B** to this affidavit, and are described comprehensively in the above referenced peer-reviewed publications.

28. In short, the specific, novel, highly advanced Brain Fingerprinting methods that made possible my successful test of Mr. Avery were not available at the time of Mr. Avery's trial in 2007. The Brain Fingerprinting evidence in the Avery case is newly discovered, and could not have been discovered at the time of Mr. Avery's trial.

III. BRAIN FINGERPRINTING ADMITTED IN CRIMINAL PROCEEDING

29. In *Harrington v. State,* Case No. PCCV 073247 (Iowa District Court for Pottawattamie County, March 5, 2001), petitioner Terry Harrington sought to overturn a 1978 murder conviction on several grounds, including an allegation that newly discovered evidence in the form of Farwell Brain Fingerprinting entitled him to a new trial.[2]

30. To obtain relief, the petitioner had to show that the newly discovered evidence was unavailable at the original trial, and that the new evidence, if introduced at the trial, would probably change the verdict. Additionally, in view of the fact that the proffered evidence consisted of a novel forensic application of psychophysiological techniques, the court was required to determine whether this scientific evidence was sufficiently reliable to merit admission into evidence and, if admitted, whether the weight of the scientific evidence was sufficiently compelling to change the verdict.

31. The U.S. Supreme Court has held that the standard for admissibility of novel scientific evidence is a showing of reliability based on (1) whether a theory or technique can be

[2] This section is based on Farwell, LA and Makeig, T (2005). Farwell Brain Fingerprinting in the case of *Harrington* v. *State. Open Court X* [*10*], 3:7-10, Indiana State Bar Assoc.

(and has been) tested; (2) whether it has been subjected to peer review and publication; (3) whether, in respect to a particular technique, there is a known or potential rate of error, and whether there are standards controlling the technique's operation; and (4) whether the theory or technique enjoys general acceptance within a relevant scientific community. See *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 594 (1993) (construing Federal Rule of Evidence 702). The Iowa Supreme Court has not formally endorsed this federal evidentiary standard, but in *Leaf v. Goodyear Tire & Rubber Co.*, 590 N.W.2d 525, 533 (Iowa 1999), it announced that the Iowa courts may use the *Daubert* factors in assessing the admissibility of novel scientific evidence.

32. In the Harrington case, I developed a series of probes for the crime scene, and a separate series of probes for the petitioner's alibi, from previously undisclosed police files, interviews with witnesses, examination of the location where the crime took place, and other evidence.

33. I administered the test to Harrington in May 2000 and, in October 2000, I rendered a report to the Iowa District Court analyzing the P300-MERMER responses. I supplemented the report with a separate analysis based solely on P300 brainwave responses on November 10, 2000. Both analyses produced a result of "information absent" regarding the crime scene probes and "information present" regarding the alibi probes, with a high degree of statistical confidence (over 99%). This indicates that the record stored in Harrington's brain does not match the crime scene, and does match his alibi.

34. The District Court held a one-day hearing on the Brain Fingerprinting evidence on November 14, 2000. The court took preliminary testimony on my credentials, the efficacy of the test, and the reliability of the underlying science. The court also examined

the test results, subject to a later determination whether this scientific evidence was sufficiently reliable to be admissible.

35. At the November 14 session, I testified and was cross-examined on the basis of my test reports. Additionally, two other psychophysiologists with EEG expertise, Prof. William Iacono of the University of Minnesota and Prof. Emanuel Donchin of the University of Illinois at Champaign-Urbana, testified on my credentials, my test reports, and the science underlying the Brain Fingerprinting test. Prof. Iacono testified at Harrington's request, and Prof. Donchin was called by the state.

36. Both experts validated the science underlying Brain Fingerprinting and acknowledged my credentials; however, while Prof. Iacono validated the forensic application of P300 science based on his own research, Dr. Donchin asserted that the tester's selection and presentation of the specific probes is the point at which science ends and art begins.

37. Regarding Dr. Donchin's contention that the selection of probes in Brain Fingerprinting is the end of science and the beginning of art, I agree that the selection of probes – which is a feature of the skilled investigation and not of the scientific Brain Fingerprinting testing – has a subjective element. I assert, however, that this subjective element is the kind of evidence that judges and juries are competent to evaluate: A non-scientist is well equipped with common sense and life experience to evaluate all the facts and circumstances of the case and determine whether a finding that the specific probes in question returned a scientific result of "information present" or "information absent" helps to establish the subject's guilt.

38. After briefs were submitted and other, unrelated grounds for post-conviction relief were tried, District Judge Timothy O'Grady issued his ruling on March 5, 2001. The court

determined that Brain Fingerprinting was new evidence not available at the original trial, and that it was sufficiently reliable to merit admission of the evidence.[3] However, the court did not regard its weight as sufficiently compelling in light of the record as a whole as meeting its exacting standard, and thus it denied a new trial on this and the other grounds asserted by Harrington.

39. The court stated the following:

    a. "In the spring of 2000, Harrington was given a test by Dr. Lawrence Farwell. The test is based on a 'P300 effect'."
    b. "The P-300 effect has been recognized for nearly twenty years."
    c. "The P-300 effect has been subject to testing and peer review in the scientific community."
    d. "The consensus in the community of psycho-physiologists is that the P300 effect is valid."
    e. "The evidence resulting from Harrington's 'Brain Fingerprinting' test was discovered after the verdict. It is newly discovered."

40. The first trial court to perform the gatekeeping function in regard to Brain Fingerprinting has determined the test to be sufficiently reliable to merit admission into evidence. This is an achievement that has consistently eluded every form of polygraphy for decades, and it is based on a common perception in the relevant scientific

[3] In the Harrington case, I conducted two analyses of the brainwave data. One analysis included only the P300. Another analysis included the P300-MERMER, which is inclusive of the P300 brain response plus additional features. Both analyses returned the same result. The rationale for conducting two separate analyses was to provide one analysis that included only extremely well established science, and another analysis that applied the current state of the art. The P300 is an extremely well-established phenomenon. At the time of the Harrington case, the P300-MERMER had not been published in the peer-reviewed scientific literature. The P300-MERMER has now been published in several peer-reviewed scientific publications in the fields of psychophysiology, neuroscience, and forensic science, including the CIA, FBI, US Navy, and real-crime studies discussed herein. The court in the Harrington case admitted only the P300-based analysis, and not the MERMER-based analysis, on the grounds that the MERMER had not yet at that time achieved sufficient peer-reviewed publication and acceptance in the relevant scientific community. Nevertheless, the P300-based science was sufficient to warrant admissibility of the Brain Fingerprinting evidence.

community that the P300 science that forms the basis of Brain Fingerprinting, and the statistical tools used to analyze its results, are well accepted.

41. Brain Fingerprinting testing had previously been instrumental in another murder case, that of James B. Grinder in Missouri. A Brain Fingerprinting test I conducted in 1999 showed that Grinder had the record of the 1984 murder of Julie Helton stored in his brain. Grinder and other alleged witnesses and suspects had previously given several contradictory accounts, some involving his participation and some not. The Brain Fingerprinting test showed that the account that matched the record in his brain was the one in which Grinder perpetrated the crime. One week later, faced with a certain conviction and almost certain death sentence, Grinder pled guilty in exchange for a sentence of life without parole.

IV. NEWLY DISCOVERED FORENSIC SCIENCE EVIDENCE

42. Forensic science testing has demonstrated that the perpetrator initially attacked and wounded or killed Teresa Halbach under completely different circumstances and in a different location than anything that was discussed in Mr. Avery's trial. Recently obtained blood-spatter evidence has demonstrated definitively that the perpetrator struck Teresa with an object when she was behind her car and the rear cargo door was open. This deposited blood-spatter evidence on the inside of the cargo door that could not have been deposited in any other way.

43. As in every crime, the brain of the perpetrator was central to the phenomenon revealed by the newly discovered blood-spatter evidence in the Avery case. The perpetrator's feet stood behind the car. The perpetrator's hands wielded the object and struck Teresa. The perpetrator's feet and hands, however, cannot operate independently. The perpetrator's

brain controlled the actions of his hands and feet. The perpetrator's brain controlled and processed the phenomenon that the perpetrator attacked and struck Teresa when she was behind her car and the cargo door was open.

44. The perpetrator's brain is different from the brain of an innocent suspect. The perpetrator's brain processed the information that (1) Teresa was behind her car and (2) the cargo door was open when the perpetrator attacked and struck Teresa. An innocent suspect's brain processed entirely different information at the time of the attack, for example, that the innocent suspect was at home doing something else other than murdering Teresa. Having had different experiences and having commanded different actions, the perpetrator's brain is different from the brain of an innocent subject. The purpose of a Brain Fingerprinting test is to detect this difference between the brain of the perpetrator and the brain of an innocent subject.

45. There are three ways that the record of these two facts (that the perpetrator attacked Teresa when she was behind her car and that the cargo door was open) could be stored in a suspect's brain. (1) The suspect is the perpetrator, and he obtained this information when he attacked Teresa; (2) The suspect was a witness to the crime, and he obtained this information by witnessing but not perpetrating the crime; and (3) the suspect did not perpetrate or witness the crime, but rather obtained this information after the crime, e.g., by seeing it in the news media or hearing it during the trial or interrogation.

V. WHAT STEVEN AVERY CLAIMED TO KNOW AND NOT KNOW

46. Mr. Avery knows extensive information about the events surrounding the murder of Teresa Halbach from several sources. He knows some information about events surrounding the crime from his own experience of meeting her earlier on the day of the

crime. He knows the information that was revealed during his trial and associated interrogations and investigations.

47. Mr. Avery acknowledges knowing all of this. He claims that he knows information about surrounding events only through innocent participation in these events, and not through participation in the murder itself. He claims that he knows any correct details about the actual murder only from hearing this information after the murder, and not from participating in the murder.

48. Previously unknown facts about the events that took place at the time of the perpetrator's attack on Teresa were revealed by the newly discovered blood-spatter evidence. Since these facts were unknown at the time of Mr. Avery's trial, it is not possible that Mr. Avery obtained this information during the trial, the preceding investigation, associated interrogations, or other interactions with authorities or anyone else at the time of the investigation and the trial. Nor had anyone revealed this information to Mr. Avery between that time and the time of my Brain Fingerprinting test on Mr. Avery. At the time of my Brain Fingerprinting test on Mr. Avery, therefore, Mr. Avery had no known way of possessing this particular, newly discovered information about specifically what happened at the time of the crime, except for having directly participated in the crime.

49. I interviewed Mr. Avery prior to the Brain Fingerprinting test in order to ascertain if Mr. Avery knew this information through any other means, unknown to investigators or me.

50. Prior to the Brain Fingerprinting test, Mr. Avery explicitly stated that he did not commit the attack on Teresa, nor did he witness the crime. He explicitly stated that no one had told him the specific details of the perpetrator's initial attack on the victim. In particular, he explicitly stated that he did not know where the victim was in relation to her vehicle

when the perpetrator attacked and wounded her. (Specifically, he stated that he did not know if she was behind the car, in the driver's seat, or on the passenger side.) He explicitly stated that he did not know the configuration of the victim's vehicle when the perpetrator attacked the victim. (Specifically, he stated that he did not know if the cargo door was open, the front was locked up, or the rear window was down.)

51. I obtained these statements from Mr. Avery without revealing to Mr. Avery the correct information about these details of the crime. For example, I asked Mr. Avery, "Do you know where the victim was in relation to her vehicle when the perpetrator attacked and wounded her? Do you know if she was behind the car, in the driver's seat, or on the passenger side?" Such questions obtained a denial from Mr. Avery that he knew the relevant information, without revealing the correct information about the crime.

52. If Mr. Avery did not commit the crime, he would have no way of knowing that the perpetrator attacked the victim when (1) she was behind her car and (2) the cargo door was open. He explicitly denied knowing these details about the crime, on the basis of his contention that he did not commit or otherwise participate in the crime.

53. If it could be scientifically demonstrated that this critical, salient information was stored in Mr. Avery's brain, this would provide evidence that a prosecutor could use to argue that Mr. Avery's brain was the brain that processed this information at the time of the crime, that is, that Mr. Avery committed the crime.

54. If it could be scientifically demonstrated that this critical, salient information was not stored in Mr. Avery's brain, this would provide evidence that Mr. Avery's defense counsel could use to argue that Mr. Avery's brain was not the brain that processed this information at the time of the crime, that is, that Mr. Avery did not commit the crime.

(Of course, the burden of proof is on the prosecution, so in this case the evidence could be used to raise a reasonable doubt.)

VI. BRAIN FINGERPRINTING TEST ON STEVEN AVERY

55. On May 2, 2016, I conducted a Brain Fingerprinting test on Mr. Avery. This test was structured to determine definitively and scientifically whether or not two specific salient features of the murder of Teresa Halbach were stored in Mr. Avery's brain:

    a. Where the victim was in relation to her vehicle when the perpetrator attacked and wounded her: behind car.
    b. The configuration of the victim's vehicle when the perpetrator attacked the victim: cargo door open.

56. As described above, a Brain Fingerprinting test involves presenting three types of stimuli consisting of words or phrases on a computer screen, and recording the subject's brain responses to these stimuli.

57. Probe stimuli contain information that (1) is known only to the perpetrator and investigators, and not to the general public, and hence would not be known to a subject who did not participate in the crime; (2) the suspect/subject being tested has never been told, and has no way of knowing other than participation in the crime; (3) the subject being tested explicitly denies knowing for any reason.

58. The probe stimuli for my Brain Fingerprinting test on Mr. Avery were "behind car" and "cargo door open." I explained to Mr. Avery the significance of these stimuli in relation to the crime, but did not reveal which were the probe stimuli and which stimuli were irrelevant. Following standard Brain Fingerprinting subject instructions, I told Mr. Avery that he would see a phrase correctly specifying "where the victim was in relation to her vehicle when the perpetrator attacked and wounded her," but he did not inform Mr. Avery that the correct information (probe stimulus) was "behind car." I told Mr. Avery

that he would see a phrase correctly specifying "the configuration of the victim's vehicle when the perpetrator attacked the victim," but I did not inform Mr. Avery that the correct information (probe stimulus) was "cargo door open."

59. The irrelevant stimuli corresponding to where the victim was in relation to her vehicle when the perpetrator attacked and wounded her were equally plausible, but incorrect, locations: "driver's seat" and "passenger side." The irrelevant stimuli corresponding to the configuration of the victim's vehicle when the perpetrator attacked the victim were equally plausible, but incorrect, configurations: "front locked up" and "rear window down."

60. Target stimuli contain crime-relevant information that is known to the suspect. I made sure that Mr. Avery knew the target stimuli and their significance in relation to the crime by informing him of the target phrases and explicitly describing their significance. The target stimuli and their descriptions were as follows:

    a. The type of vehicle the victim drove: Toyota RAV4.
    b. What killed the victim: .22 bullet.

61. The corresponding irrelevant stimuli for the type of vehicle the victim drove were "Saab 9 5" and "Volvo S40." The corresponding irrelevant stimuli for what killed the victim were "deep stream" and "golf club." For Mr. Avery or anyone else with a basic knowledge of the crime, clearly the target stimuli were the correct, crime-relevant information, and the corresponding irrelevant stimuli were irrelevant and had nothing to do with the crime.

62. Prior to the Brain Fingerprinting test, I gave the following instructions to Mr. Avery:

> The perpetrator attacked the victim, wounded her, and ultimately killed her. At the trial, one specific attack with one specific weapon was extensively discussed, so everyone knows about that attack, including you. Just because you know about

it, does not mean you did it, only that you heard about it at the trial. There was another attack with another method that was not mentioned at the trial. The perpetrator knows about that other attack, where it took place, and what happened, but an innocent suspect does not know these things. In this test you will see items related to more than one attack on the victim, in more than one situation and setting. You definitely will know about the one attack that was mentioned in the trial, because you heard about it at the trial. This is not a problem. All it means is that you heard about that attack at the trial, not, repeat NOT, that you committed the crime.

If you are innocent, you do not know anything about the other attack that took place, because you were not there. If you are guilty, you know the details about the other attack, because you did it. This Brain Fingerprinting test will determine whether or not you know specific details about this other attack that was never mentioned at the trial, that no one ever told you about.

63. When a subject sees, recognizes, and processes information that is significant in the current context, the brain emits a P300 brainwave response. Clearly, in the current context of a test on information regarding the murder of Teresa Halbach, the target stimuli comprised significant information. Moreover, the target stimuli were significant in context to Mr. Avery because I instructed him to press a specific button in response to targets (and another button for all other stimuli). In a Brain Fingerprinting test, the subject's brain response to targets provide a template for that subject's response to known, relevant information. The responses to targets are expected to contain a large P300 brain response.

64. Brain Fingerprinting does not make scientific determinations based on visual inspection of the brainwave data. My Brain Fingerprinting system computes a mathematical determination of "information present" or "information absent" based on a mathematical analysis of all of the brainwave data. If the brain response to the probes matches the brain response to the targets (containing a P300), this demonstrates that the tested information is stored in the subject's brain. The determination is "information present."

If the brain response to the probes matches the brain response to the irrelevants (lacking a P300), this demonstrates that the tested information is not stored in the subject's brain. The determination is "information absent." The Brain Fingerprinting system mathematically computes a determination of "information present" when the subject knows the information embodied in the probes and "information absent" when the subject does not know the information embodied in the probes.

65. In addition, the Brain Fingerprinting system computes a statistical confidence for the determination. This computation takes into account the size of the effect measured in the brainwaves along with the variability in responses in all of the brainwave data collected.[4]

66. The determination mathematically computed by the Brain Fingerprinting system in the case of Mr. Avery is as follows:

Determination: Information Absent
Statistical Confidence: 99.9%

67. These results mean that scientific testing has determined with a 99.9% statistical confidence that Mr. Avery does not know certain specific details about the attack on Teresa Halbach. This salient, crime-relevant information, which was experienced by the perpetrator when he committed the crime, is not stored in Mr. Avery's brain. Specifically, this information comprises the details that were revealed by the newly discovered blood-spatter evidence and embodied in the probe stimuli. This provides scientific evidence that

[4] In order to make a determination of "information present" or "information absent" there must be a high statistical confidence for one determination or the other. If there are insufficient data to make a determination with a high statistical confidence in either direction, then no determination is made. The outcome is "indeterminate." In the Avery case and in all of the recent studies cited above, there have been no indeterminate outcomes. Brain Fingerprinting has provided a definite, correct determination of "information present" or "information absent" with a high statistical confidence in every case.

Mr. Avery does not know specific critical, salient crime-relevant information regarding what actually took place at the time that the perpetrator attacked Teresa Halbach.

68. For detailed analysis of Brain Fingerprinting generally and my Brain Fingerprinting test of Mr. Avery, see my Brain Fingerprinting report on Mr. Avery, attached as **Exhibit B** to this affidavit.

FURTHER AFFIANT SAYETH NAUGHT

Lawrence Farwell

Lawrence Farwell, PhD

Subscribed and sworn before me
this 26 day of April, 2017.

Notary Public

KYLE MARCUS SAMPSON
NOTARY PUBLIC
STATE OF WASHINGTON
My Commission Expires September 9, 2020

EXHIBIT A
Lawrence A. Farwell, PhD
Curriculum Vitae

Summary

Dr. Lawrence Farwell, PhD has a BA from Harvard University and a PhD in biological psychology from the University of Illinois. He is a former research associate at Harvard Medical School.

Dr. Farwell is the inventor of Brain Fingerprinting. He conducted research on Brain Fingerprinting at the FBI, the CIA, and the US Navy. He has published his Brain Fingerprinting research the leading peer-reviewed scientific journals in forensic science (*Journal of Forensic Sciences*), neuroscience (*Cognitive Neurodynamics* and *Frontiers in Neuroscience*), and psychophysiology (*Psychophysiology*). He wrote the definitive review and encyclopedia reference on Brain Fingerprinting in the *Wiley Encyclopedia of Forensic Science*.

He was issued four US patents and one UK patent on his Brain Fingerprinting invention.

Dr. Farwell also invented the first brain-computer interface, and wrote the seminal peer-reviewed paper on brain-computer interfaces (Farwell and Donchin 1988).

Dr. Farwell has applied Brain Fingerprinting to solve real-world criminal cases, and has testified as an expert witness on Brain Fingerprinting in court.

Dr. Farwell and his inventions have been featured in major national and international news media, including *TIME* magazine, *US News and World Report*, the *Washington Post*, the *New York Times*, *CBS 60 Minutes*, *ABC Good Morning America*, *CBS Evening News*, *ABC World News*, *CNN*, the *Discovery Channel*, *BBC*, and many others worldwide.

TIME magazine selected Dr. Farwell to the TIME 100: The Next Wave, the top innovators of this century who may be "the Picassos or Einsteins of the 21st Century."

In addition to Brain Fingerprinting, Dr. Farwell has invented and developed new applications of brainwaves in several fields. He developed and patented medical technology for the early detection of Alzheimer's and other cognitively degenerative diseases and pioneered the use of brainwaves to evaluate the effectiveness of advertising scientifically.

Dr. Farwell is the founder, chairman, and chief science officer of Brain Fingerprinting Laboratories, Inc., and the founder, CEO, and chief science officer of Brain Fingerprinting, LLC.

More information on Dr. Farwell is available on his website, http://www.larryfarwell.com/.

Academic Degrees

B. A. Harvard University

M. A. University of Illinois at Urbana-Champaign

Ph.D. University of Illinois at Urbana-Champaign (Biological Psychology)

Employment and Academic Appointments

1994 - 1996
Research Associate, Department of Psychiatry
Harvard Medical School

1991 – 2002
President and Chief Science Officer
Human Brain Research Laboratory, Inc.

2002 –
Chairman and Chief Science Officer
Brain Fingerprinting Laboratories, Inc.

2015 –
CEO and Chief Science Officer
Brain Fingerprinting, LLC

Representative Scientific Publications

Farwell, L.A., Richardson, D.C., & Richardson, G.M. (2013). Brain fingerprinting field studies comparing P300-MERMER and P300 brainwave responses in the detection of concealed information. DOI 10.1007/s11571-012-9230-0, *Cognitive Neurodynamics* 7(4): 263-299 (PDF); *Cognitive Neurodynamics* website.

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Miller, G. A., Bashore, T.R., Farwell, L. A., and Donchin, E. (1987). Research in Geriatric Psychophysiology. In *Annual Review of Gerontology and Geriatrics. 7*:1-27 In K.W. Schaie, & C. Eisdorfer, (Eds.), New York: Springer.

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