

# Science Advisory Board's Statement with regard to the PCAST Report

## Introduction

On September 20, 2016, the US President's Council of Advisors on Science and Technology (PCAST) published a report on *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* in response to the President's question as to whether there are additional steps that could help ensure the validity of forensic evidence in the Nation's legal system. However, according to published reviews of this report (e.g., [1-4]), the PCAST report presents a flawed paradigm for forensic evaluation, misapplies statistics and the notion of probability, ignores existing data and literature in forensic science, and, as a result, this report is scientifically unsound.

Of interest to the Department of Forensic Sciences (DFS) are the sections on DNA, Latent Fingerprint Analysis, and Firearms Analysis. Previously, the Scientific Advisory Board (SAB) issued recommendations on DNA Analysis. This recommendation will deal with Latent Fingerprint Analysis.

## Latent Fingerprint Analysis

### Cognitive Bias (Part I of Validity as Applied)

The report addressed concern for the influence of bias on an examiners decision, and gave examples such as the 2004 bombing in Madrid where an erroneous identification occurred due to bias. They broke their concerns down into contextual bias and confirmation bias, as described by researchers i.e. Itiel Dror: (p.10, 28-32)

*(1) Confirmation bias. Work by FBI scientists has shown that examiners often alter the features that they initially mark in a latent print based on comparison with an apparently matching exemplar. Such circular reasoning introduces a serious risk of confirmation bias. Examiners should be required to complete and document their analysis of a latent fingerprint before looking at any known fingerprint and should separately document any additional data used during their comparison and evaluation.*

*(2) Contextual bias. Work by academic scholars has shown that examiners' judgments can be influenced by irrelevant information about the facts of a case. Efforts should be made to ensure that examiners are not exposed to potentially biasing information.*

**We, the Science Advisory Board, state that at the time of this writing, the PCAST statement on bias has some validity to it and DFS has addressed these concerns in the best way possible. The DFS Standard Operating Procedures for latent print comparisons require examiners to analyze the latent prints prior to comparison and document value or no value before proceeding. This procedure minimizes the potential for "circular reasoning" and limits the risk of confirmation bias. In regards to contextual bias, DFS has limited contact of examiner and detective to only matters that involve discrepancies with evidence vouchered. Field reports are not accessible to analysts only the crime type and location. This limits the examiners' exposure to task irrelevant case information that could be potentially biasing. Although it is impossible to eradicate all bias, SAB agrees DFS is limiting cognitive bias by ways of using sequential unmasking methods. SAB has advised against using individualization as an accurate conclusive result. DFS has stated that the word "individualizing" has been removed from DFS testifying language and in testimony prior to PCAST and it was never stated on reports. DFS has also stated that examiners also do not report or testify to 100% certainty, zero error rate and/or a reasonable degree of scientific certainty and**

have not for over two years' time. Therefore, jurors are not receiving incorrect or inappropriate information in regards to latent print identifications. SAB is keeping abreast with the Organization of Scientific Area Committees for Forensic Science (OSAC) and its research and development standards and guidelines, which were created in response to the 2009 NRC report. SAB will continue to advise DFS to make appropriate adjustments to advance and improve the discipline when finalized reports are published by the OSAC.

### **Proficiency Testing (Part II of Validity as Applied)**

The report addresses the need for proficiency testing. PCAST not only believes proficiency testing should be required but at some point incorporate blind proficiency testing. (p.10, 57-59)

*(3) Proficiency testing. Proficiency testing is essential for assessing an examiner's capability and performance in making accurate judgments. As discussed elsewhere in this report, proficiency testing needs to be improved by making it more rigorous, by incorporating it systematically within the flow of casework, and by disclosing tests for evaluation by the scientific community.*

*Scientific validity as applied, then, requires that an expert: (1) has undergone relevant proficiency testing to test his or her accuracy and reports the results of the proficiency testing*

*PCAST believes that test-blind proficiency testing of forensic examiners should be vigorously pursued, with the expectation that it should be in wide use, at least in large laboratories, within the next five years. However, PCAST believes that it is not yet realistic to require test-blind proficiency testing because the procedures for test-blind proficiency tests have not yet been designed and evaluated.*

*While only non-test-blind proficiency tests are used to support validity as applied, it is scientifically important to report this limitation, including to juries—because, as noted above, non-blind proficiency tests are likely to overestimate the accuracy because the examiners knew they were being tested.*

**The Science Advisory Board agrees that the PCAST statement on the need for proficiency testing is correct, but in regards to the accuracy of examiners, being overestimated in non-blind settings is not accurate. The members of the PCAST did not perform any studies or research to show that examiners are, or tend to be, more accurate in non-blind proficiency tests versus proficiency tests, but merely cited a psychological study on “Hawthorne Effect” and a pilot study. The current amount of available research is insufficient to prove that accuracy of examiners results varies greatly from blind to non-blind test settings. DFS is an ISO/IEC 17025:2005 accredited laboratory and as such follows and is audited against its quality management system, which requires the administration of either internal or external proficiency tests to examiners on an annual basis. This complies with PCAST recommendations.**

**Under an accreditation setting, external PTs should be supplied from not only an approved vendor, but also one that has met the established criteria of ISO/IEC 17043:2010. In fact, DFS believes in testing the proficiency of the examiner in whichever discipline or sub discipline they are performing casework , latent prints or otherwise. The administration of the proficiency test should be of a level comparable to standard laboratory casework, both in terms of quality and quantity of the samples. PCAST recommends that blind proficiency testing is the best way to move forward, but does not offer ways to go about this nor identify resources with which to achieve this goal. In fact, PCAST points out *that it is not yet realistic to require test-blind proficiency testing***

***because the procedures for test-blind proficiency tests have not yet been designed and evaluated. SAB believes that without the addition of both monetary funding and employees to DFS it would be impossible to set up a true blind proficiency testing system without creating a detrimental backlog of cases.***

### **Foundational Validity**

The report concludes that the only way to establish foundational validity is through appropriately designed black box studies (p. 46):

*Scientific validity and reliability require that a method has been subjected to empirical testing, under conditions appropriate to its intended use, that provides valid estimates of how often the method reaches an incorrect conclusion. For subjective feature-comparison methods, appropriately designed black-box studies are required, in which many examiners render decisions about many independent tests (typically, involving “questioned” samples and one or more “known” samples) and the error rates are determined. Without appropriate estimates of accuracy, an examiner’s statement that two samples are similar—or even indistinguishable—is scientifically meaningless: it has no probative value, and considerable potential for prejudicial impact. Nothing—not training, personal experience nor professional practices—can substitute for adequate empirical demonstration of accuracy.*

**Numerous research studies have been published in the peer reviewed literature about the scientific validity of the practice of latent fingerprint analysis, including several notable black box and white box studies. PCAST has created the artificial requirement that the only studies permitted to demonstrate foundational validity are appropriately designed black box studies and as the SAB previously noted, this ignores the volumes of published literature regarding the field. All forensic science disciplines, including latent print analysis, can improve as more research is conducted and our understanding of scientific phenomena evolve, just as any other field in science.**

**In the spirit of the highlights made within the PCAST report, the SAB does agree with the need for continued research in this area. However, PCAST subsequently fails to address how many studies of this type would be required to adequately establish the validity of latent print comparisons to meet their criteria. Without the clear explanations of how, why and the number required, the PCAST has not done its due diligence into the studies performed in the field and their recommendations are therefore unreliable and inappropriate. Under the current budgetary and administrative confines, continuation of this research is restrictive; however, with additional support from advisory bodies such as NIST, appropriate research criteria could be identified and explored to add some additional scientific perspective regarding the examination method used. Federal funding is required for research in the forensic sciences, not at just the federal level, but also at the state and local levels. Inherent variability with scientific research is a common occurrence because of variables present and research criteria. However, by allowing reproducibility of the research methods, a clear and relevant result may be obtained which would allow for a more accurate and reliable determination of false positive and negative rates amongst examiners.**

## References:

- [1] I.W. Evett, C.E.H. Berger, J. Buckleton, C. Champod, G. Jackson, Finding the way forward for forensic science in the US - A commentary on the PCAST report, *Forensic Science International* 278 (2017) 16-23.
- [2] FBI, Comments on: President's Council of Advisors on Science and Technology REPORT TO THE PRESIDENT Forensic Science in Federal Criminal Courts: Ensuring Scientific Validity of Pattern Comparison Methods, 2016.
- [3] H. Ruslander, IAI PCAST Response, 2016.
- [4] M. Ramos, NDAA PCAST Response, 2016.
- [5] ASCLD-LAB, ASCLD PCAST Response, 2016.
- [6] I.E. Dror, D. Charlton, A.E. Peron, "Contextual information renders experts vulnerable to making erroneous identifications," *Forensic Science International*, Vol. 156 (2006): 74-78.
- [7] B. Ulery, R.A. Hicklin, J. Buscaglia, M.A. Roberts, "Accuracy and Reliability of forensic latent fingerprint decisions," *Proceedings of the National Academy of Sciences of the United States of America* 108, no. 19 (May 10, 2011): 7733-7738, published online April 25, 2011
- [8] SWGFAST Response to The Research, Development, Testing & Evaluation Inter-Agency Working Group of the National Science and Technology Council, Committee on Science, Subcommittee on Forensic Science - November 16, 2011:  
<https://www.nist.gov/sites/default/files/documents/forensics/Annotated-Bibliography-latent-print-analysis.pdf>