



Association of Firearm and Tool Mark Examiners

Response to PCAST Report on Forensic Science October 31, 2016

In September, 2016 the President's Council of Advisors on Science and Technology (PCAST) issued a report titled "Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods." As the leading professional organization for practitioners of forensic firearm identification, the Association of Firearm and Tool Mark Examiners (AFTE) acknowledges the challenge faced by the PCAST to understand the scientific field of comparative sciences from their stated brief review of the literature. AFTE strongly agrees with the premise that additional ongoing structured research strengthens the foundational and applied validity of firearm identification, as well as endeavors to reduce the effects of cognitive bias and subjectivity. However, we cannot overstate our disappointment in the PCAST's choice to ignore the research that has been conducted.

Decades of validation and proficiency studies have demonstrated that firearm and toolmark identification is scientifically valid, and that despite the subjective nature of the final comparison stage of analysis, competent examiners employing standard, validated procedures will rarely, if ever, commit false identifications or false eliminations. The foundational literature of the science has been presented to bodies such as the PCAST and the National Academy of Science (NAS) on multiple occasions and can be found at these links on the AFTE website: <https://afte.org/resources/afte-position-documents> , <https://afte.org/resources/swggun-ark>. The PCAST report is highly critical of any research that is not considered a "black box" study; and while this type of research is valuable and should be utilized more going forward, AFTE believes it is not the sole standard by which good science is measured.

The PCAST report references one such black box study conducted in 2014 by the Midwest Forensics Resource Center (MFRC) at the Ames Laboratory, Iowa State University, as the solitary study that can be utilized to accurately determine the error rate for firearm identification. The results of the Ames study were consistent with previous research demonstrating a very low error rate among properly trained examiners. However, the PCAST recommendation that any and all court testimony should refer to this one study as the singular foundational research of firearm and tool mark examination is irresponsible and inaccurate, and suggests a fundamental lack of understanding about the range of analyses done in this forensic discipline. While a global and numerically precise average of accuracy (error rate) would be useful in evaluating the value of an analytical technique, of greater relevance is the performance of the individual examiner as demonstrated by their participation in proficiency testing and similar testing. It should be noted that when foundational black-box type studies have been conducted in the past, the reported errors tend to be clustered among individuals or small groups

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of participants rather than generally distributed amongst the population of all examiners participating in the study. Moreover, the technical and quality review processes utilized by laboratories for casework are not applied in these studies.

The PCAST report's assessment of the AFTE Theory of Identification as circular further illustrates the lack of adequate investigation and understanding on the part of the PCAST. First, the Theory of Identification has been in existence since 1992, not 2011 as cited.^(p.59) Second, the report erroneously defines sufficient agreement as "the examiner being convinced that the items are extremely unlikely to have a different origin."^(p.103) This characterization is utterly incorrect. The AFTE Theory of Identification clearly defines for the examiner when sufficient agreement does exist and how it is related to the significant duplication of random toolmarks. Only after sufficient agreement has been established does an examiner conclude that the two items are extremely unlikely to have a different origin. It has been consistently demonstrated that when the AFTE Theory of Identification is properly applied, examiners are able to conduct quality, accurate analysis.

Finally, the PCAST insistence on independent inquiry of our field in validation studies and matters of peer review implies a fatal limitation or bias within our community that can only be cured by an outside source. It is true that the majority of past research has been conducted by AFTE members, because while DNA and fingerprints have applications outside of forensics (such as medicine and biometrics), firearm identification has few profit-making applications and does not garner research attention from the private sector. Fortunately, in recent years a great diversity of academics, scientific professionals and agencies have joined in research on firearm and tool mark examination, but they require the input and participation of qualified forensic practitioners. We welcome the attention and ongoing collaboration of such organizations as the National Institute of Standards and Technology (NIST) and the newly-formed Center for Statistics and Applications in Forensic Evidence (CSAFE) in current and future research. Meanwhile, AFTE remains dedicated to the exchange of information, methods and best practices, and the furtherance of research in support of its members world-wide.
