



Strengthening Forensic Science in the United States: A Path Forward

*Committee on Identifying the Needs of the Forensic Sciences Community,
National Academy of Sciences, 2009*

Position Summary

The Scientific Working Group on Friction Ridge Analysis, Study, and Technology (SWGFAST) agrees with and supports many of the conclusions and recommendations of the National Academy of Sciences (NAS) report. Nevertheless, SWGFAST maintains that a significant body of constructive scientific research has already been conducted that addresses some of the concerns expressed in the report. This research has not been adequately reported by the NAS committee. Future research is certainly encouraged and SWGFAST, in partnership with the National Institute of Standards and Technology (NIST), National Institute of Justice (NIJ), and other recognized bodies, will continue to proactively address the challenges highlighted in the report.

Furthermore, SWGFAST endorses the existence and continuous review of guidelines and standards for the examination of friction ridge impressions in forensic science. Accreditation and certification are important aspects of a quality assurance system, and SWGFAST recognizes those programs provided by existing bodies. SWGFAST is eager to continue its work toward the stronger enforcement and application of those guidelines and standards in the friction ridge examination discipline. SWGFAST supports the creation of enforcement mechanisms that would mandate and ensure compliance with professional standards and practices. Although creating a National Institute of Forensic Science (NIFS) may seem appealing, SWGFAST believes that a more efficient use of the existing infrastructure can offer an effective way to promote standardization.

SWGFAST is concerned that the NAS report may be used to misrepresent the true state of the practice and science of friction ridge comparisons. The NAS report has already been cited in a legal motion to exclude forensic evidence [1]. It would be unfortunate if the report is represented as a definitive analysis of forensic science practices as opposed to a presentation of concerns derived from a select group of interviews and limited literature review.

Mission and Organization

SWGFAST has been establishing guidelines and standards for the development and enhancement of friction ridge examiners' knowledge, skills, and abilities since 1995. Additionally, SWGFAST documents provide guidance for training programs, examiner qualifications, proficiency testing and standardized practices and terminology. Although sponsored by the FBI Laboratory, SWGFAST members are from international, federal, state, and local forensic science laboratories, as well as from academia and private practice. Members represent practitioners who work with latent prints (crime scene evidence), tenprints (biometric records), and associated research and technology sectors. SWGFAST membership is capped at fifty participants. SWGFAST regularly considers new members with diverse backgrounds and experience. Professionals interested in SWGFAST membership are required to submit a letter of interest along with their credentials for consideration by the group. Membership approval is based on the availability of vacant positions and the perceived intellectual contributions of the candidate. Those wishing to continue with SWGFAST membership after the expiration of their term must seek re-election by the current membership.

SWGFAST Review and Response

SWGFAST features prominently in the NAS report "Strengthening Forensic Science in the United States: A Path Forward". The report appreciates the work of the Scientific Working Groups (SWGs) when it acknowledges: "Nonetheless, the SWGs have been a source of improved standards for the forensic science disciplines and represent the results of a profession that is working to strengthen its professional services with only limited resources" [p. 7-8]. The report goes on to criticize the lack of an enforcement mechanism for SWGFAST guidelines and standards. Despite this, SWGFAST guidelines and standards are routinely quoted in court as evidence of adherence to best practices. Enforcement of these guidelines and standards could be a simple matter. As with other public policy issues, funding dependent on adherence could go a long way toward encouraging the formal adoption of SWGFAST documents. Another enforcement mechanism should be the incorporation of SWGFAST documents into the accreditation process.

SWGFAST suggests that practitioners, police agencies, and forensic organizations begin implementing several of the recommendations immediately. This could include establishing and following a code of ethics (Recommendations 7 and 8); requiring certification and accreditation (Recommendation 7); implementing written standards and, written acceptable conclusions and defining what is meant by each of them (Recommendations 2 and 8); implementing quality assurance wherever possible through case reviews, testimony audits, and mandatory proficiency testing; and ensuring that all practitioners are adequately trained and that the training is continually up to date (Recommendations 5 and 8). Implementing these things could be done immediately; there is no need to wait for a federal body to mandate them. The NAS Committee Report should be a wake-up call for the community.

Clarifications

The Congressional charge to the NAS Committee was monumental. Even so, the Committee acknowledged that it could only do so much. Unfortunately, the lack of practicing examiners on the NAS Committee itself may have led to misunderstandings about the practice of the discipline and an unbalanced reliance on certain research and sources. As an example, the Committee comments on the "...common lack of scientific expertise among judges and lawyers..." [p. 1-14] yet relies, though not solely, on the opinion of a single jurist when addressing the scientific underpinnings and reliability of fingerprint examinations [p. 1-7]. The Committee focused on the following issues as support for its findings regarding the perceived shortcomings of the practice of friction ridge comparative analysis:

Individualization

The NAS states "With the exception of nuclear DNA analysis, however, no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source [p. S-5]. SWGFAST respectfully disagrees. History, practice, and research have shown that fingerprints can, with a very high degree of certainty, exclude incorrect sources and associate the correct individual to an unknown impression. Furthermore, fingerprints discriminate between monozygotic twins, and DNA currently does not.

Bias

The NAS Committee concerns itself with the issue of bias and how it may influence the decisions of examiners. Research in this area is limited, yet the Committee has exerted a disproportionate amount of effort in addressing it. Effort, it is felt, that could have been more appropriately devoted to further examining other issues that, although addressed, were not thoroughly examined. The possibility of biases influencing the decision making process of examiners is acknowledged. However, more research is needed before this perceived problem can be fully understood and corrective action can be prescribed.

Along with allegations of bias, fingerprint analysis is criticized for being subjective in its practice [p. 5-10]. SWGFAST acknowledges that subjectivity is inherent in the friction ridge examination process. Subjectivity (informed judgment) is inherent to every human activity. Therefore, it naturally follows that it is also present in any scientific endeavor where the human is the instrument and the decision cannot be separated from the method. In fact, subjectivity is found in the informed analysis of DNA, a discipline the NAS regards throughout the report as the gold standard of forensic science. During the encoding phase of DNA entry to a search system, a human examiner subjectively determines the presence and the degree to which individual markers are present in the sample. Additionally, the examiner also compares peak heights of the unknown sample with known samples presented as likely candidates for a match, the quality of which can also sometimes vary in degraded samples. A great deal of subjectivity exists specifically in the interpretation of mixtures of DNA profiles and low copy number analysis. All of these factors point to the same subjective elements in the determination of the relevance of features in DNA analysis that are present in the selection and evaluation of friction ridge skin features.

Subjectivity allows for informed, educated conclusions based upon inductive reasoning supported by training, experience, and data obtained from scientific research. Without subjectivity, collective knowledge could not be applied to issues at hand in any endeavor, including legal decisions, medical diagnoses, and forensic casework. SWGFAST proposes that subjectivity is an inherent and necessary aspect of complex reasoning, and that the real issue at hand is that of transparency. At a minimum, transparency is necessary to better assess the work that is being performed and to provide those outside the profession with an understanding of the processes that are used.

Methodology

The comparative examination of friction ridge skin is conducted pursuant to a method known by the acronym ACE-V (Analysis, Comparison, Evaluation, and Verification). ACE-V is a methodology that mirrors the vision science's description of object recognition when applied to the examination of fingerprint impressions. It is a structured, logical procedure designed to minimize bias resulting in very few errors. Thorough documentation of this process allows for the transparency required for competent reviewers to determine that the data and case information have been appropriately considered. Additionally, blind verification can and is used as an ancillary component to the examination process, and, when appropriate, is used to detect and guard against the possibility of bias or otherwise tainted results.

Error Rates

SWGFAST acknowledges that errors do occur and furthermore that claims of zero error rate in the discipline are not scientifically plausible. Although current practices and procedures will not facilitate the

calculation of error rates in actual casework because of varying factors and limited information, history demonstrates that the actual error rate in practice is very low. It may be possible to arrive at a generic error rate that considers methodological and practitioner errors through the use of an appropriately designed study. However, determining the reliability of the practice and not error rates would be a better metric in assessing its value as evidence. Billions of comparisons worldwide have occurred over the course of a century with an extremely low number of errors. Recent studies published in peer reviewed journals, although limited, also tend to suggest that the error rate of friction ridge examination, when conducted by competent examiners, is very low [p. 2-6].

SWGFAST endorses additional research in this area to further assess the accuracy of friction ridge examination.

Brandon Mayfield

The misidentification of Oregon Attorney Brandon Mayfield as the source of a fingerprint found on a plastic bag containing bomb making parts in the Madrid train bombing of 2004 by FBI fingerprint examiners, is often presented as proof of the fallible nature of fingerprint examinations. This error has been used by advocates to dismiss the claims of reliability of fingerprint identification and illustrate the effects of bias on the process. Although unfortunate, the error prompted the FBI to re-examine its processes and to implement improved practices. The national and international fingerprint community has also addressed the error and has applauded the transparency demonstrated by the FBI as it analyzed the event. The fingerprint community credits the FBI's recommendations to improve the protocols, processes, and practices that further advance procedures and methods within the profession.

The Committee offered a series of recommendations it believes addresses the concerns identified in the report [p. S-14 through S-24]. SWGFAST offers the following observations:

Recommendation 1

SWGFAST supports the areas of focus in the *NAS Report on Forensic Science in the United States: A Path Forward* to further improve the forensic science disciplines. SWGFAST acknowledges that one solution to moving in this direction would be to create a new all-encompassing federal institute or organization -- NIFS -- to accomplish all of these goals. However, such an entity would require an unprecedented and problematic management model to oversee all aspects of an entire profession. SWGFAST proposes that there may be more efficient and pragmatic approaches to support these efforts. For example, collaborative efforts between existing organizations such as the National Science Foundation (NSF), the SWGs, NIST, national laboratories, and academic institutions could be leveraged to complete an aggressive research agenda in the furtherance of the goals of this recommendation.

Some of the goals in the NAS report are being accomplished today and many of them are attainable now through existing mechanisms which need to be better funded.

Recommendation 2

The NAS suggests consistency in terminology and reporting. SWGFAST agrees with this recommendation, but does propose that recognizable differences in select terminology that exist within the forensic sciences are acceptable based upon the needs of each discipline and are within the boundaries of science. SWGFAST recommends a collaborative and cooperative approach to improving consistency in forensic science nomenclature among SWGs and the scientific and legal communities. SWGFAST currently uses the development of our glossary to standardize terminology [p. 5-11].

Recommendation 3

The NAS notes that “some forensic science disciplines are supported by little rigorous systematic research to validate the discipline’s basic premises and techniques” [p. S-16]. However, as reported by the NAS, there are “more established protocols and available research for the analysis of fingerprints” than for other types of (pattern, impression) evidence [p. S-6]. It is the position of SWGFAST that more than a century of research exists in the discipline of friction ridge analysis including studies in biology, physiology, histology, embryology, physics, genetics, statistics, mathematics and computer science. Continued research is the cornerstone of any scientific endeavor and friction ridge examination would benefit from more research funding to strengthen the robustness of the accuracy, reliability, and underlying scientific protocols of the discipline. In fact, SWGFAST is actively engaged in the development of a suggested research agenda to offer specific recommendations for consideration by the research community.

Recommendation 4

SWGFAST agrees that forensic laboratories and identification units should have insular funding mechanisms that do not compete with the allocation of primary law enforcement resources. The intent of the report is vague on this issue. Initially, the recommendation calls for “independence from or autonomy within the law enforcement community” [p. S-17]. However, the report then states that federal funding should be made available “for the purpose of removing all public forensic laboratories and facilities from the administrative control of law enforcement agencies or prosecutors’ offices” [p. S-17]. The report states “The best science is conducted in a scientific setting as opposed to a law enforcement setting” [p. S-17]. But it remains unclear what sort of “scientific setting” is sought. There are many models from which to choose: the academic model, the industrial or commercial model, the government sponsored alliances, and military application research and testing.

The report implies that laboratory affiliation with law enforcement creates a results oriented atmosphere that may not be conducive to the best scientific practices. But law enforcement interests are not the only pressures on the forensic laboratory. The courts have an interest in the professional, efficient, and timely operation of the forensic laboratory. Creating a privatized system of testing labs or divorcing labs from their jurisdictional responsibilities could yield an atmosphere of results shopping by investigative agencies. Laboratories separated from the overall mission of criminal investigation may be more concerned with generic success as opposed to the targeted needs of law enforcement and providing investigative leads [7].

Recommendation 5

SWGFAST agrees that research on the effects of human observer bias may assist in reducing error in forensic examinations. In fact, many SWGFAST members also serve on the Expert Working Group on Human Factors in Latent Print Analysis, jointly sponsored by NIST and NIJ. The charge and goals of the NIST/NIJ Working Group closely mirrors the specific recommendations of the NAS, and, therefore, SWGFAST proposes that this body of work is already well under way by very credible and capable organizations. Accredited laboratories are already required to have quality assurance programs designed to detect, document, address, and, therefore, prevent errors in forensic science analyses. Many non-accredited laboratories and identification units have voluntarily adopted these same procedures.

Recommendation 6

SWGFAST acknowledges the important contributions of NIST and its leadership role in research and the development of standards. SWGFAST commits itself to the NAS recommendation for cooperation and consultation with bodies such as NIST to assist in deploying SWGFAST standards to the fingerprint community to advance the discipline of friction ridge analysis. (See response to Recommendation 1.)

Recommendation 7

As recommended by the NAS, SWGFAST endorses accreditation of forensic laboratories and identification units to ensure the proper handling, documentation and examination of evidence. SWGFAST also endorses the certification of examiners to test their knowledge and skills. Accreditation and certification are both meaningful measures that play important roles to assure the public and the courts that evidence handling and testing are conducted using best practices by qualified examiners. Both of these topics have long been subjects included in SWGFAST initiatives. We are pleased to see them emphasized by the NAS and support a recommendation calling for an enforced mandate of compliance of both.

Recommendation 8

SWGFAST agrees with the statement “Forensic laboratories should establish routine quality assurance and quality control procedures to ensure the accuracy of forensic analysis and the work of forensic practitioners” [p. S-19]. It should be noted that such procedures are already in place at accredited and non-accredited laboratories. However, the lack of review and compliance enforcement for non-accredited laboratories and forensic units needs to be addressed.

Recommendation 9

SWGFAST recognizes the importance of ethical professional conduct in forensic science and has an existing model policy for a code of professional conduct in friction ridge examination. SWGFAST encourages and will continue to support efforts to enforce codes of ethics and professional conduct within the discipline.

Recommendation 10

SWGFAST agrees in principle with the importance of academic programs related to forensic science. NAS recommends the appropriation of funding to academic institutions to enhance programs related to physical and life sciences” [p. S-14, S-20, 2-21, 8-17] and “graduate studies in multidisciplinary fields” [p. S-20, 8-16, 8-17]. SWGFAST encourages an environment of continued research and academic influence. We propose that the intent of the NAS might be better served by focusing on more specific forensic studies than proposed by NAS. Although advanced degree programs can be very beneficial for the improvement of the forensic disciplines, undergraduate and post-graduate skills-based programs are better suited to provide the student with the skills necessary for a smooth transition into units conducting friction ridge comparisons.-

SWGFAST recommends that funding should also be provided for continuing education in the forensic sciences. It would also seem necessary for judges and lawyers to receive training in forensic science because it is their efforts that will ultimately bring test results before a jury. Training for the Bar and Judiciary would help to bolster the court’s effectiveness in its gatekeeper role.

Recommendation 12

SWGFAST agrees that AFIS interoperability would lead to additional fingerprint searches and identifications that would provide additional investigative leads to solve domestic criminal and international terrorism related cases. Several SWGFAST members also serve on the existing NIST Automated Fingerprint Identification System (AFIS) Interoperability Working Group. The charge and goals

of this Working Group closely mirror the specific recommendations of the NAS, and, therefore, SWGFAST suggests that this body of work is already well under way by a very credible and capable organization.

Recommendations 11 and 13 are outside of the purview of SWGFAST.

References

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