



National Institute of Justice

S O L I C I T A T I O N

Jeremy Travis, Director

March, 2000

Forensic Friction Ridge (Fingerprint) Examination Validation Studies

APPLICATION DEADLINE:

July 28, 2000

U.S. Department of Justice
Office of Justice Programs
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Washington, DC 20531

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Department of Justice Response Center:
800-421-6770

Office of Justice Programs
World Wide Web Site:
<http://www.ojp.usdoj.gov>

National Institute of Justice
World Wide Web Site:
<http://www.ojp.usdoj.gov/nij>

SL000386

Forensic Friction Ridge (Fingerprint) Examination Validation Studies

I. Introduction

Forensic friction ridge (i.e. fingerprint, palmprint, footprint) examination (FFRE) has long been recognized and accepted as the standard for personal identification worldwide. The National Institute of Justice (NIJ) publication *Forensic Sciences: Review of Status and Needs* (NCJ 173412) has identified the need for validation of the basis for friction ridge individualization and standardization of comparison criteria. Furthermore, all expert testimony must follow the admissibility rules for scientific evidence set forth in recent court cases e.g. *Daubert v. Merrill Dow Pharmaceuticals* (113 S.Ct. 2786). These rules require scientists to address the reliability and validity of the methods used in their analysis. Therefore, the purpose of this solicitation is to address the needs identified in the above NIJ publication and to provide greater scientific foundation for forensic friction ridge (fingerprint) identification.

II. Background

In 1995, the Federal Bureau of Investigation (FBI), recognizing the need for standardized procedures for friction ridge examination, hosted a meeting of latent print examiners to discuss development of consensus guidelines, which would preserve and improve the quality of service provided by examiners nationwide. This group evolved into the Scientific Working Group on Friction Ridge Analysis, Study, and Technology (SWGFAST). SWGFAST participants include Fingerprint Identification Committee members and Latent Print Certification Board members from the 4,800-member International Association for Identification. Currently, there are more than thirty members attending SWGFAST from Federal, State, and local law enforcement

agencies. SWGFAST already has developed guidelines for hiring, training, and quality assurance.

In 1997, the American Society of Crime Laboratory Directors (ASCLD) requested that NIJ bring together a forensic science team of 44 scientists and administrators to identify the current status and needs of the forensic sciences. This resulted in the 1999 NIJ publication *Forensic Sciences: Review of Status and Needs* (NCJ 173412). The status and needs publication includes a section on **Latent Print Examinations**. In this publication the forensic science team identified a number of needs including the **Validation of the Basis for Print (friction ridge) Individualization** as well as **Standardization of Comparison Criteria**.

In 1998, NIJ launched a research and development program to support the recommendations on needs discussed in the *Forensic Sciences: Review of Status and Needs*. In 1998, NIJ issued a solicitation on **Forensic Document Examination Validation Studies** and funded a study in 1999 on **Handwriting Identification: Research to Study Validity of Individuality of Handwriting and Develop Computer-Assisted Procedures for Comparing Handwriting**. In May 1999, NIJ assembled a Fingerprint Research Advisory Panel (FRAP) to develop this solicitation to address the latent print needs.

The participants in the NIJ FRAP included practicing latent print examiners, researchers, and senior administrators from Federal, State, and private forensic science laboratories. They reached a consensus that the field needs:

- C Basic research to determine the scientific validity of *individuality in friction ridge* examination based on measurement of features, quantification, and statistical analysis.
- C Procedures for comparing friction ridge impressions that are standardized and validated.

Basic research into the individuality of friction ridges requires objective measurement and statistical analysis. Validation could be performed in the context of existing systems such as AFIS (automated fingerprint identification system) and/or APIS (automated palmprint identification system) that offer some of the most comprehensive friction ridge identification databases in the world. Other related technologies that may be easily adaptable to the quantification of fingerprints include: data mining, image and/or multimedia search engines, intelligent agents, signal processing, voice identification, automated vision robotics, data visualization, and pattern recognition.

Such procedures must be based, however, on more than community-based agreement. Procedures must be tested statistically in order to demonstrate that following the stated procedures allows analysts to produce correct results with acceptable error rates. This has not yet been done. Methodologies that may be useful here include: quality control, experimental design, protocol evaluation, and cognitive and perceptual psychology.

III. Areas of Research Required

A. Statistical Validation of Individuality in Friction Ridge Analysis

The proposed research must address the question of individuality in friction ridge analysis. Friction ridge print evidence has historically been “understood” to hold

individuality based on empirical studies of millions of prints. However, the theoretical basis for this individuality has had limited study and needs additional work to demonstrate the statistical basis for identifications. It is expected that proposals would address the relative importance of different minutiae to establish individuality, as well as the statistical significance of groups of minutiae. The comparative analysis consists of both a qualitative and quantitative process. Aspects of friction ridge individuality that should be addressed are: pattern type and ridge flow (Level I); ridge endings, bifurcations and dots (Level II); and ridge and pore morphology (Level III). It is required that the proposed research application include:

- Evaluation of the relationship among the characteristics and among the levels.
- Data set (representative samples from U.S. population).
- Measurement Tools (feature selection and extraction, computer or manual systems).
- Statistical Analysis.

An expected deliverable is a report of publishable quality in respected nationally distributed peer-reviewed journals detailing the results of the analyses on whether and how individual friction ridge validation can be demonstrated.

B. Qualitative/Quantitative Aspects of Friction Ridge Comparison

The proposed research must address the qualitative questions (clarity) of friction ridge detail.

Practical application has demonstrated that a reliable identification is based upon both a qualitative and quantitative analysis of the friction ridge detail. It is required that the

proposed research application address both of these issues.

An expected deliverable is a report of publishable quality in respected nationally distributed peer-reviewed journals detailing the results of the analyses on an objective and scientific approach for determining the sufficient quality and quantity of friction ridge details needed to conduct a valid examination for comparison purposes.

C. Statistical Validation of Standard Operating Procedures for Friction Ridge (Fingerprint) Comparison

The proposed research must address the question of whether Standard Operating Procedures are valid and reproducible. It is required that the proposed research application include:

- Data set.
- Standard Operating Procedure (SWGFAST or others).
- Experimental designs.
- Statistical analysis.

An expected deliverable is a report of publishable quality in respected nationally distributed peer-reviewed journals detailing the results of the analyses of a valid Standard Operating Procedure (a standardized, objective, statistical, reproducible method) to examine friction ridge minutiae.

IV. Selection Criteria

NIJ is firmly committed to the competitive process for awarding grants. All proposals are subjected to an independent, peer-review panel evaluation. The peer-review panel consists of members with academic, practitioner, technical, and operational expertise in the subject areas of the solicitation. Selection criteria used to evaluate proposals are as follows:

1. Quality and Technical Merit

- Soundness of methodology, analytic, or technical approach.
- Innovation and creativity.
- Feasibility of proposed project; awareness of pitfalls.
- Awareness of existing research and related applications.

2. Impact of the Project

- Understanding importance of the problem.
- Potential for significant advance in crime prevention, law enforcement, courts, corrections, or other practice or policy areas.
- Potential for advancement of scientific understanding of the problem area.
- Relevance to practice, including development and demonstration in application domains (if applicable).
- Affordable end products (if applicable).

3. Capabilities, Demonstrated Productivity, and Experience of Applicants

- Qualifications and experience of personnel as related to proposed project.
- Responsiveness to the goals of the solicitation.
- Demonstrated ability to manage proposed effort.
- Adequacy of proposed resources to perform effort.

4. Budget Considerations

- Total cost relative to perceived benefit.
- Appropriate budgets and level of effort.
- Use of existing resources to conserve costs.
- Cost-effectiveness of program or product for application in the criminal justice system (if applicable).

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After peer-review panelists' consideration, Institute staff make recommendations to NIJ's Director based on the results of the independent reviews. Final decisions are made by the NIJ Director following consultation with Institute staff.

V. How to Apply

Those interested in submitting proposals in response to this solicitation must complete the required application forms and submit related required documents. (See below for how to obtain application forms and guides for completing proposals.) Applicants must include the following information/forms to qualify for consideration:

- C Standard Form (SF) 424—application for Federal assistance
 - C Assurances
 - C Certifications Regarding Lobbying, Debarment, Suspension and Other Responsibility Matters; and Drug-Free Workplace Requirements (one form)
 - C Disclosure of Lobbying Activities
 - C Budget Detail Worksheet
 - C Budget Narrative
 - C Negotiated indirect rate agreement (if appropriate)
 - C Names and affiliations of all key persons from applicant and subcontractor(s), advisors, consultants, and advisory board members. Include name of principal investigator, title, organizational affiliation (if any), department (if institution of higher education), address, phone, and fax
- Proposal abstract
 - C Table of contents
 - Program narrative or technical proposal
 - Privacy certificate

- References
- Letters of cooperation from organizations collaborating in the research project
- Résumés
- Appendixes, if any (e.g., list of previous NIJ awards, their status, and products [in NIJ or other publications])

Proposal abstract. The proposal abstract, when read separately from the rest of the application, is meant to serve as a succinct and accurate description of the proposed work. Applicants must concisely describe the research goals and objectives, research design, and methods for achieving the goals and objectives. Summaries of past accomplishments are to be avoided, and proprietary/confidential information is not to be included. Length is not to exceed 400 words. Use the following two headers:

Project Goals and Objectives:

Proposed Research Design and Methodology:

Page limit. The number of pages in the “Program Narrative” part of the proposal must not exceed 30 (double-spaced pages).

Due date. Completed proposals **must be received** at the National Institute of Justice by the close of business on July 28, 2000. Extensions of this deadline will not be permitted.

Award period. In general, NIJ limits its grants and cooperative agreements to a maximum period of 12 or 24 months. However, longer budget periods may be considered.

Number of awards. NIJ anticipates supporting one or more grants under this solicitation.

Funds available. Funds totaling \$500,000 will be made available for this NIJ solicitation, contingent upon NIJ's budget appropriations.

Applying. Two packets need to be obtained: (1) application forms (including a sample budget

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worksheet) and (2) guidelines for submitting proposals (including requirements for proposal writers and requirements for grant recipients). To receive them, applicants can:

C Access the Justice Information Center on the web:

<http://www.ncjrs.org/fedgrant.htm#NIJ>

or the NIJ web site:

<http://www.ojp.usdoj.gov/NIJ/funding.htm>

These web sites offer the NIJ application forms and guidelines as electronic files that may be downloaded to a personal computer.

C Request hard copies of the forms and guidelines by mail from the National Criminal Justice Reference Service at 800-851-3420 or from the Department of Justice Response Center at 800-421-6770 (in the Washington, D.C., area, at 202-307-1480).

C Request copies by fax. Call 800-851-3420 and select option 1, then option 1 again for NIJ. Code is 1023.

Guidance and information. Applicants who wish to receive additional guidance and information may contact the U.S. Department of Justice Response Center at 800-421-6770. Center staff can provide assistance or refer applicants to an appropriate NIJ professional. Applicants may, for example, wish to discuss their prospective research topics with the NIJ professional staff.

Send completed forms to:

Forensic Friction Ridge (Fingerprint)
Examination Validation Studies
National Institute of Justice
Office of Science & Technology
810 Seventh Street N.W.
Washington, DC 20531
[overnight courier ZIP code 20001]

NIJ is streamlining its process to accommodate the volume of proposals anticipated under this solicitation. Researchers can help in a significant way by sending NIJ a nonbinding letter of intent by June 23, 2000. The Institute will use these letters to forecast the numbers of peer panels it needs and to identify conflicts of interest among potential reviewers. There are two ways to send these letters. You can reach NIJ by Internet by sending e-mail to tellnij@ncjrs.org and identifying the solicitation and section(s) you expect to apply for. You can write a letter with the same information to Forensic Friction Ridge (Fingerprint) Examination Validation Studies, 810 Seventh Street N.W., Washington, DC 20531. Help us help you.

For more information on the National Institute of Justice, please contact:

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Box 6000
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You can view or obtain an electronic version of this document from the NCJRS Justice Information Center web site (<http://www.ncjrs.org>) or the NIJ web site (<http://www.ojp.usdoj.gov/nij>).