OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need:	Comparability and complexity in handwriting and hand printing
Keywords:	Handwriting, hand printing, signatures, handwriting comparisons, handwriting analysis

R&D Need Rank: Low, Medium, High	Medium	**SAC Approved Date:**	June 9, 2025

Submitting subcommittee(s): Forensic Document Examination

Research Need Summary:

The purpose of these research needs is to build a stronger scientific foundation for forensic science standards. The information provided herein will help to evaluate and strengthen existing standards, and/or fill any standards related gaps. In the space below, please provide a brief narrative of the need to be addressed. This should include:

- The identity of any specific standards that would be affected/improved/evaluated
- A discussion on gaps that exist within the standards or standards related gaps that need to be filled
- How this work would fill those gaps
- An overview of any current or past research efforts that may be relevant to this effort
- A discussion regarding how this research might improve current laboratory capabilities and/or forensic services within the criminal justice system
- Any relevant references

Forensic Document Examiners (FDEs) conduct handwriting comparisons, whether glyphs that comprise the writing are classified as cursive (connected), printed (unconnected), mixed (hybrid), complex, or simplistic. This includes initials and signatures as well. Prior research has begun to subdivide writing and signature groups, and further research into complexity, comparability, and FDE expertise is needed. Additional basic and applied research would further the body of knowledge about handwriting, handwriting comparisons, and the differentiation between FDE and layperson capabilities to conduct these comparisons. A study to show what level of handwriting complexity, and what amount (quantity) of writing, is necessary to make a reliable and verifiable conclusion. This might be broken into two separate projects, one on complexity and one on writing amounts, or researched in a combined process.

Key bibliographic references relating to this research include:

- Bird, C, Found, B., and Rogers, D., Forensic handwriting examiners' skill in distinguishing between natural and disguised handwriting behaviours. *Journal of Forensic Sciences*, 2010. 55: p. 1291---1295.
- Boot, David, An Investigation into the Degree of Similarity in the Handwriting of Identical and Fraternal Twins in New Zealand, Journal of the American Society of Questioned Document Examiners, Vol. 1, No. 2, 1998
- Hicklin, R.A, Eisenhart, L., Richetelli, N., and Eckenrode, B.A. (2022). Accuracy and reliability of forensic handwriting comparisons. https://doi.org/10.1073/pnas.2119944119
- Huber R. (2000). "The Heterogeneity of Handwriting," Journal of American Society of Questioned Document Examiners, 3(1)
- Johnson, Mark E., Vastrick, Thomas W., Boulanger, Michele, Schuetzner, Ellen, Measuring The Frequency Occurrence of Handwriting and Hand---Printing Characteristics, Final Report - NIJ Award 2010-DN-BX-K273
- Kam, M., Wetstein, J., and Conn, R., (1994) Proficiency of Professional Document Examiners in Writer Identification, *Journal of Forensic Sciences,* Vol. 39, No. 1, pp. 5-14.
- Kam, M,. Fielding, G., and Conn, R., (1997) Writer Identification by Professional Document Examiners, *Journal of Forensic Sciences,* Vol. 42, No. 5, pp. 778---786.
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- Kam, M., and Lin, E., (2003) Writer Identification Using Hand---Printed and Non---Hand---Printed Questioned Documents, *Journal of Forensic Sciences,* Vol. 48, No. 6, pp. 1391---1395.
- Livingston, Orville B., A Handwriting and Pen---Printing Classification System For Identifying Law Violators, *Journal of Criminal Law, Criminology and Police Science,* Vol. 49, p. 487.
- Marquis, R., Bozza, S., Schmittbuhl, M., and Taroni, F., Handwriting Evidence Evaluation Based on the Shape of Characters: Application of Multivariate Likelihood Ratios. . J Forensic Sci. Volume 56, Issue S1, January 2011, Pages: S238–S242, . Article first published online: 11 NOV 2010, DOI: 10.1111/j.1556---4029.2010.01602.
- Merlino, Mara L. and Tierra M. Freeman, Veronica Blas Dahir and Victoria Springer, Derek Hammond, Adrian Dyer, Bryan Found, (2015), Validity, Reliability, Accuracy, and Bias in Forensic Signature Identification. Kentucky State University, Frankfurt, Kentucky. NCJRS Document No. 248565.
- Mitchell, L. L. and Merlino, M. (2016). A blind study on the reliability of hand printing identification by forensic document examiners. Journal of the American Society of Questioned Document Examiners, 19 (1), pp. 3-10.
- Wooton, Elaine X., *A Preliminary Discussion of Research and Reference Materials Using the U.S. INS Collection of Handwriting from Other Countries,* paper presented at the annual meeting of the ASQDE, Long Beach, CA 1994.

Improvements to current laboratory capabilities:
Having research that shows how complex writing needs to be and/or the amount of writing that is necessary to formulate an accurate and verifiable opinion will only strengthen the field. Error rates could possibly go down and the range of opinions given by different examiners could be narrowed. Results would assist FDEs in understanding the intricacies of what they do in the "eye–brain" visual comparison process, explaining the training process to trainees, and testifying in court and testifying in Daubert style challenges (i.e., explaining examinations and opinions to laypersons and triers of fact).

Improving the scientific basis for the subcommittee:
Basic research would provide a means of articulating the complexity of attempting to classify each person's writing with simplistic, identifiable terms. Applied research could also potentially describe, in a gestalt view, some of the sub-processes that the human observer uses in the process of side-by-side comparisons. Additional research, especially new research, will need to be reflected in the standards created for the applicable forensic field. More research should make writing standards easier.

Improving services to the criminal justice system:
Applied research could potentially serve as verification that printed writing is as identifiable as cursive writing and signatures are a sub-set category of handwriting. Any research that can further validate forensic handwriting examinations will be a positive to the criminal justice system.

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.