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Editorial

There is one issue that keeps coming up when challenged by a member of the American Board of Forensic Document Examiners (ABFDE) and that is the standard requirement for training of a document examiner. The standard states that one must work in an approved laboratory with "qualified" document examiners for two years in order to become a document examiner. According to members of ABFDE that is the only way to become a document examiner.

Nothing could be further from the truth. It has been demonstrated that privately-trained examiners excel in proficiency testing and they frequently out-perform these other examiners.

There are only 47 members of ABFDE who accept cases in the private sector. Some of these examiners work fulltime in a government laboratory but are able to take some private cases. Obviously, 47 people cannot handle all of the cases involving questioned documents in a country of 330,000,000 people.

Albert Osborn is considered the Father of Document Examination and he obviously did not spend two years in an approved laboratory. Nor did other pioneers in the field of document examination.

There are some people who try to pass themselves off as document examiners. These people do not follow the standards for document examiners. They are marginally trained, if at all. Some are graphologists who should not testify as document examiners appear in court and give private examiners a bad reputation. The rest are people who retire from the government and immediately become a document examiner with little or no training. I have known several of them, one in particular who claimed that he examined documents when he worked for the government. His job was to send any suspicious documents to the document laboratory. He had no credentials in document examination.

Be prepared to demonstrate to the court that you follow the standards originating with SWGDOC and accepted by the Academy Standard Board (ASB) with the approval of the American National Standards Institute (ANSI). The standards were first developed by the Scientific Working Group for Questioned Document Examiners (SWGDOC) and adopted by ASB.

We object to the standard that the only way to become a document examiner is to spend two years in an approved laboratory. The definition includes "or the equivalent" and we use this statement to demonstrate that we have learned how to identify handwriting through other means.

On another note, we have three articles written by document examiners in IADE. The articles are well-researched and include much valuable information.

I encourage all of you to write an article for our Journal. If you do not feel comfortable writing an article by yourself, collaborate with someone who can work with you. I am available to assist if you need help.

Kathie

Juror Interpretation Risks in Forensic Document Examination Cases: A Voir Dire Framework for Managing Lay Overconfidence, Expert Boundaries, and Outside-Research Risks

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Abstract
Forensic document examination (FDE) evidence can appear deceptively simple to lay jurors because most people regularly write, sign, read, and handle documents. That familiarity may create an illusion of competence in assessing it. In cases involving handwriting, signatures, alterations, indented writing, questioned printing, or related document issues, a juror with similar or adjacent experience (such as notary work, banking, fraud review, graphic design, printing, auditing, or informal handwriting-analysis interests) may be perceived by other jurors as an inside source of specialized knowledge, or perhaps better said as, may be perceived by other jurors as an informal expert within the jury room. If that juror happens to or confidently introduces private methods, unsupported beliefs, or outside research into deliberations, the group may drift from the admitted evidence toward a "jury of one" dynamic, in which the verdict is disproportionately shaped by a single juror's private authority. This paper proposes a practice-based risk framework for forensic document examination cases. It distinguishes forensic document examination from graphology, reviews relevant concepts from social influence and juror decision-making literature, and offers a voir dire framework designed to identify overconfidence, graphology beliefs, resistance to expert boundaries, and tendencies toward dominance. The paper also addresses legal and ethical limits, including impartiality, Batson[1] concerns, juror misconduct, and prohibitions on outside research. The goal is not to select a favorable jury, but to support a fair jury capable of evaluating expert evidence within the court's instructions and the discipline's limits.

1. Problem Statement

Forensic document examination cases create a distinctive jury risk because the evidence appears familiar. Jurors may assume that handwriting comparison, signature evaluation, or visual inspection of a disputed document requires little more than careful observation. In everyday life, people compare signatures, recognize handwriting, review forms, and make informal judgments about documents. In court, however, those everyday activities are not equivalent to a[1] *Batson v. Kentucky*, 476 U.S. 79 (1986). This case established that a prosecutor's use of peremptory challenges to exclude jurors based solely on their race violates the Equal Protection

Batson v. Kentucky, 476 U.S. 79 (1986). This case established that a prosecutor's use of peremptory challenges to exclude jurors based solely on their race violates the Equal Protection Clause of the Fourteenth Amendment. The "Batson challenge" allows defendants to contest the exclusion of potential jurors on this basis during voir dire.

[1] *Batson v. Kentucky*, 476 U.S. 79 (1986). This case established that a prosecutor's use of peremptory challenges to exclude jurors based solely on their race violates the Equal Protection Clause of the Fourteenth Amendment. The "Batson challenge" allows defendants to contest the exclusion of potential jurors on this basis during voir dire.

Clause of the Fourteenth Amendment. The "Batson challenge" allows defendants to contest the exclusion of potential jurors on this basis during voir dire. Forensic document examination requires defined questions, appropriate standards, systematic comparison, awareness of natural variation[2], recognition of limitations, and disciplined reporting of conclusions.

The risk is heightened when a juror has related but non-forensic experience. A notary, bank employee, fraud reviewer, auditor, graphic designer, law-enforcement employee, printer, archivist, or hobbyist may have handled documents professionally without having been trained in the forensic document examination methods[3]. Such a juror may be entirely sincere and still become a source of distortion in deliberations. If the juror presents private experience as superior to, or more practical than, expert testimony, other jurors may defer to that confidence. The resulting deliberation may not reflect the court's instructions, the expert record, or the stated limits of the discipline.

This paper treats the problem as one of courtroom interpretation. Jurors do not receive evidence passively. They interpret testimony, evaluate authority, create narratives, and negotiate meaning with one another. In document cases, that interpretive process can be skewed when a juror supplies an alternative method or language similar to: "I used to verify signatures," "I can tell when handwriting is fake," "handwriting reveals character," or "this is just common sense." These statements are powerful because they are linguistically simple and socially confident, even when they are forensically unsupported.

2. Forensic Document Examination Is Not Graphology

A threshold distinction is necessary. Forensic document examination addresses questions such as authenticity, authorship, alterations, additions, deletions, sequencing, document production, and the relationship between questioned and known materials. Its purpose is not to infer personality, honesty, morality, temperament, or future behavior from handwriting. Modern forensic-document standards define the field by examination, comparison, and analysis of documents, not by personality interpretation. Graphology, by contrast, claims to infer personality traits from handwriting. Whatever cultural or historical interest graphology may have, it is not the same discipline as forensic document examination. In the courtroom, the distinction matters because graphological thinking can introduce character reasoning into a question of authenticity. A juror who believes that handwriting reveals honesty may treat a document dispute as a moral reading of the writer rather than an evidentiary question about production, authorship, or alteration.

The practical implication for voir dire is direct. Counsel should not merely ask whether jurors have experience with handwriting. Counsel should explore whether jurors believe handwriting reveals personality or character; whether they have read books or taken informal courses in handwriting analysis; and whether they can set aside those beliefs if instructed that the evidence is limited to forensic questions. The aim is not to embarrass a juror who holds such beliefs, but to determine whether those beliefs would interfere with the court's evidentiary boundaries.

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[2] Huber, R. A., & Headrick, A. M. (1999). Handwriting Identification: Facts and Fundamentals (p. 365). CRC Press. Quoted Text: "Natural variation: The imprecision with which the habits of the writer are executed on repeated occasions (Huber), or the divergence of one execution from another in an element of an individual's writing that occurs invariably in the graph but may also occur in the choice of the allograph (Huber), or normal or usual deviations found between repeated specimens of any individual's handwriting or in the product of any typewriter or other record making machine (Hilton)."

[3] Scientific Working Group for Forensic Document Examination (SWGDOC). (2013). Standard for Examination of Handwritten Items. ASTM E2290-07. ASTM International.

3. Core Concepts Jurors Commonly Misunderstand

Several document-examination concepts are especially vulnerable to lay misunderstanding. The first is natural variation. A genuine writer does not reproduce a signature or letterform mechanically (identically) each time. Speed, writing position, health, age, writing surface, instrument, purpose, and context may all influence the resultant writing. A juror who expects exact repetition may mistake natural variation for forgery. Conversely, a juror who has heard that signatures vary may excuse differences that are too fundamental to be explained by variation alone.

A second misunderstood concept is the difference between simulation, disguise, and genuine variation. A simulated writing may show pictorial resemblance to a model while lacking the writer's natural rhythm, fluency, stroke sequence, or subtle habits. Disguised writing may contain deliberate alterations but still reveal the underlying writer’s unconscious habits. A third concept is the limitation of simple visual inspection. Lay "eyeballing" may focus on the most obvious forms (often just upper case and initial forms) while missing line quality, pen lifts, connecting strokes, proportions, spacing, and other more discriminating features.

A fourth concept is that of standards. The strength of a handwriting comparison depends partly on whether the known writings are genuine, sufficient, comparable, and reasonably contemporaneous. A juror who ignores the quality of the standards may overvalue either similarities or differences. A fifth concept is the meaning of expert conclusions. Forensic opinions are best expressed on a scale or with qualified language. A juror who expects absolute certainty may misinterpret cautious expert language as weakness, while overvaluing confident lay assertions.

4. Literature Review: Social Influence, Narrative Formation, and Expert Evidence

4.1 Informational Influence and Conformity

Classic research on conformity demonstrates that group pressure can affect individual judgment even when the task appears perceptual and straightforward (Asch, 1951). The relevance to document cases is not that jurors will behave exactly as laboratory subjects behaved, but that group settings can reward confidence and suppress hesitation. When expert evidence is technical, probabilistic, or visually complex, jurors may look for a simplifying authority inside the deliberation room.

A juror with adjacent experience can fill that role. Statements such as "I’ve done this at work" or "I know what forged signatures look like" may give other jurors a socially (and cognitively) convenient shortcut. Instead of working through the expert's reasoning, limitations, and exhibits, the group may defer to the person who sounds most certain. The problem is especially serious when that confidence is paired with a method the parties never had an opportunity to test through testimony, cross-examination, or judicial instruction.

4.2 Minority Influence and Dissent

Research on minority influence suggests that dissent can improve group reasoning by requiring members to reconsider assumptions and evaluate alternatives (Nemeth, 1986). In a jury, however, dissent may be difficult to maintain when one juror dominates the discussion. A juror who speaks early, teaches others, or frames disagreement as ignorance can reduce the quality of deliberation by making other jurors less willing to ask questions or express uncertainty.

The concern is not leadership itself. Some jurors help organize discussion fairly. The concern is dominance combined with private expertise or inflexible certainty. In that situation, the deliberation may become less a group evaluation of admitted evidence and more an exercise in accepting or resisting one juror's authority.

4.3 Shared Information Bias and Private Knowledge

Stasser and Titus (1985) found that group discussions tend to emphasize information shared by members while underusing unique information held by individuals. In jury deliberations, the problem can reverse in a dangerous way when one juror's unique information is treated as privileged expertise. A juror's workplace experience, personal method, or outside reading may become an untested evidentiary supplement.

Forensic document cases are vulnerable because the physical or visual nature of the evidence invites comparison. Jurors may be tempted to trace, overlay, measure, magnify, copy, or conduct internet searches. Even when done innocently, these actions can introduce procedures never presented by the expert and never limited by the court.

4.4 Narrative Evaluation and the Story Model

Pennington and Hastie's story model describes jurors as constructing narratives to organize evidence and evaluate verdict options (Pennington & Hastie, 1992). Documentary evidence often appears concrete and therefore may become a narrative anchor. A disputed signature, altered receipt, or anonymous note can quickly become the visual centerpiece around which jurors build a story about deception, mistake, carelessness, or credibility.

A juror expert can become a narrative translator. The juror may reduce a complex expert dispute into an apparently simple story: "different-looking means forged," "similar-looking means genuine," "experts overcomplicate things," or "handwriting reveals whether someone is honest." These narratives are persuasive because they are easy to remember. They are also dangerous because they may bypass the forensic method.

5. The Juror Expert and Jury-of-One Model

For purposes of this framework, a "juror expert" is a juror who claims or implies expertise related or adjacent to forensic document examination and uses that experience to interpret evidence beyond the admitted court record or to guide other jurors through private methods. A "jury of one" is a deliberation dynamic in which one juror's authority, confidence, or personality disproportionately controls the verdict, thereby weakening the group's independent evaluation of the evidence.

The model is based on six mechanisms. First, informational uncertainty makes jurors receptive to confident simplification. Second, social hierarchy cues (occupation, age, education, managerial experience, or verbal fluency) may cause some jurors to receive automatic deference. Third, persuasive confidence can operate as a substitute for demonstrated reliability. Fourth, narrative control allows a juror to define what the case is "really about." Fifth, dissent suppression reduces the corrective value of group deliberation. Sixth, access to documents and images (inside the jury room) creates opportunities for private experimentation.

These mechanisms do not prove that any particular juror will behave improperly. Nor do they mean that jurors with document-related experience should automatically be excluded. Some experienced jurors may be careful, humble, and rule-following. The risk increases when adjacent experience is combined with overconfidence, graphology beliefs, generalized distrust of authorities, the courts, or judicial processes, stubborn refusal to follow instructions, or a tendency to dominate others.

6. Voir Dire Framework

The voir dire framework proposed here has three purposes: to identify jurors whose private experience may become an alternative evidence source; to assess jurors' willingness to follow the court's instructions

and expert-boundary limits; and to recognize deliberation styles that may either protect or threaten the group's ability to reason. The questions should be neutral, open-ended where possible, and designed to elicit narratives rather than merely yes-or-no commitments.

The first area to examine is adjacent document experience. Counsel may ask whether a juror has verified signatures, notarized documents, checked forms for accuracy, reviewed fraud claims, worked with printing or graphic design, compared handwriting, or used document-authentication tools. Follow-up questions should focus on method and transfer: What did that work involve? Were written standards used? Could the juror set aside workplace practices and rely only on the court's evidence and instructions?

The second area is graphology and character inference. Counsel may ask whether the juror believes handwriting reveals personality, honesty, emotional state, or moral character. Follow-up questions should ask whether the juror can accept an instruction that handwriting evidence is limited to authenticity, authorship, or document production issues and not personality assessment.

The third area is deliberation style. Counsel may ask how the juror behaves in group decisions: whether the juror tends to speak first, teach others, listen before deciding, change views when given reasons, or become frustrated when others disagree. This inquiry should not punish leadership. It should identify whether the juror can participate in deliberation without substituting personal authority for the evidence.

The fourth area is institutional trust and expert evaluation. Jurors should be invited to explain how they evaluate expert testimony. Useful jurors are not those who blindly trust experts, but those who can assess reasons, methods, limitations, and supporting evidence. High-risk responses include categorical distrust of experts, belief that all paid experts are dishonest (or "bought"), or insistence that common sense alone is sufficient for technical questions.

The fifth area is outside research and experimentation. Counsel should ask whether jurors can refrain from using internet searches, artificial-intelligence tools, magnification apps, handwriting-analysis websites, coworker advice, or private experiments. In document cases, this instruction should be specific rather than generic because jurors may not recognize tracing, overlaying, measuring, or copying as prohibited experiments unless the boundary is made very clear.

7. Red Flags and Green Flags

Red flags include adjacent document experience combined with reluctance to set aside personal methods; graphology beliefs that link handwriting to character or honesty; overconfidence in pattern recognition; fixed suspicion that "everything can be faked"; categorical distrust of experts or courts; and statements suggesting refusal to follow limiting instructions. No single factor should be treated mechanically. The central question is whether the juror can fairly evaluate the admitted evidence under the court's instructions.

Green flags include intellectual humility, attention to detail without identity investment, balanced skepticism, comfort with expert conclusions that include limitations, and willingness to deliberate collaboratively. A juror who says, "I have seen signatures at work, but I understand this is different and I would follow the judge's instructions," may present less risk than a juror with no formal experience who says, "I can always spot a fake."

The highest-risk combination is not experience alone, but experience plus dominance or inflexibility. A second high-risk combination is belief in graphology plus moralizing suspicion. A third is high curiosity plus weak respect for anti-research rules. These combinations should guide follow-up questioning and, where

legally appropriate, challenges for cause or peremptory decisions based on expressed attitudes and behaviors rather than protected characteristics.

8. Legal and Ethical Limits

This framework must operate within the law governing impartial juries, attorney voir dire, expert admissibility, and nondiscriminatory jury selection. Federal Rule of Evidence 702 requires expert testimony to rest on sufficient facts or data, reliable principles and methods, and reliable application to the facts of the case. In document cases, this means that expert testimony should be presented with attention to standards, methodology, comparison materials, limitations, and appropriate opinion language.

Voir dire is not an invitation to select jurors based on protected status or demographic assumptions. Batson and related authority prohibit discriminatory use of peremptory challenges.

The framework proposed here is therefore limited to case-relevant attitudes, experiences, stated beliefs, and observable behaviors. It should not be used as a demographic proxy system or as a form of juror profiling.

The framework also respects the difference between skepticism and bias. A juror may question expert testimony and still be fair. A juror may have prior experience with fraud and still follow instructions. A juror may be detail-oriented and still avoid private experimentation. The legally important issue is whether the juror can decide the case on the evidence, follow the court's instructions, and avoid introducing outside methods or information into deliberations.

9. AI, Outside Research, and New Deliberation Risks

Artificial-intelligence tools create a new version of an old problem: jurors may seek outside assistance to interpret evidence. In document cases, a juror might ask an AI system whether a signature looks forged, whether handwriting reveals personality, how to detect altered documents, or what certain forensic terms mean. The danger is not only that the answer may be inaccurate. The deeper danger is that the juror introduces an external, untested interpretive authority into the deliberation process.

AI tools can also make private experimentation feel less like misconduct. A juror may believe that asking a general question is merely educational, even if the answer supplies a method for evaluating the specific evidence. For this reason, instructions should identify AI tools, search engines, online handwriting-analysis sources, smartphone magnification tools, and informal consultation with others as prohibited forms of outside research when they are used to evaluate the case.

Voir dire can address this risk without becoming alarmist. Counsel may ask whether jurors regularly use

AI tools for explanations, research, or problem-solving; whether they can refrain from using such tools during trial and deliberation; and whether they understand that even a seemingly general search may affect their interpretation of the evidence. The goal is to prevent private authority from replacing the adversarial testing of evidence.

10. Trial Presentation Guardrails

Voir dire alone cannot solve the juror-expert problem. Trial presentation should also reduce the need and opportunity for private reconstruction. Expert testimony should explain the question presented, the materials reviewed, the comparison method, the role of standards, the observed similarities and differences, the limitations, and the basis for the opinion. Visual exhibits should thoroughly teach the jury

how to understand the expert's reasoning without leaving vagaries that could invite jurors to conduct their own unsupervised tests.

Pre-instructions and repeated reminders can be especially important. Jurors should be told not only that they may not conduct outside research, but also that they may not perform private experiments with the documents. In a document case, prohibited conduct should be concrete: tracing signatures, overlaying images, measuring letters, using magnification apps, asking coworkers, consulting websites, or prompting

AI systems. Specificity improves comprehension.

The examiner's language should also be disciplined. Overclaiming invites resistance and may make a juror expert more persuasive. Underexplaining invites jurors to fill gaps with private methods. The strongest presentation is neither overstated nor vague. It shows what was examined, what was compared, what was significant, what was limited, and why the conclusion follows.

11. Limitations

This paper proposes a practice-based framework, not an empirically validated prediction model. Jury behavior varies with case facts, judge supervision, local voir dire practice, group composition, the quality of expert testimony, and the clarity of instructions. The framework should therefore be used cautiously as a way to organize inquiry, not as a promise of outcome.

The paper also does not endorse psychological diagnosis of jurors. It does not claim that particular occupations, hobbies, or personality styles automatically produce unfair jurors. A juror with banking or notary experience may be careful and fair. A juror without any such background may still be overconfident. The proper focus is the juror's stated ability to follow instructions, avoid outside research, respect evidentiary boundaries, and deliberate fairly.

Finally, the paper recognizes that juror expertise can sometimes be helpful when it is bounded by humility and adherence to instructions. The goal is not to remove every juror with experience. The goal is to prevent private expertise from becoming untested evidence and to protect the deliberative process from domination by unsupported authority.

12. Conclusion

Forensic document examination evidence presents a distinct challenge because it appears accessible while remaining methodologically complex. Jurors may believe that handwriting and document comparison are matters of ordinary perception, even when the actual forensic question requires specialized training, suitable standards, systematic comparison, and careful limitation of conclusions. That gap between apparent simplicity and technical complexity creates space for the juror expert.

The juror expert becomes dangerous when private experience, graphology beliefs, overconfidence, or outside research are combined with persuasive dominance. In such cases, deliberation may shift away from admitted evidence and toward an untested private method. The resulting "jury of one" dynamic undermines the value of group deliberation and the court's control over the evidence.

A disciplined voir dire framework can reduce this risk. Counsel should explore adjacent experience, graphology beliefs, comfort with expert limitations, rule-following, deliberation style, and willingness to avoid outside research, including AI-assisted research. The inquiry must remain lawful and ethical, focused on case-relevant attitudes and behaviors rather than demographic assumptions. When paired with clear instructions and disciplined expert presentation, this approach can help jurors evaluate forensic document evidence more fairly, more carefully, and within the boundaries of the legal process.

Appendix: Focused Voir Dire Examples

The following abbreviated examples are included only to illustrate how the framework may be translated into neutral, case-relevant questions. They are not intended as a script for every case.

Document-Experience Module

• Tell us about any work, training, or regular responsibility you have had involving signatures, handwriting, notarization, fraud review, document accuracy, printing, graphic design, or document authentication.
• What steps did you use in that work, and were those steps based on written standards, employer practice, or personal judgment?
• Could you set aside those workplace methods and evaluate this case only on the evidence and instructions provided in court?

Graphology and Character-Inference Module

• Do you believe handwriting can reveal personality, honesty, morality, or character?
• Have you ever read books, taken courses, or used online materials that claim handwriting reveals character traits?
• If the court instructs you that handwriting evidence is limited to authenticity, authorship, or document production, could you follow that instruction?

Deliberation-Style Module

• When you are part of a group decision, do you usually speak first, listen first, organize the discussion, or wait to hear from others?
• How do you respond when someone in a group strongly disagrees with you?
• If another juror claimed special knowledge about handwriting or documents, how would you evaluate that claim?

Outside-Research Module

• During trial or deliberation, could you refrain from searching online, asking AI tools, using smartphone apps, consulting coworkers, or performing private experiments with the documents?
• Would you understand tracing, overlaying, measuring, copying, or using magnification apps as forms of private experimentation if the court prohibited them?
• If another juror proposed using outside tools or personal methods, would you be able to follow the court's instruction and decline?

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Through Paradigm, he helped modernize the way academic institutions issue and manage credentials, expanding from traditional printed diplomas and certificates into secure digital credentials, automated transcript services, and apostille processing. Through Integrated Government Solutions, he has focused on improving public-sector efficiency by developing secure, scalable digital platforms for credentialing, records management, and government transactions.

Across more than three decades in business, he has participated in, observed, or sat through well over one hundred depositions and related legal proceedings, giving him unusual practical exposure to how evidence, testimony, and decision-making function in contested matters. In his current COO-Emeritus chapter, he has turned that experience toward the study of forensic document examination, which he expects to complete in 2026. He also has extensive training in interviewing and interrogation, forensic statement analysis, and deception detection, and is set to begin a master's program in forensic linguistics in 2027. His work reflects a strong interest in jury strategy, human behavior, and the practical courtroom use of forensic evidence.

The Document Examination Response Case (DERC): Your Essential Toolkit for On-Site Examinations
by William Losefsky

Document examiners often find themselves traveling to off-site locations such as attorney offices and banks, where strict policies may prohibit removing original documents from the premises. In these scenarios, being equipped with the right tools is essential to perform thorough and accurate examinations while respecting the document owner's requirements. To address this need, a well-prepared Document Examination Response Case (DERC) is indispensable.

A DERC is a portable, secure, and organized kit containing all the tools necessary for on-site document analysis. A heavy-duty locking aluminum case, available for under $50, provides a durable, secure, and lightweight option to protect your sensitive and often expensive equipment during transit. I discovered this concepts when conducting accident reconstruction events and called it my ARC Accident reconstruction case. The need for a carry case containing all the essential tools became one of my Six Sigma thinking processes for efficiency.

Key Components of a DERC

1. Document Handling Tools

- **Gloves**: Latex or nitrile gloves to prevent contamination from oils or dirt.
- **Clean, Smooth Surface Mat**: Provides a safe workspace to lay out documents without risking damage.

2. Examination Equipment

- **Portable Light Sources**:
  - **Oblique Lighting Tool**: Highlights indentations and surface irregularities.
  - **UV Light**: Reveals fluorescence in inks, paper, or security features.
  - **IR Light (Infrared)**: Assists in evaluating ink properties and differentiating between similar inks.
- **Magnification Tools**:
  - **Handheld Magnifying Glass** (10x or higher): For detailed inspection.
  - **Portable Digital Microscope**: USB or battery-powered for high-resolution analysis.
- **Ruler/Measuring Tools**:
  - Transparent rulers with both metric and imperial units.
  - Protractor or angle gauges to evaluate alignment and layout.

3. Imaging Equipment

- **High-Resolution Digital Camera or Smartphone with Tripod**: Captures detailed images of documents.
- **Flatbed Portable Scanner**: Useful for creating high-quality scans of allowed portions of the document.
- **Lighting Tents or Diffusers**: Prevent glare and enhance clarity when photographing.

4. Analysis Tools

- **Micrometers/Calipers**: Measure paper thickness with precision.
- **Portable Spectrometer (if available)**: Analyzes ink and pigment properties.
- **Tracing Paper or Mylar Sheets**: Enables overlay analysis of handwriting or document layout
- without marking the original.

5. Reference Materials and Notes

- **Reference Books or Charts**:
  - Guides on fonts, typewriter styles, or handwriting exemplars.
  - Security feature references for specific document types (e.g., currency, IDs, checks).
- **Notebook/Clipboard**: For detailed note-taking and documentation.
- **Voice Recorder**: If permitted, to record observations on-site. You can use a transcription serve to download your audio notes in to a written report draft for extra efficiency.

6. Administrative Items

- **Consent Forms/Chain of Custody Logs**: Essential for documenting document handling and permissions.
- **Portable Printer**: Enables immediate creation of report summaries if required.

7. Cleaning and Safety Supplies

- **Compressed Air**: Removes dust or debris gently.
- **Anti-Static Brush**: Cleans delicate surfaces without damage.
- **Lens Cleaning Kit**: Keeps your camera and magnification tools clear and functional.

Conclusion

Equipping yourself with a fully stocked DERC ensures that you are always prepared for on-site examinations. The tools listed above allow you to conduct thorough and professional analyses while safeguarding the integrity of the original documents. Whether you're working in a high-security bank vault or a private attorney's office, your DERC is your portable laboratory, enabling you to deliver precise and reliable results in any environment. Put a DERC on your list and enhance your efficiency in the field!

William Losefsky
Forensic Document Examiner

William (Bill) Losefsky is a Certified Investigator, Certified Master Investigator, Certified Anti-Terrorism Specialist, and a Certified Death Investigator. He is also a document examiner and has recently joined IADE

INK

Ink is commonly described as a liquid or semi-liquid material, though chemists define it as a colloidal system of pigment particles dispersed in a solvent (Chem. Br., February, p. 28). Early black inks, dating to around 2500 BC, were made from carbon, lampblack, natural gum, or egg albumen. Modern inks contain pigments plus vehicles, wetting agents, biocides, and thickeners to control flow, stability, and application (Chemistry World, March, 2003).

Printing inks make up over 90 percent of all ink produced. Pigments—insoluble colorants—are used in most writing inks, while dyes are soluble and appear in many red and blue inks. Permanent inks often contain iron sulfate, gallic and tannic acids, and dyes. Ballpoint inks are pasty and contain 40–50 percent dye.

Concerns about heavy-metal toxicity have led to replacing inorganic pigments such as chrome yellow and cadmium red with organic pigments that offer better lightfastness. Carbon black has replaced spinel black and is widely used in the ink industry.

Ink chemistry has evolved with writing and printing technologies. Modern pens use dyes or pigments in water or organic solvents. Pigment dispersion is a key focus: inorganic pigments disperse easily, while organic pigments require specialized milling. Surfactants and polymers stabilize pigment particles, and particle size influences color and lightfastness.

Environmental regulations have reduced the use of volatile organic solvents, pushing ink chemists toward water-based systems, which present new formulation challenges.

Viscosity is essential for printing performance. Polymeric thickeners create the needed consistency, and drying depends on absorption or solvent evaporation. The introduction of dyes such as indigo in the nineteenth century expanded color ranges, especially with fountain pens. Ballpoint pens later introduced quick-drying paste inks, now the most common writing medium. Fiber-tipped, rollerball, and gel pens followed, each using different ink systems. Gel inks, which use pigment-based viscous formulations, are increasingly common and more difficult to analyze using thin-layer chromatography (Advances in the Forensic and Dating of Writing Ink, p. 33).

Non-pen inks used in printing or typewriting show distinctive microscopic features. Typewriter impressions differ from carbon ribbon impressions by their duller edges, and dot-matrix printing produces sharp, dense dot patterns (Preliminary Methods of Ink Analysis, p. 53).

Forensic ink examination begins with nondestructive visual methods. Microscopy (20–50×) can reveal the glossy, pasty appearance of ballpoint ink, while water-based inks appear more even and lack gloss (Scientific Examination of Documents: Methods and Techniques by David Ellen p. 125). Crayons, pencils, carbon paper, and erasable ballpoint inks also show characteristic microscopic features.

Inkjet printing relies on electronically controlled ink droplets, and inkjet inks undergo extensive quality-control testing for print quality, lightfastness, bleeding, gloss, and drying (Chemistry World, March,

2002).

Color assessment is an early comparison step. Ink dyes and pigments absorb specific wavelengths of light, and mixtures create varied absorption spectra. Under magnification, black ballpoint inks may appear similar, though some show subtle hues such as purple (Preliminary Methods of Ink Analysis, p. 57).

Color and absorption spectra can be examined using colored light, dichroic filters, or micro spectrophotometry. Many inks absorb ultraviolet and infrared radiation, requiring detection methods such as infrared photography, fluorescence, and luminescence.

Erasures may be mechanical, chemical, or solvent-based (Scientific Examination of Documents: Methods and Techniques, p. 136). Detection often relies on changes in paper luminescence under high-intensity light sources such as lasers.

When nondestructive methods cannot differentiate inks, destructive techniques such as chromatography, thin-layer chromatography, high-performance liquid chromatography, or chemical testing may be used. Research continues in laboratories and academic institutions.

In the United States, ink formulation records, dating methods, and cooperation with manufacturers assist forensic examiners in distinguishing inks. Special chemical additives can be detected through sensitive analytical procedures. Despite digital communication, ink remains a complex and essential material with lasting forensic importance.

Michael Babin

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Photocopies VS Originals

Document examiners prefer to work with original documents whenever they are comparing handwriting for authenticity. The main advantage of working with originals is that document examiners can be certain that the documents have not been altered since photocopies can mask the alterations. In fact, it is frequently impossible to identify altered photocopies. Documents that are scanned into a computer and altered electronically are impossible to detect as altered documents.

However, originals are not always available for comparison purposes. If document examiners could only work from original documents, perpetrators could simply destroy their original documents and present fraudulent copies. However, the court accepts best evidence and that includes photocopies. Modern photocopiers produce clear copies that can be useful for comparison purposes.

There has been a lack of empirical evidence regarding document examiners' ability to successfully compare photocopies to make an identification of handwriting. Dr. Bryan Found conducted a study in to determine if document examiners could give accurate opinions on copies. The study compared 260 questions signatures by six document examiners at the Document Section of the New Zealand Police Department.

The document examiners were originally supplied with second generation photocopies of the 260 questioned signatures which they compared with 21 normal signatures. Ten months later they were given the 260 original signatures for comparison. Opinions included correct identification, misidentification and inconclusive.

The breakdown of the questioned documents includes 50 genuine signatures, 168 simulations, 21 disguised signatures and 21 auto-simulations. The document examiners worked in pairs and altogether 780 opinions were expressed.

All the document examiners were correct 100% of the time when opining on original genuine signatures. There was a 2% error in identifying genuine photocopied signatures. However, error rate based on the number of opinions given was negligible There were 59 disguised signatures identified from the photocopies and 61 disguised signatures identified on the original documents. The only flaw in the comparison of the documents is that the document examiners gave inconclusives on some of the disguised and all of the simulated signatures. It is always more difficult to distinguish between disguise and simulation. All simulated signatures were given inconclusives by all the examiners.

This research clearly reveals that document examiners are able to give opinions on complex signatures with the same accuracy whether examining originals or photocopies. More research needs to be conducted as this was only one small study. Additional studies need to be conducted.

It is this author's observation that accurate opinions are given on photocopies and that opinions rarely change when presented with original documents. However, since some alterations cannot be detected on photocopies, ideally, document examiners should review original documents whenever possible.

Some cases can only be solved by viewing the original document.

Occasionally someone tries to pass off a machine-generated signature as an original. It is difficult to distinguish originals versus photocopies when they have been signed in black ink. It may require strong magnification to identify original ink from photocopies. All documents should be examined under magnification to determine their origin. On one occasion, I flew to Trinidad to determine if a signature was an original or a copy, and on another occasion, I few to Jamaica to photograph two different cases in the same courthouse.

Documents have been cut to hide information. One case involved promissory notes that were cut across the bottom of each page. There was an artifact on one of the cut pages. Since the perpetrator used forms to create fraudulent documents, copies of the forms were obtained from a stationery store. The artifact contained the date that the forms were updated. This date occurred after the date on the documents, revealing that the documents had been created fraudulently and cut to hide the updates. Only by looking at the originals were we able to prove that the documents were altered and therefore fraudulent.

A common scenario involves signatures that have been cut and pasted from another document. This is a frequent occurrence. However, when a cut and paste signature is attached to a fraudulent document by hand, it is possible to identify the alterations by measuring the horizontal and vertical alignment. They will probably be misaligned. There may be a shadow line around the signature block that the perpetrator may not notice. However, if he sees it, he will recopy the document. Look for trash marks, the marks left on a photocopy based upon dirt on the glass or a nick in the drum. The trash marks will cluster because the copy often has to be recopied to hide the shadow marks left by the pasted signature.

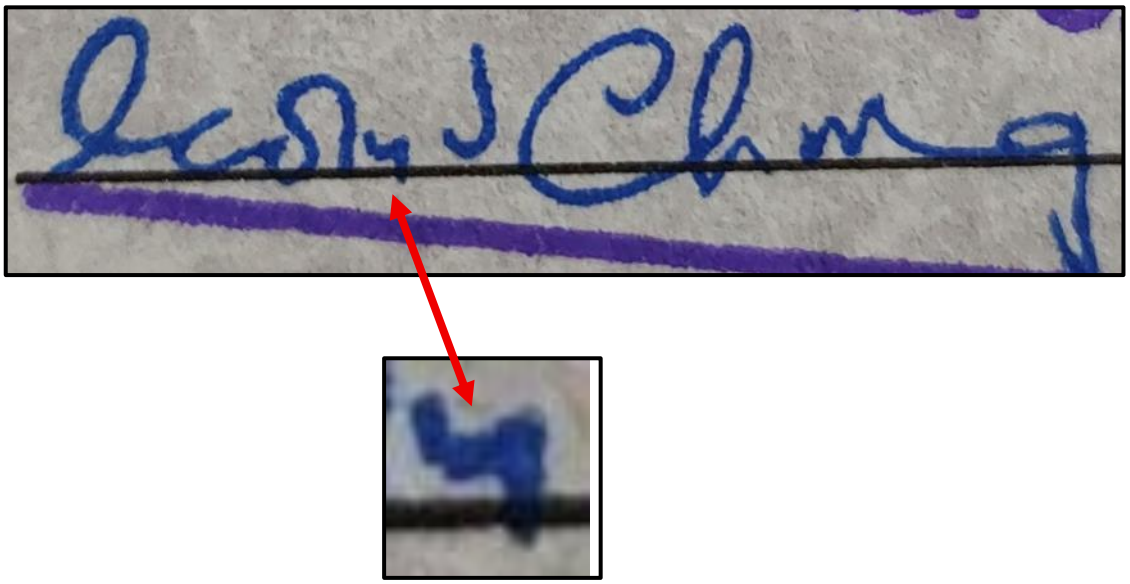
Sometimes the perpetrator cuts and pastes electronically and this is harder to identify because there will not be misalignment or shadow lines. There may be a difference in the generation of the copy. The signature block may be a different generation than the rest of the document.

In some cases, it may be necessary to go to the location of an original document. Equipment must be portable. It is well worth your time to look at original documents when they are available. One case reviewed had the signature of a witness attached with tape to the bottom of the Last Will and Testament. There was a line on the photocopy

but it wasn't possible to prove that the document had been altered until the original was reviewed.

Original documents should be photographed and scanned into the computer. Photograph signatures independently for better resolution. The photographs can then be used to create exhibits. At least make a copy of original documents for your file before returning them to the client. And always return originals in a secure manner such as Federal Express or United Parcel Service when mailing documents.

Here is one of the cases I examined in Jamaica and which I subsequently testified. The letter "y" is constructed of three separate strokes that can only be seen on the original or on a photograph of the original. The separate strokes cannot be seen on a photocopy.



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