Blind Verification: Does it Compromise the Conformance of ACE-V Methodology to the Scientific Method?

By Alexander Mankevich
Maryland State Police

ABSTRACT: This paper will address the call for blind verifications as part of the latent print comparison process. This paper will explore how the practice of blind verifications can actually compromise critical aspects of the scientific method. Specifically, this paper will detail how important components of ACE-V methodology such as the transparency of the data, the proposal of the null hypothesis, the attempts to falsify the findings, 'red flag' tolerances, peer review and the verification phase are all seriously compromised or negated when performing a blind verification.

INTRODUCTION

Several authors have championed ACE-V has being analogous to, or derived from, the scientific method. [1], [2],[3],[4] The importance of associating ACE-V to the scientific method is that the scientific method is universally accepted as a sound, reliable and valid guide to the research of numerous subjects in the natural and physical worlds. Courts have now taken judicial notice of how well latent print examinations comply with the scientific method in their determination to accept latent print testimony as valid and reliable.[5]

A hallmark of the scientific method is the use of hypothesis testing, which permits studies and research to be conducted with a clear understanding of the fundamentals that influence the outcome of scientific experimentations. Scientific research is not carried out on a "let's see what we get" basis. Rather, sound reasoning and a thorough comprehension of the underlying principles and fundamentals are first assembled prior to any experimentation or data collecting. In this manner, the collected data and the conclusions which they support can be judged as proper, valid and reliable.

A cornerstone of scientific research is the application of rigorous, empirical testing through experimentation in order to determine if the hypothesis can be falsified. Scientists appreciate the distinction between reproducing the experimental data as opposed to reproducing the experimental conclusion. The general view in the scientific community is that if the data cannot be reproduced with continued experimentation, then the data is discarded, and any conclusion drawn from that data is considered unreliable.

Champions and critics of ACE-V methodology have both promoted blind verification [6], [7], [8] as a means to reproduce conclusions in their effort to avoid what they consider to constitute 'confirmation bias' [9]. No one will argue that their intentions are well-meaning. It is their belief that conclusions which match using a blind verification approach either represent the highest degree of independent analysis, or, represent a sure means to reduce the risk for errors. What their good intentions fail to consider is that good scientific practices embody the validation of the experimental conditions, experimental data and experimental observations, not a mere reproduction of the conclusions. There is a word that defines the condition under which conclusions are independently repeated without access to or knowledge of the original data, observations and interpretations. That word is 'happenstance'.

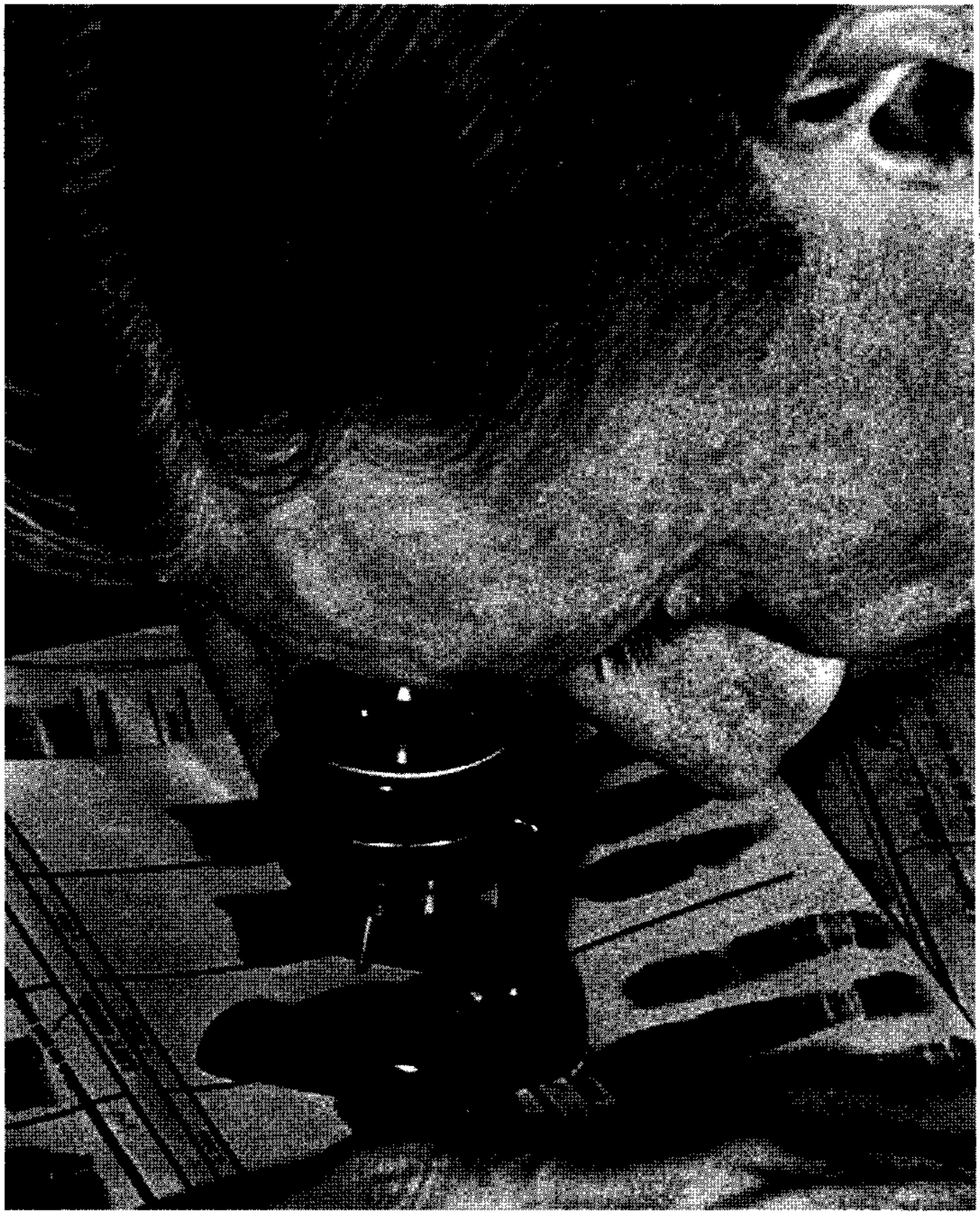
THE PRIMACY OF INITIAL DATA AND ITS RELATIONSHIP TO SUBSEQUENT DATA

When astronomers discover a new object in orbit around the sun, they simply don't say to their colleagues "go find it so that you may verify this discovery". Instead, the astronomers make their initial observational data available to verifying astronomers who use the initial data to support or to debunk the discovery as valid. The objective of the verification efforts is to critically assess how well the initial astronomers had collected their data and whether they had fully described the new object's characteristics and orbit. The initial astronomers' data should complement their descriptions and interpretations. Should additional star-gazing reveal its orbit as different, or its characteristics as disparate, then these discrepancies act to diminish the initial claim of discovery.

High value is placed upon initial data since its accuracy and integrity will serve as the benchmark to test the quality of any additional data collection. Subsequent data is always interpreted in context with the initial data. It is the correlation in accuracy and integrity of the initial data to the subsequent data that provides the critical evaluation of whether the hypothesis is accepted or rejected. Both sets of data become meaningful only when they can be empirically assessed as either anomalous or complementary to each other.

The availability of the actual initial data and its documentation are essential to other qualified scientists in order for them to validate the initial conclusion for its accuracy. This same data and its documentation are also crucial to permit scrutiny by other qualified scientists in order for them to attempt to refute or falsify the conclusion tentatively established by the initial scientist.

Friction ridge analysis is distinguishing in that the whole of its data is used for both validation and hypothesis testing. The image of the friction ridge detail with its depictions of the shape, location, and spatial relationships is one class of data. The narrative descriptions, interpretations, diagrams, enlargements and case note documentations constitute another class of data.



The original image and its accompanying annotations are used by the verifying examiner in his/her attempt to falsify the tentative conclusion. It is essential that the procedures, standards and controls of the comparison and evaluation phases be sufficiently designed, sufficiently comprehensive and sufficiently commensurate in order to permit the hypothesis testing. Case notes do not substitute for the data incorporated into the impression's image and annotations when attempting to refute or falsify the tentative conclusion.

The interpretations, diagrams and narrative descriptions of the comparison and evaluation phases are used by the peer reviewer to validate the accuracy of the tentative conclusions. The impression's image and its accompanying annotations do not substitute for the data incorporated into case notes when validating the accuracy of the tentative conclusion, and validating whether that data was collected in adherence to the fundamentals, standards and controls that govern the science's methodology.

The influence of any bias is addressed by the scientific method, which promotes that the methodological design of any experimentation be formulated in order to cancel out bias. This action is accomplished through the critical assessments performed by verifying examiner on the initial examiner's adherence to the underlying canons and principles of the methodology. A rigorously-applied attempt by the verifying examiner to *falsify the hypothesis* as explored by the initial examiner is the critical assessment performed in order to guard against confirmation or contextual bias.

DISCUSSION OF VARIOUS TERMS USED IN CASEWORK REVIEW

Triplett and Cooney [10] discussed the potential problems of terminology when terms are generally understood in their lay sense, but become ambiguous when applied in their technical sense. This author has taken casework review terms which are defined by the Committee on National Statistics [11] and attempted to render their definitions less technically ambiguous when applied to casework utilizing ACE-V methodology.

REANALYSIS: a study of the same impressions as investigated by the initial examiner in which the data collected by the initial examiner may or may not be used. The goal of reanalysis is an effort to assure any critic that the initial examiner had not engaged in any unethical or grievous scientific practice such as falsification of data, ad hoc dismissal of conflicting data and use of flawed equipment. This method of casework review is not a critical appraisal of the quality and credibility of the initial data, nor does it critically address the merits and integrity of the initial examiner's hypothesis-testing design. A true reanalysis suffers from its ambiguity concerning its procedures for the sharing of data, for addressing alternative theories, and for the assessment of competing or complementary conclusions.

REPLICATION: a repeat of the initial examiner's work in its entirety, whereby new data is independently collected. The emphasis of a replication is to assure the validity and credibility of the data through its repeated re-collection. This method of casework review de-emphasizes the design and model of the initial examiner's hypothesis testing regarding how the data is to be collected and how it is to be interpreted. Lacking in a true replication is a forum by which the verifying examiner can understand or comment upon the initial examiner's hypothesis testing, controls and quality assurance measures. Nor can the verifying examiner critically assess the initial examiner's understanding of the underlying principles and theories that govern what is regarded as empirical knowledge of the friction ridge details depicted in any two friction ridge impressions.

VERIFICATION: a study of the same impressions as investigated by the initial examiner in which the same data as collected by the initial examiner is shared. Data-sharing is essential for the verification process. Identical data is analyzed in an identical manner. This full disclosure of the initial data allows the verifying examiner to build upon the prior study. A true verification provides a forum by which results can be summarized and scrutinized for consistency, quality and objectivity. This method of casework review permits the assessments of competing or complementary conclusions. The paramount goal of a true verification is the correct interpretation of data.

BLIND VERIFICATION: Triplett defines blind verification in her on-line Fingerprint Terms as "a method of testing a hypothesis. This method is implemented by limiting the information given to practitioners analyzing data, such as previous conclusions. The intent behind blind verification is to decrease the amount of bias involved in an analysis. Blind verification tests the reliability (consistency) of a conclusion but not the validity (justification) of the conclusion. This testing method is especially useful when analyzing inherently subjective data." [12] In its lay sense, this term seems to suggest that "independence in the application of the methodology" is its key issue.

PEER REVIEW: a study designed to validate the scientific and technical merits of the data collection and the integrity of the interpretation process. Peer review specifically addresses the strength, logical structure, compliance with standards, and appropriateness of the data interpretation exhibited by the initial examiner's study. Peer review judges the adequacy, quality, breadth, and depth of experimentation for the purpose of ensuring consistent scientific excellence.

'INDEPENDENT VERIFICATION': INDEPENDENTLY-PERFORMED EXPERIMENTATION OR INDEPENDENTLY-REPLICATED CONCLUSIONS?

Perhaps blind verification champions are thinking that examinations which are performed without reference to each other are a means to institute independence in both the initial and verifying analyses. Another presumed goal of a blind verification is to assure the accuracy of the reported conclusions. However, there is a distinction between independently-performed experimentation and independently-replicated conclusions.

Science places high value on the ability to reproduce conclusions under non-identical conditions. When different scientists utilizing their own resources, their own understandings of the underlying principles and causation factors, and their own data-interpretation skills obtain similar results, then the outcome serves to increase the confidence regarding the accuracy of the conclusion. Confidence is instilled since it demonstrates that the consistency in conclusions isn't tied to some singular event, nor is the conclusion contingent upon precisely recapitulating the initial experimental conditions.

This is why a latent print verification is designed to be an independent application of our methodology. Independence doesn't mean that the verifying examiner has to be shielded from knowledge of the initial examiner's case notes and conclusions. Independence actually means that the verifying examiner isn't compelled or required to perform his/her examination using pre-designated friction ridge details in the same sequence as used by the initial examiner.

Independence means that the verifier suffers no restriction in choice(s) of evaluative criteria to: a) start the examination at a selected focal point, b) use a selected region of the impression, c) use a chosen sequence of ridge counts and ridge tracings and d) terminate the examination at his/her own choice of completeness in friction ridge comparison and evaluation. Thus, the independent verifier is most certainly obtaining a conclusion under conditions which are non-identical to those used by the initial examiner. Good scientific practices embrace this approach to data interpretation.

This is the distinction between independently-performed experimentation and independently-replicated conclusions. The above paragraph describes an independently-performed experimentation. No one dictates to the verifying examiner how he/she must perform the examination. Importantly, the hypothesis-testing design of ACE-V methodology is sufficiently robust to permit independently-performed experimentation based upon various evaluative criteria and empirical data interpretations separately applied by the initial and verifying examiners. This flexibility means that by default the verifying examiner ends up testing the null hypothesis and attempts to falsify the conclusion of the initial examiner, thus bolstering confidence in the accuracy of the tentative conclusion established by the initial examiner.

Blind verification champions have somehow interpreted and/or equated 'independent verification' to mean independently-replicated conclusions. Their presumption is that bias is eliminated when data is not shared and/or the verifying examiner is shielded from knowledge of any previously obtained conclusions. It seems apparent that their misunderstanding of the robustness embodied into ACE-V methodology's hypothesis testing design leads them to believe that any consensus over the merits, integrity and appropriateness of data interpretation using friction ridge detail can only be performed under the auspices of technical reviews and conflict resolution procedures.

TESTING OF THE NULL HYPOTHESIS

"Inherent in the formulation of a hypothesis is the consideration of the corresponding null hypothesis. The null hypothesis would mean that the unknown print could not be individualized to the known print. In practice, however, a more practical term for the opposite of the hypothesis would be the 'counter-hypothesis'. If the hypothesis is identification, then the counter-hypothesis would be exclusion. The 'null hypothesis' might include the possibility that the examiner could not reach a conclusion ...." [13]

A cornerstone of scientific research is its rigorous empirical testing through experimentation in order to determine if the hypothesis can be falsified. Good scientific practices require that the design of the methodology and the protocols for data collection permit experimentations for whether or not the hypothesis is true. The hypothesis testing embodied in ACE-V methodology is contingent upon experimentation that validates or refutes the causative relationship which individualizes the source known impression to the questioned latent impression. This experimentation tests the persistency in the correspondence of matching friction ridge details (despite attempts to falsify their correlation or correspondence).

The protocols used to signify that an individualization is supported upon proving the hypothesis is true is accompanied by another set of protocols by which an exclusion is supported upon falsifying (refuting) the hypothesis. Should an evaluation survive attempts to falsify, then the hypothesis of individualization is upheld. The science of friction ridge identification recognizes that negative instances (discrepancies in friction ridge detail) will falsify a finding of individualization. The ability of a latent print examiner or verifier to declare an exclusion is how ACE-V complies with the scientific method's requirement that experimentation be capable of falsifying the result.

We have designed our methodology so that it incorporates into its experimentation (the comparison and evaluation phases) critical assessments of the observed friction ridge details so that they may yield discrete signals that the hypothesis is refuted or falsified. We do this by a) testing for ridge path correspondences, b) testing for the sufficiency of friction ridge uniqueness, c) testing for the absence of unaccountable dissimilarities, and d) testing for the acceptability of "red flag" tolerances. Should a latent print examination fail one of these tests, then the null hypotheses as applied to the ACE-V methodology is proved. The basis for proving the null hypothesis is that genuine discrepancies in the relationship of the friction ridge details (i.e. data) between the known and latent impressions act to falsify the conclusion of an individualization.

The verification phase is the stage in which the attempts to falsify the hypothesis focus upon the quality, interpretation, and weight assigned to the observed friction ridge details. The term 'falsify' is used in order to convey the meaning that the scientific method requires that the data be collected so that upon further study it can signal that the hypothesis (of an individualization) is false. Good scientific practices require that a means be designed into the experimentation to permit the data to yield unambiguous signals that the hypothesis is either true or false.

Under blind verification protocols, the verifying examiner would not know of the initial examiner's exploration into considering the null hypothesis, which if proved, would necessitate a finding of an exclusion.

ATTEMPTS TO FALSIFY THE CONCLUSION DURING THE VERIFICATION PHASE

The Scientific Working Group on Friction Ridge Analysis, Study & Technology (SWGFAST) *Quality Assurance Guidelines for Latent Print Examiners* under their *Fundamental Principles of Quality Assurance in Friction Ridge Examination* explicitly state that "[all individualizations (identifications) must be verified by another qualified latent print examiner".[14] There will be few who doubt that this standard is a practice found at nearly all latent print offices world-wide.

SWGFAST also states that the verification phase "is the independent examination by another qualified latent print examiner resulting in the same conclusion."[15], [16] SWGFAST's 'Glossary-Consolidated' states the verification phase as a "confirmation of an examiner's conclusion by another qualified examiner."

However, having written standards in place and properly practicing their intended objectives are two separate matters. Engaging in verification practices for the sake of complying with written standards is not the primary intention of these SWGFAST guidelines.

The verification phase, as promoted by SWGFAST, is a complete application of the methodology to a result obtained by the initial examiner to either validate the first examiner's conclusion or to disagree with that conclusion. The goal of the verification phase is to determine if there is a consensus over the appropriateness, importance and correct interpretation of the data used for the conclusion. The intended objective is that the initial examiner's conclusion will undergo a scrutiny by another qualified examiner. This scrutiny is intended to be a critical appraisal of the data, merits, basis and justifications used by the initial examiner in reaching his/her conclusion. If the conclusion passes this scrutiny, then validity can be assigned to the conclusion.

There is a distinction at play here. The scientific application of a verification is intended to be a critical assessment of whether the depicted friction ridge details do in fact exhibit themselves at levels of quality and quantity that are sufficient in order for the conclusion to be valid. The blind application of a verification is intended to be an attempt to determine whether conclusions can be replicated by different examiners.

The verification is not simply an effort to determine if the correct finger was recorded on the worksheet, and that the examiner did not mistakenly confuse the right hand fingers with the left hand fingers. The verification is a process of determining whether the available data could allow the examiner to establish a correct conclusion. This is the true character of any friction ridge impression verification, if it is to be promoted as part of a scientific process. This process is based upon ascertaining that the depicted friction ridge details do in fact exhibit precisely the properties and attributes necessary for a valid determination of whether the known and unknown impressions correspond to a level of exclusion, individualization, or inconclusive.

The verification is intended to be a critical appraisal. The verification is intended to be a scrutiny. The verification is intended to be a process of attempting to find fault with the initial conclusion. The manner by which the verifying examiner engages in this role is to attempt to falsify the conclusion.

An attempt to falsify the conclusion is not some adversarial process designed to test whether the initial examiner can "stand the heat". Attempts to falsify the conclusion are embodied in both scientific methodology and hypothesis testing. When another qualified examiner attempts to falsify the conclusion he/she is in fact demonstrating that the methodology of friction ridge examination is designed as a proper scientific process.

A properly-designed scientific process demands that the verifying examiner have unfettered access to the notes, observations, annotations, and other relevant data as recorded by the initial examiner. It is the initial examiner's notes that initiate the exploration into whether all the necessary conditions, protocols, benchmarks, guidelines, and standards are present in order for the conclusion to be established according to the relevant methodology.

And how does blind verification comply with the role of attempting to falsify the conclusion in order to properly test a scientific conclusion? It should be obvious by now that duplicating or replicating a conclusion doesn't embody what the scientific process takes pains to achieve. The only thing 'blind' about a blind verification is the 'blind eye' turned towards what is accomplished when we apply ACE-V methodology.

In order to properly apply the scientific method to latent print examination, the verifying examiner must be allowed to scrutinize the conditions, data, design, and observations utilized by the initial examiner. Without knowledge of, or access to, the initial examiner's notes and annotations, the verifying examiner cannot perform his/her role in ACE-V methodology while staying true to the scientific method. The practice of blind verification conspires against this critical aspect of the scientific method. Blind verification is in conflict with the design of the verification phase being analogous to the scientific method. Attempting to falsify the conclusion during the hypothesis testing phase of the scientific method explicitly requires the verifying examiner to have knowledge of the initial examiner's data and results.

> "The embodiment of transparency in scientific endeavors is used to convey the assurance that the documentation of the data was done in an explicit, objective, appropriate, and accurate manner."

Mary Beeton describes the verification phase in her article "*Scientific Methodology and the Friction Ridge Identification Process*" as follows: "Verification occurs when another Latent Print Examiner completes a second independent identification process of the first Latent Print Examiner's friction ridge identification. A complete scientific methodology framework includes verification of the initial friction ridge identification and, in some cases, non-identification. Taken together, identification and verification processes provide a comprehensive scientific methodology that Latent Print Examiners can apply to current practices." [17]

The American Association for the Advancement of Science in its "Statement on Intellectual Property Protection for Databases" advocates the sharing of data and collaborative efforts in scientific investigations:

"The hallmark of every scientific investigation is the full and open communication of all data among those engaged in the research. The earlier investigative model of the solo scientist has been replaced by the increasing involvement of scientists in large-scale, interdisciplinary, and collaborative arrangements, where data passes between groups of scientists and the knowledge produced is collectively generated and shared."

Under blind verification protocols, the verifying examiner is rendered incapable of attempting to falsify the initial examiner's conclusion. The verifying examiner is not permitted to conduct any critical judgment or appraisal regarding the accuracy, integrity and appropriateness of the correspondence (or not) in friction ridge details as interpreted or determined by the initial examiner.

Particularly lacking during a blind verification is the verifying examiner's access to, and insight into, the initial examiner's perspective regarding the quality of his/her data.

PEER REVIEW PROCESS

"The main goal of peer review is to look at how a conclusion was arrived at, not merely to confirm the conclusion. In order to examine whether scientific principles were used, the peer review phase requires that the peer reviewer see all information and documentation that the initial practitioner used to arrive at his or her conclusion, even if the reviewer would not have arrived at the conclusion the same way. The reasoning is that the goal of peer review is not to reinvent a conclusion but to assess whether a conclusion was arrived at accurately, using procedures that are tested and accepted" (The Etiology of ACE-V and its Proper Use: An Exploration of the Relationship Between ACE-V and the Scientific Method of Hypothesis Testing", Triplett and Cooney, JFI, 56(3), 2006, pg. 348).

"A truly fundamental precept of science is that no theory or finding is accepted until a consensus has been reached among scientists who have independently evaluated the earlier work. Achieving such a consensus usually involves access by others to data from the original scientific team or specific sets of data extracted from commercial or public domain databases and arranged and analyzed in new ways. Such arrangements will yield useful insights and interpretations" (American Association for the Advancement of Science "Statement on Intellectual Property Protection for Databases", October 31, 1997).

"Evaluation includes reviewing the experimental procedures, examining the evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Although scientists may disagree about explanations of phenomena, about interpretations of data, or about the value of rival theories, they do agree that questioning, response to criticism, and open communication are integral to the process of science" (National Science Education Standards (NSES, 1996, pg. 171).

Peer review is a stage of scientific experimentation where the attempt to falsify the initial examiner's conclusion focuses upon a scrutiny of his/her comprehension of the methodology's underlying principles and fundamentals. Peer review focuses upon 'good scientific practices', and whether the case under scrutiny bears evidence that the initial examiner employed these 'good scientific practices'. If so, the conclusion derived from the data becomes validated. Peer review examiners need insight into the adequacy, quality, breadth, and depth of the examination as performed by the initial examiner in order to perform a proper peer review. Peer review examiners gain this insight through a review of the notes and observations recorded by the initial examiner.

The performance of a blind verification ignores this aspect of the scientific method and focuses instead upon the agreement or disagreement of two or more sets of conclusions independently derived by different examiners.

FAILURE OF THE BLIND VERIFICATION PROCESS TO EMBRACE THE TRANSPARENCY OF DATA

The transparency of collected data refers to the actual collected data itself and to the methods and procedures by which that data was collected and documented. The embodiment of transparency in scientific endeavors is used to convey the assurance that the documentation of the data was done in an explicit, objective, appropriate, and accurate manner. This assurance then imparts integrity to any conclusion established from that data. Casework review then performs an assessment of whether the conclusion was based upon a proper interpretation of that data. Naturally, an assessment of whether the initial examiner had in fact performed proper data interpretation is possible only when that data is made available to the verifying examiner.

Another aspect of transparency specifically addresses the initial examiner's objectivity reflected in his/her observations and interpretations regarding the limits, cautions, and possible alternative considerations of the data due to shortcomings in its exhibited clarity and detail (i.e. 'red flags'). ACE-V methodology incorporates intentional efforts which are undertaken to document any data that can be recognized as possibly introducing an alternative assumption (null hypothesis) to the testing of the conclusion. A drawback of a blind verification is that the verifying examiner cannot assess to these 'red flags' as considered, interpreted, and documented by the initial examiner.

The appendix of this article contains a sample of a worksheet that can be used by the initial and verifying examiner alike to record their notes and observations in a manner which documents that the necessary elements within each phase of ACE-V methodology have been appropriately applied to the latent print examination.

It is the verifying examiner's awareness of the initial examiner's exploration into falsifying an individualization, and the verifying examiner's awareness of the initial examiner's 'red flag' considerations, that permits the friction ridge detail (i.e. data) to be holistically evaluated for its appropriateness in establishing a valid conclusion. Evaluative criteria and data-interpretation can be refined by both examiners in order to collectively assign the proper weight to friction ridge discrepancy/distortion. This is why the scientific method insists upon the transparency of data.

The practice of blind verification exhibits a preoccupation with a rapid determination of whether a consensus is present between the initial examiner's and the verifying examiner's conclusions. The willful ignorance of initial data during a blind verification is contrary to the transparency of the initial data insisted upon by a true verification. Absent in a blind verification is the ability of the verifying examiner to achieve an informed perspective of the initial examiner's judgments, assessments and interpretations, which are contemporaneously documented during his/her examination.

The practice of blind verification is in direct conflict with the scientific method's insistence upon the transparency of data. A blind verification instead seeks to sequester that very data.

CONCLUSION:

This paper has focused upon arguing that an embrace of the practice of blind verification is actually detrimental to efforts to conform the science of friction ridge identification to the scientific method.

The advent of the blind verification process with all its incongruities and dissonance leaves the science of friction ridge identification at a crossroads. Do we insist that *all* aspects of the application of ACE-V methodology embrace the principles and tenets of the scientific method? Instead, do we institute blind verifications with the wishful presumption that two or more different examiners wouldn't arrive at similar conclusions that have coincidentally been based upon an improper application of the methodology and/or an improper interpretation of the data (albeit independently-performed)?

This author recommends that we conscientiously avoid an environment in which we veer away (consciously or unconsciously) from our current conformance with the scientific method to embracing a process that negates our compliance with some of the scientific method's most essential elements. Should we abandon some of the key tenants of the scientific method we would be permitting non-experts to self-servingly redefine what constitutes valid proof that our discipline conforms to proper scientific experimentation. This paper has progressively demonstrated that blind verification champions lack an understanding of what makes scientific results valid and reliable. Fortunately, their misunderstanding can be remedied by better education in the processes by which the various forensic sciences assert their conformance with the scientific method.

We should be striving even harder to have the science of friction ridge identification be understood by our champions and critics alike to be derived from the scientific method. We need to articulate during Daubert challenges that we fully comprehend just how the various aspects of our science's underlying principles, design of methodology, and empirical testing permit us to unequivocally declare that our science conforms exhaustively to the universally-accepted and universally-defensible scientific method.

The practice of blind verification may gain credence and appropriateness to the scientific method only after it has modeled itself upon the definition of a true verification (see 'Definitions of Casework Review Terms' earlier in this article). The conservative view is that so long as its emphasis and scope remain in their current state of technical ambiguity, the practice of blind verification should not be embraced by the science of friction ridge identification.

And if you want to reduce the risk of bias, you do so by conforming to the scientific method, not by running away from it. ★

"We should be striving even harder to have the science of friction ridge identification be understood by our champions and critics alike to be derived from the scientific method."

REFERENCES:

1. Tuthill, H.G. and Graeme, G., Individualization: Principles and Procedures in Criminalistics, 2nd. Ed., Lighting Powder Co., Jacksonville, FL., 2002, pg. 9.
2. "Scientific Methodology and the Friction Ridge Identification Process", Beeton, Mary, Identification Canada 25 (3) (September 2002). Reprinted in Georgia Forensic News 32 (3) (November 2002) 1, 6–8.
3. "Scientific Comparison and Identification of Fingerprint Evidence", Wertheim, Pat A., Fingerprint Whorld, vol. 26, no. 101, July 2000, pg. 103-104.
4. "Ridgeology", Ashbaugh, David R., Journal Forensic Ident., vol. 41, no. 1, 1991, pg. 44-46.
5. Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, 113 S.Ct., 2786 (1993).
6. "Review of the Scientific Basis for Friction Ridge Comparisons as a Means of Identification: Committee Findings and Recommendations", Budowle, B., Buscaglia, J., Pearlman, R.S., Forensic. Science Communications, vol. 8, no. 1, Jan. 2006.
7. "Report on the Erroneous Fingerprint Individualization in the Madrid Train Bombing Case", Stacey, R.B., Jor. Forensic Ident., vol. 54, no. 6, Nov./Dec. 2004, pg. 715.
8. "Judge Grants Motion to Exclude Latent Fingerprint Identification", Ostrowski, S., The Sleuth, Apl-June 2007, pg. 4-5.
9. "Confirmation Bias, Ethics, and Mistakes in Forensics", Byrd, J.S., Jor. Forensic Ident., vol. 56, no. 1, July/Aug. 2006, pg. 511-525.
10. "The Etiology of ACE-V and its Proper Use: An Exploration of the Relationship Between ACE-V and the Scientific Method of Hypothesis Testing", Triplett, Michelle and Cooney, Lauren, Jor. Forensic Ident., vol. 56, no. 3, 2006, pg. 348.
11. "Sharing Research Data", Committee on National Statistics - Commission on Behavioral and Social Sciences and Education, 1985.
12. "Michele Triplett's Fingerprint Terms", http://www.fprints.nwlean.net/d.htm (accessed April 12, 2007).
13. "Scientific Comparison and Identification of Fingerprint Evidence", Wertheim, Pat A., Fingerprint Whorld, vol. 26, no. 101, July 2000, pg. 103.
14. "Fundamental Principles of Quality Assurance in Friction Ridge Examination", Quality Assurance Guidelines for Latent Print Examiners, SWGFAST, 08/22/2002 ver. 2.11.
15. "Method of Friction Ridge Examinations", Friction Ridge Examination Methodology for Latent Print Examiners, SWGFAST, 08/22/2002 ver. 1.01
16. "Definitions and Conclusion - Friction Ridge Examination", Quality Assurance Guidelines for Latent Print Examiners", SWGFAST, 08/22/2002 ver. 2.11.
17. "Scientific Methodology and the Friction Ridge Identification Process", Beeton, Mary, Identification Canada 25 (3) (September 2002). Reprinted in Georgia Forensic News 32 (3) (November 2002) 1, pg. 6–8.

BIOGRAPHY

Alexander Mankevich is currently employed as a Forensic Scientist assigned to the Latent Print Unit at the Maryland State Police Forensic Sciences Division in Pikesville, Maryland. Alex graduated college with a Bachelor's Degree in Forensic Science. Alex performs latent print, footwear impression, and tire track impression casework.

Alex has been a Chesapeake Bay Division (CBD) member since 1987 and he regularly attends the Chesapeake Bay Division conferences. He is currently serving as the CBD's Historian and Webmaster. Until recently, you may have met Alex serving as Hospitality Host at our conferences' Social Gatherings. Alex has been honored by the CBD as a recipient of the Lillian U. Jenkins Special Achievement Award.

Alex is both an IAI certified Latent Print Examiner and an IAI certified Footwear Examiner. He is a past chairperson of the CBD's Latent Print Certification committee and he has served on the IAI Parent Body's Footwear Certification Board. Alex has participated in the preparation for both latent print and footwear Daubert challenges. Alex is the creator of the ACE-V portion on the CBD's website (www.cbdiai.org). He has been a member of an ASCLD-LAB accredited forensic laboratory in both Illinois and Maryland. Alex performs yearly proficiency testing in both the latent print and the footwear impression disciplines.

Alex's proficiency and professional activities in multiple forensic identification disciplines gives him an advantage when assessing the merits of any proposed methodologies, standards, controls, guidelines, and protocols.

APPENDIX

Below is a sample of an ACE-V compatible worksheet. Under the Analysis Phase it prompts to the initial examiner to document the observed properties and attributes of the latent print impression and its level 1-3 friction ridge details. It permits the documentation of what had rendered the latent print impression to be unsuitable for comparison and evaluation. Importantly, it documents the initial examiner's interpretation of 'red flag' factors.

Under the Comparison & Evaluation phases, this worksheet documents the initial examiner's protocols for testing his/her tentative conclusion, and his/her exploration into considering the null hypothesis. The initial examiner is prompted to document the accountability of any discrepancy.

There is a column to document the verifying examiner's peer review in his/her attempt to falsify the initial examiner's conclusion.

ACE-V Analysis Phase

TOTALS: FP = 0 ; PP = 0 ; IMP = 0 ; NV = 0

Lift #1		Lift #3		Lift #5		Lift #7		Lift #9	
Lift #2		Lift #4		Lift #6		Lift #8		Lift #10	

LATENT IMPRESSION: #

'No Value' Result Deficiencies Observed:

[ ] Clarity	[ ] Quantity of Minutiae	[ ] Uniqueness of Relationship
[ ] Target Area	[ ] Orientation Features	[ ] Ridge Path Continuity

FRICTION RIDGE DETAIL ATTRIBUTES PRESENT:

Pattern:	Ridge Flow:	Focal Points Present:
[ ] Arch [ ] Loop [ ] Whorl [ ] Palm	[ ] Right slant [ ] Left slant	[ ] Core [ ] Delta [ ] Flex. Crease [ ] Curvature [ ] Divergence [ ] Scar
Sufficient Minutiae Present:	Clarity:	Ridge / Valley Definition:
[ ] Yes [ ] No	[ ] Sufficient [ ] Insufficient	[ ] Poor [ ] Sufficient [ ] Remarkable

SUBSTRATE / MATRIX / 'RED FLAG' FACTORS OBSERVED:

[ ] Lack of Ridges/Detail	[ ] Excess Residue	[ ] Fragmented Ridges	[ ] Pressure Distortion
[ ] Obscured Region(s)	[ ] Excess Moisture	[ ] Continuity Disruption(s)	[ ] Streaking / Slippage
[ ] Poor Contrast / Visibility	[ ] Excess Powder	[ ] Tape Voids / Creases	[ ] Superimposed Ridges
[ ] Surface Interference / Texture	[ ] Tonal Shifts	[ ] Diffused Ridges	[ ]

Additional Analysis Notes (as required):

ACE-V Comparison & Evaluation Phases:

SID# FBI#	NAME	Date Exam Done	Indiv. - ID Exclude - XX Inconcl. - ??	Test for Sufficiency of Uniqueness	Test for Ridge Path Correspondences	Test for Absence of Unaccountable Discrepancies	Test for Acceptable 'Red Flag' Tolerances	Peer Review for Falsification of Conclusion Initials:
				[ ] Pass [ ] Fail	[ ] Pass [ ] Fail	[ ] Pass [ ] Fail	[ ] Pass [ ] Fail	[ ] Pass [ ] Fail
				[ ] Pass [ ] Fail	[ ] Pass [ ] Fail	[ ] Pass [ ] Fail	[ ] Pass [ ] Fail	[ ] Pass [ ] Fail

Document the interpretation of any discrepancy / distortion existing between known & unknown impressions:

Discrepancy / Distortion in: [ ] Ridge Count [ ] Ridge Trace [ ] Minutiae Shape [ ] Spatial Relationship

Interpretation: [ ] Genuine Discrepancy [ ] Apparent Artifact [ ] Accountable (see below)

Additional Comparison & Evaluation Notes (as required):