E88 How Do Latent Print Examiners Perceive Proficiency Testing? An Analysis of Examiner Perceptions, Performance, and Print Quality

Sharon Kelley, PhD, Institute of Law, Psychiatry, and Public Policy, Charlottesville, VA 22903; Daniel C. Murrie, PhD, Institute of Law, Psychiatry, & Public Policy, Charlottesville, VA 22908; Brett O. Gardner, PhD, University of Virginia, Charlottesville, VA; Karen D.H. Pan, Department of Statistics Halsey Hall, Charlottesville, VA 22904; Karen Kafadar, PhD, University of Virginia, Charlottesville, VA 22904; Kellyn Blaisdell, BA, University of Virginia, Charlottesville, VA 22902*

Learning Overview: The goal of this presentation is to educate attendees on how latent print examiners view current proficiency testing items and how such views relate to more objective measures of proficiency tests, such as print quality metrics and examiner test performance.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by shedding light on the current state of latent print proficiency testing as viewed by its primary consumers (i.e., latent print examiners). This presentation will investigate the connection between these views and the results of objective evaluative measures (i.e., print quality metrics). Both these views and the objective measures ultimately will inform efforts to craft more rigorous, or better operationalized, materials for training and assessing proficiency.

Accrediting agencies generally require that forensic science laboratories administer proficiency tests, or practice tests designed to resemble real forensic casework, at regular intervals to assess analysts' competence. Moreover, latent print examiners sometimes cite results on proficiency tests as evidence that the work in an actual case is accurate.[1]

Importantly though, commercial test materials may differ in important ways from "real world" evidence.[2,3] If proficiency tests are simpler than actual casework, the value may be diminished. On the most recent latent print examination proficiency test administered by Collaborative Testing Services, Inc. (CTS), 91% of respondents received a score of 100%.[4] This study may reveal important ways in which proficiency tests do not provide true metrics of competence or proficiency in the field. Without such metrics, both internal (e.g., by laboratory managers) and external oversight (e.g., by accrediting bodies) become less meaningful.

For the present study, CTS added a series of questions to its latent print examination proficiency test shipped in August 2017. Three hundred twenty-two latent print examiners submitted completed tests and answered attached survey questions during the testing period. The survey asked respondents to separately rate the level of challenge and similarity to casework of each latent print on the test using an 11-point scale ranging from 0=*Extremely easy/Nothing like casework*, to 10=*Extremely challenging/Exactly like casework.* Additionally, examiners identified the *least* and *most* challenging latent print and rated their confidence in the accuracy of their decisions. For the latent print that examiners identified as most challenging, examiners identified the characteristic(s) that caused the print to be challenging. Finally, to provide a more objective measure against which to evaluate the proficiency test and examiners' perceptions of the test, all prints used in the test were examined using a global-quality metric algorithm (i.e., LQM).[5]

In brief, the mean level of perceived difficulty across all items was 4.27, indicating that, in general, participants found the questions to be relatively easy. Examiners also typically perceived latent prints in the test to be similar to their casework (M=6.97). Interestingly, items perceived as more similar to casework were also perceived as more difficult to complete (r[308]=0.30, p<.001). Examiners expressed significant confidence in conclusions regarding both the least and most challenging items on the test.

In general, all included prints scored highly on a metric examining level of image quality. Indeed, no latent print scored below a 60 out of 100 and the estimated probabilities that an examiner would find each print of value for identification and comparison were 95% or greater for all prints included in the test. The quality metric scores for each latent print and its source print were averaged to compute an overall quality score for each test item. This quality score was not significantly correlated with examiners' perceptions of item difficulty (r[7]=-0.68, p=0.09) but was significantly correlated with perceptions of item similarity to casework (r[7]=-0.79, p=0.04). Additional analyses exploring examiner perceptions and related associations with objective print quality and test performance will be discussed.

In conclusion, the current findings reveal that examiners viewed proficiency test items as generally easier than casework, were highly confident in the conclusions, and achieved very high accuracy in the conclusions. Quality metric scores corroborated examiners' perceptions in that included prints were consistently rated as very high quality. Given that examiners viewed more challenging prints as more similar to typical casework, the results have important implications for meaningful proficiency testing moving forward.

Reference(s):

1. Garrett, B.L., and G. Mitchell. The Proficiency of Experts. *University of Pennsylvania Law Review*, 166, (2018): 901-960.
2. Koehler, J.J. Fingerprint Error Rates and Proficiency Tests: What They Are and Why They Matter. *Hastings Law Journal*, 59, (2008): 1077-1099.
3. National Research Council (US) Whither Biometrics Committee. *Biometric Recognition: Challenges and Opportunities.* Eds. J.N. Pato and L.I. Millett. (Washington, DC: The National Academies Press, 2010).
4. Collaborative Testing Services, Inc. *Latent Print Examination Test No. 18-5161/2/5 Summary Report*. (2018). Retrieved from https://cts-forensics.com/reports/38161_Web.pdf. 1-26.
5. Hicklin, R.A., J. Buscaglia, and M.A. Roberts. Assessing the Clarity of Friction Ridge Impressions." *Forensic Science International*, 226, (2013): 106-117.

Latent Print Examination, Proficiency Testing, Quality Metrics