Latent Print Quality in Blind Proficiency Testing: Using Quality Metrics to Examine Laboratory Performance

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Learning Overview: This program will educate attendees about preliminary findings from a blind quality control (BQC) program in the Latent Prints section at the Houston Forensic Science Center. Additionally, this presentation will detail the quality of latent prints examined as part of this program, explore how this information can be used to improve similar programs, and consider implications for routine casework.

Impact on Forensic Community: This presentation will evaluate a blind, latent print quality control program to demonstrate how such programs, supplemented with quality metrics, can improve forensic case work. Audience members will be encouraged to reflect upon their practice and consider the feasibility of incorporating BQC programs into their labs and quality metrics into routine casework.

Introduction: In 2015, the Houston Forensic Science Center adopted the recommendations detailed in the 2009 National Academy of Sciences (NAS) report1 for blind proficiency testing by implementing a blind quality control (BQC) program. 2 The intent of the BQC program is to supplement open proficiency tests that are required for accreditation and provide a way to monitor the entire quality management system from evidence submission to reporting of results. The program was initiated in the Latent Prints section in November 2017, and lab personnel routinely track case outcomes and print quality associated with all blind cases.

The current study sought to: 1) Describe preliminary results from a blind testing program within a latent print unit of a crime laboratory, 2) Examine the quality of submitted prints via quality metrics software, and 3) Examine the potential association between latent print quality and resulting sufficiency determinations and identification conclusions.

Method: Since its implementation, the quality division within the laboratory has developed and inserted 290 blind cases/requests for analysis into the latent print comparison unit. Print images for 144 of these cases were obtained for the present study. In total, examiners reviewed 376 latent prints as part of the 144 cases. Most blind cases involved only one latent print; however, some involved as many as 13 latent prints. The majority of latent prints were fingerprints (94.3%) or palm prints (4.9%).

Results: Of the 376 prints, 92.0% were determined to be of sufficient quality to enter into AFIS, and 6.1% were determined to be of comparative value, but insufficient quality to enter into AFIS. Very few prints were determined to be of no comparative value (1.6%).

Most prints were submitted with the true source present in AFIS (80.3%; n = 302). Based on ground truth, examiners arrived at the 'correct' conclusion in about half of all submitted prints (51.1%). Specifically, 33.0% of all latent prints were correctly associated with their source and 18.1% were correctly excluded from erroneous associations. There were no instances of false positive errors (i.e., associating a latent print with the wrong source print), but 41.0% of all prints were concluded to have no association with other prints despite the true source being in AFIS. Of course, there are multiple reasons why prints might not be associated with their source, including poor print quality, limitations of AFIS algorithms, or examiner error. There were only two occasions when the source candidate was listed in AFIS results and the examiner concluded that no association existed.

The quality of all latent print images was assessed using the FBI's Universal Latent Workstation Latent Quality Metrics (LQMetrics) software.[2] The presentation will present detailed findings, but for clarity within this proposal, the quality of all prints will be categorized according to the traditional *Good, Bad,* and *Ugly* criteria defined by LQMetrics software. Put simply, print quality was associated with sufficiency determinations and, to a greater extent, ultimate conclusions. Prints belonging to the *Ugly* quality category were 0.88 times less likely

to be determined to be of sufficient quality for AFIS entry and were more likely to be of no comparative value. Regarding accuracy, *Good* latent prints were 2.18 times more likely to result in a correct conclusion than were *Ugly* prints, whereas *Ugly* prints were 3.71 times more likely to result in inconclusive conclusions (i.e., no AFIS searches) than were *Good* prints. The accuracy of conclusions regarding *Bad* prints fell between *Good* and *Ugly* prints. The presentation will address how the use of quality metrics can improve the effectiveness of blind testing programs and routine casework.

References

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