A6 Reliability and Reproducibility of Friction Ridge Edgeoscopy

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After attending this presentation, attendees will understand the problems involved in comparing exemplar prints to friction ridge prints recovered from crime scenes using edgeoscopy.

This presentation will impact the forensic science community by investigating the factors that affect ridge detail when fingerprints are deposited at crime scenes as compared to exemplar prints collected by the authorities.

In this study, the factors that affect ridge detail when fingerprints are deposited at crime scenes, and during the taking of exemplar prints, will be examined. These factors are: substrate, matrix, and pressurerelated deformations along with development media and anatomicalrelated distortions. Four of the most common methods of print development were used and evaluated for the level of detail in the recovered latent prints. These included: fingerprint powder, cyanoacrylate and iodine fuming, and development with ninhydrin. Each type of substrate, pressure, and development media combination will produce its own unique blend of distortions and deformations. Specific areas for edgeoscopy were selected and the exemplar prints were then compared to the developed latent prints to determine if these features could be distinguished and compared between both prints.

This study examined whether or not thirdlevel detail, namely edgeoscopy, could be distinguished among all of the distortions found in exemplars and latent prints. The first hypothesis tested was that variation in pressure and direction used to deposit fingerprints will create unpredictable deformation in edgeoscopy, even in exemplar prints. To do this, exemplars were deposited in five different directions onto photo paper to reduce ink bleed: roll to left, roll to right, roll down, roll up, and pressed vertically onto the paper. The second hypothesis tested whether prints lifted from surfaces typically found at crime scenes would produce the same level of detail as exemplars taken under ideal situations. Six edgeoscopy features were chosen at random for comparison across all latent and exemplar prints examined for hypotheses one and two. Analysis of these exemplar sets revealed that edgeoscopy features showed significant and inconsistent variation. Some features remained recognizable while others were distorted or obscured completely. The same areas of edgeoscopy were then evaluated on latent prints, deposited on a variety of surfaces and then developed using fingerprint powder, cyanoacrylate and iodine fuming, and ninhydrin. Some samples produced areas with excellent edgeoscopy reproduction. In the majority of the developed latent prints, however, the edgeoscopy details were unrecognizable. Ninhydrin in particular produced no observable edgeoscopy detail due to the fragmented appearance of the developed print.

Friction ridge prints play a vital part in criminal investigations. The public believes that latent prints are more reliable than they actually are in case investigations because of the CSI Effect. This study showed that edgeoscopy reproducibility is unpredictable. However, edgeoscopy could provide added supporting evidence in the rare occasions where this detail is recovered. This area of friction ridge print science warrants more research and evaluation. Methods for collection of exemplar prints that produce the highest level, and most reproducible amount, of third level detail have also yet to be determined. It is extremely important that everything possible be done to minimize distortion while taking exemplar prints. Without the detail present in an exemplar print to compare to, the detail recovered from a latent print will be useless to the investigator. Parallel research must also be done to determine the best methods for recovery of quality latent print ridge details. This is a large area of research due to the number of substrate and matrix combinations possible. Each will have a development method that is the most effective.

Friction Ridges, Latent Prints, Edgeoscopy

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