A157 The Statistical Evaluation of Torn Duct Tape Physical Matches

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After attending this presentation, attendees will gain information on current research in the field of duct tape physical matching; this includes the uniqueness of duct tape end matches, statistical data and error rates associated with the analysis of duct tape end matches, the influence of various factors on false positive and false negative errors during duct tape end matching, and the development of a criteria for what constitutes a physical match.

This presentation will impact the forensic science community by establishing the reliability of duct tape end matching as an analytical technique. The statistical analysis on the error rates associated with duct tape end matching and the development of a criterion for what constitutes a physical match will prove valuable for criminalists both in the laboratory and during courtroom testimony. Finally, a recommendation as to a suitable training program for those analysts who participate in duct tape end matching will help create consistency in crime laboratories across the country.

Although the analysis of duct tape end matches is common in crime laboratories today, there is currently no objective criterion to support what constitutes a physical match, and there is a lack of significant statistical data as to the reliability of end matching and the error rates associated with it; therefore, this study was designed to examine duct tape physical matches in order to determine the statistical significance of an "end match" conclusion and attempt to develop some objective criteria of what constitutes an end match.

Several forensic science graduate student researchers (GSR) from the University of California, Davis were selected to participate as duct tape analysts during this study. All of the graduate students were extensively trained in the area of duct tape analysis and matching techniques using literature review, practice samples, and an intensive series of duct tape validation/ proficiency samples. The experimental design is a blind study using duct tape from two of the top manufacturers, which included two duct tape grades from each manufacturer and two colors from each grade. Two-hundred evidentiary and exemplar samples were created by tearing each of the eight different duct tapes, giving a total of 1,600 torn pairs of tape. Each of the evidentiary and exemplar samples was labeled with random numbers. The samples were then paired together with each pair containing one evidentiary sample and one exemplar sample. Half of the pairs were chosen at random to remain matching, while the evidentiary tapes in the other half of the pairs were randomly assigned not to match. Finally the pairs were randomized into 1,600 envelopes. Each graduate student analyzed all 1,600 envelopes of duct tape pairs in order from envelope #0001 through envelope #1,600; meanwhile, the analysts were blind of each other's results.

The data was subjected to statistical analysis to determine the false positive and false negative error rates for the various analysts and across a combination of factors. The statistical analysis was performed using analytical software.

Further testing involved the use of an Elmendorf tear tester on 200 duct tape samples. Like the previous 1,600 specimen, these samples were analyzed by the participating GSR and statistical analysis was conducted to determine if a more uniform tear has any effect in the overall error rates of the analysts.

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This study was sponsored by NIJ Grant.

Duct Tape, End Match, Physical Match

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