



E58 A Longitudinal Database of Athletic Shoe Outsole Wear

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Learning Overview: After attending this presentation, attendees will be familiar with the features of a new longitudinal database of athletic shoe outsoles. Attendees will be able to query the database for data from different collection methods, shoe styles and sizes, and wear levels.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing information on a new resource for understanding the development of individualized wear patterns on athletic shoes. This presentation will also discuss the development of individual characteristic wear patterns over the course of the study for each of the two athletic shoes examined in this experiment.

In order to ground forensic science in data-driven methodology, it is necessary to assemble reference databases that can be used to benchmark new methods. The longitudinal shoe outsole database hosted on the Center for Statistical Applications in Forensic Evidence (CSAFE) data portal contains images of 160 pairs of athletic shoes, in two styles and four sizes. Participants wore the shoes for at least 10,000 steps per week, and images of the shoes were taken at five-week intervals, producing five observation points for each pair of shoes. At each time point, shoes were imaged using pressure-mat scans, high-resolution photography, 2D digital scanning, 3D scanning, film/dust prints, paper/dust prints, and vinyl/dust prints intended to simulate crime scene prints. For a subset of the shoes, randomly acquired characteristics have been marked and identified by the Israeli Police.

This database, which is freely available to the public, provides a curated data set for examination of Randomly Acquired Characteristic (RAC) development, individual wear pattern characterization, and benchmarking of statistical methods for matching outsole prints. As there are many replicates of each size/style combination in the data set, it is possible to assess within-style individual characteristics and examine how those characteristics develop over time. In addition, as shoes have been imaged using multiple methods, with replicates of each method at each timepoint, it is possible to examine the variability of each collection method and establish the strengths and weaknesses of each method. The database is structured to allow for the download of query-filtered subsets of the images and accompanying metadata. Users can also preview images and 3D surface files using the graphical database interface. Bulk downloads of the full dataset, which is approximately 1.4 TB, will also be available.

This presentation will include a live demonstration of the database and an example of the development of wear over time for one pair of shoes, as shown using several 2D data collection methods.

Database, Outsole, Wear