



### **E39 Forensic Validity and Usefulness of the Apache Tracking Method: A Multifaceted Research and Development Protocol**

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**Learning Overview:** After attending this presentation, attendees will develop an understanding of the Apache Tracking Method and its forensic relevance and validity regarding how speed of human travel can be determined from shoe impression details left in substrates affected by the kinetic energy transference associated with forward movement. Average speeds of travel can be determined from the track details denoting forward motion of subjects.

**Impact on the Forensic Science Community:** This presentation will impact attendees by adding another novel level of scientific knowledge for biometric identification and investigation. This is noteworthy since there has not been adequate empirical data collected about tracking methods. This would offer useful information about suspect identification, crime scene reconstruction, pursuit of criminals, and apprehension of fugitives.

The key objective of this study was to determine if travel speeds can be approximated (mph) by interpreting the kinetic energy transfer details left in the shoe print impressions in a given substrate. If correct, then there should be no differences observed in the speed assessment of three subjects traveling at similar speeds. The speed assessments would be criteria dependent based on the shoe impressions, not subject dependent, assuming roughly similar weights. For this study, three male volunteers (average weight: 173.2 lbs, +/-19.4lbs SD) were recruited to travel through a tracking box (3.5 ft. wide, 12 ft. long, and 4 in. deep) filled with damp sand (Zero Earth) and with travel speed ranges of 6–8mph, 9–11mph, and 12–14mph measured by Doppler radar. This experimental “field” model was done to determine what correlation (if any) the subjects and travel speeds may have relative to pressure release scales (The Wave, The Double Wave, The Disk, The Disk-Fissure, The Disk-Crumble, The Dish, The Dish-Fissure, The Dish-Crumble, and The Explode-Off). The shoe prints left in the Zero Earth substrate were photographed and analyzed using the forward motion pressure release analysis and categorization method.<sup>1</sup> Any statistical difference across the test subjects at the travel speed ranges and pressure release categorizations were analyzed by chi-squared ( $\chi^2$ ) test (p value <0.05).

There was no significant difference between the three subjects at the three travel speed ranges. The three speed ranges can be differentiated by pressure response in the Zero Earth substrate, across nine different pressure response scales. The same classes of kinetic energy transfer details were detected at the same speed ranges. This allowed for a reliable estimate of subject speeds by shoe print analysis. The chi-squared test indicated there was no difference in the likelihood of making the same class of substrate pressure details (pressure releases) for the respective travel speed ranges.

The conclusion of this presentation is that specific travel speeds can be approximated by reading the forward motion details (pressure releases) in the shoeprint substrate. It was determined that The Disk pressure release class was found in all three subjects’ shoe print series at the 6–8mph travel speed range, The Disk-Crumble pressure release class was found in all three subjects’ shoe print series at the 9–11mph travel speed range, and The Explode-Off pressure release class was found in all three subjects’ shoe print series at the 12–14mph travel speed range.

#### **Reference(s):**

<sup>1</sup>. Brown, T. *The Science and Art of Tracking*. New York, NY: The Berkley Publishing Group. 1999.

#### **Forensic Sciences, Biometrics, Apache Tracking Method**