Footwear Impression Evidence

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Daubert Factors

- Testability
- Peer review
- Error rate
- Standards
- General acceptance
Definitions

- **Footwear**: any apparel worn on the foot, such as shoes, boots, etc.

- **Impression**: is an object or material that have retained the characteristics of other objects or materials which have been impressed against them.
Testability
The theory that a footwear impression can be identified to an article of footwear given sufficient quality and quantity has been tested:

  Footwear Identification Canadian Government Publishing Centre 1980
  - duplication of a single characteristic in a general area can occur, but infrequently
  - duplication of multiple accidental characteristics in identical areas does not occur
  - identification of an impression with an article of footwear is possible

• Stone RS (2006)
  - theoretical model for probability model for likelihood of occurrence of accidental characteristics
The theory that a footwear impression can be identified to an article of footwear given sufficient quality and quantity has been tested:

• **Adair TW et al (2007)**

  - accidental damage found on footwear outsoles is randomly produced

• **Parent S (2009)**
“The Significance of Class Association of Footwear Evidence” presented at the NIJ Trace Symposium, August 2009, Clearwater FL

  - determine the likelihood that 2 people have shoe similar in tread design, size and wear
Class Characteristics:

• Characteristics that repeat during the manufacturing process and are shared by one or more shoes. These include: size, design/pattern and mold characteristics.

• Class characteristics reduce the number of shoes from every shoe in the world to a group of similar shoes.
Individual Characteristics:

• Unique, accidental, random damage on the outsole that is the result of its use and wear.

• These nicks and scratches are in the outsole accidentally and in a completely random shape, orientation and position.
The unknown impression can be compared to the sole of a shoe, called the “known”

The unknown impression can be compared to a test impression of the sole of a shoe called the “known test impression”

Given sufficient quantity and quality of the unknown impression, differences and similarities can be observed between the unknown impression and the known shoe and known shoe impression
Analysis

• Of the Known Footwear
  – Is the pattern/design similar or different from the crime scene impression?
  – Is there contamination in the outsole?
  – Is there any wear or accidental/random damage on the outsole?

• Of the Test Impression made from the Known shoe
  – How are the characteristics in the outsole of the footwear represented in the test impression?
  – How do the characteristics in the outsole of the footwear repeat from one test impression to another?
Comparison: Side-by-side

• Characteristics observed in the crime scene (unknown) impression are compared to the characteristics observed in the test impression of the known shoe
  • Side-by-Side comparison
  • Superimposed comparison (overlay)
Evaluation

• What is the significance of the information that is gathered?
• Knowledge of the significance of what is observed comes from training and experience.
  – Footwear manufacturing and how that affects the outsole appearance
  – Classes in footwear examination
  – Many footwear comparisons

• Conclusion
  – Elimination
  – Identification
  – Inclusion
  – Inconclusive
Peer Review
Peer Review and Publication

• At least five text books have been written dealing exclusively with Footwear Impression Evidence:

Some books that include Footwear Impression Evidence


- Kiely, Terrence “Forensic Evidence: Science and the Criminal Law” CRC Press. 2001
Peer Review and Publication

- Articles on Footwear Impression Evidence have been published in numerous peer-reviewed journals all over the world
  - Journal of Forensic Identification (US)
  - Identification Canada
  - Journal of Forensic Science (US)
  - Science and Justice (UK)
  - Kriminalistik (Germany)
  - Report of the National Institute of Police Science (Japan)
  - Journal of the Indian Academy of Forensic Sciences
  - La Police Scientifique (France)
  - Information Bulletin for Shoeprint/Toolmark Examiners (European)
Peer Review and Publication

• Presentations on Footwear Impression Evidence have been given in numerous forensic science conferences
  – International Association for Identification
  – Regional Divisions of the IAI
  – American Academy of Forensic Science
  – Canadian Identification Society
  – FBI International Symposium on Footwear and Tiretread Evidence
  – International Association of Forensic Science
  – European Shoeprint/Toolmark Association
  – European Meeting of Forensic Science
Error Rate

• Complex issue
  – Inherent in technique?
    • Sample dependent
    • Reflected in conclusion
  – Examiner- proficiency test

• Retesting/reexamination always an option
Standards
Quality Control/Quality Assurance

• Accreditation through ASCLD-LAB/International
  – American Society of Crime Laboratory Directors-Laboratory Accreditation Board
    • Lab must prescribe to quality standards set by an outside governing agency
    • Lab practices are subjected to outside scrutiny
    • Requires yearly proficiency testing
  – The Minnesota Bureau of Criminal Apprehension Forensic Science Service Laboratory accredited through ASCLD-LAB/International
    • All shoeprint examiners in trace evidence section take yearly proficiency tests in shoeprint impression evidence
Standards/Certification

• A footwear certification program is available through the IAI

• Laboratory accreditation is available through the American Society of Crime Laboratory Directors-Laboratory Accreditation Board (ASCLD-LAB).
  – Minnesota BCA is an ASCLD-LAB International accredited laboratory
  – All conclusions of the footwear examiners in the Minnesota BCA are verified by another qualified examiner.
Methods/SOPS followed

• Method followed:
  – Shoeprint Method (MTC-011)

• Standard Operating Procedures followed:
  – Clothing/Tool Search (TC-011)
  – Test Shoe Print Production (TC-030)
  – Digital Images (TC-049)
  – Interpretations and Report Writing (TC-045)

• Quality Assurance Manual

• Evidence Handling Manual
Verification

• Confirmation of an examiner's conclusion by another qualified examiner

• 100% of all cases are peer reviewed and verified by another qualified examiner

• Quality control system in place
General Acceptance
Generally Accepted Standards Governing the Application of the Techniques and Theories

• International Association for Identification (IAI)
  – The goal of IAI is to share knowledge and information in forensic identification
  – Publishes a peer reviewed journal “The Journal of Forensic Identification”
  – World’s oldest and largest forensic organization
  – IAI membership today is comprised of over 6000 individuals from 70 nations and 13 forensic disciplines
  – Multiple Regional Divisions of the IAI
  – Created a guideline for the training of footwear/tire tread examiner
Generally Accepted Standards Governing the Application of the Techniques and Theories

- Scientific Working Group on Shoeprint and Tire Tread Evidence (SWGTREAD)
  - Created by the FBI to serve as a professional forum
  - Experts in footwear and tire tread evidence share, discuss and evaluate methods, techniques and protocols, quality assurance, education and research
  - Committee comprised of examiners from Federal, State and Local laboratories as well as private practice
Generally Accepted Standards Governing the Application of the Techniques and Theories

• Standard Methodology: “ACE-V”

• “ACE” is a scientific and systematic means of gathering information

• ACE takes into account size, shape, orientation and position in relation to other characteristics
Generally Accepted Standards Governing the Application of the Techniques and Theories

• Standard Used During the Examination: The Known Test Impressions

  – Known test impressions are the standards by which all the other impressions are compared

  – A proper set of test impressions records all the outsole features of the known shoe
    • Size
    • Design/pattern
    • Wear
    • Random/Accidental characteristics
Widespread Acceptance of the Techniques and Theories

- Published, Taught, Lectured
  - Techniques (development and recovery)
  - Ability to individualize a shoeprint impression to a specific shoe
  - ACE-V examination methodology
Widespread Acceptance of Footwear Impression Evidence

• Richardson case – Scotland – 1786

• Routinely accepted in courts throughout US, Canada and Europe

• Accepted in US courts as early as the 1930’s

• Accepted in Daubert hearings in other states

• Accepted in MN courts
  – 2001 State vs. Carpenter
  – 2003 State vs. MacLennan
  – 2004 State vs. Haynes
  – 2006 State vs. Wilson
  – 2009 State vs. Ortega, Jr
  – 2010 State vs. Ortega, Sr