

# Biometrics and Forensic Science

## What's the Difference?



Richard W. Vorder Bruegge

FBI Forensic Audio, Video and Image Analysis Unit  
(FAVIAU)

Building 27958A, Quantico, VA 22135

email: [rvorderbruegge@fbiacademy.edu](mailto:rvorderbruegge@fbiacademy.edu) 703-632-6315



# Biometrics and Forensic Science

## What's the Difference?

- THANKS TO:
- MAX M. HOUCK
  - West Virginia University Forensic Science Initiative
  - and
- EDWIN ROOD
  - West Virginia University Biometric Knowledge Center



# Biometrics

- “biometrics” and “biometry” have been used since early in the 20th century
  - refer to statistical and mathematical methods applicable to data analysis problems in the biological sciences
    - the analysis of data from the yields of different varieties of wheat
    - data from human clinical trials evaluating the relative effectiveness of competing therapies for a disease.



# Biometrics

- Recently refers to the emerging field of technology devoted to automated methods for authentication of individuals using physiological and behavioral traits
  - retinal or iris scans,
  - fingerprints,
  - hand geometry,
  - face recognition, etc.





# Forensic Science

- The application of the natural and physical sciences to questions of legal or public concern.
- The most common application is the analysis of evidence, such as blood, hairs, fibers, bullets, and fingerprints, from criminal cases like bank robberies, homicides, and kidnappings.



# Forensic Science

- The perpetrator is typically unknown at the time of the crime
  - an investigation is required to reduce the list of possible suspects
- Sometimes the victim is also unknown
  - must be identified through fingerprints, dental records, DNA, or some other method.
- Many of these methods are meant to identify the deceased and, therefore, are more intrusive.



# How does it work?

- Questioned items from crime scene are
  - Collected
  - Identified\*\*
  - Compared
- Known samples from victim, suspect, scene
- Demonstrates association between people, places, and things



# Identity vs. Individualization

- Identity places object in a class
  - Phillips-head screwdrivers
  - Asian males 25-37 years old
  - Convicted federal offenders
- Individualization places an object in a class with one member
  - The screwdriver that pried open the window at 223 Baker Street
  - John Wu
  - Inmate #24568, Smith, Joseph



# Identification sciences

- Forensic science and biometrics both apply various identification sciences
  - some the same and some unique to each
  - although they do so for different reasons
- Biometrics applies to a pre-event situation
  - gaining access, surveillance, or verification
  - biometrics chooses which mode of identification will be used



# Forensic science is history

- “Very short term archaeology”
- Heading into investigation (site), you don’t know what you’ll find as evidence (artifacts)
- You don’t get to pick your methods in advance
- Has implications for methods utilized



# Identification sciences

- Forensic science, however, applies to post-event situations
  - forensic science reconstructs past criminal events to assist adjudication
  - forensic scientists never know which mode of identification will be used ahead of time
  - they must sort through all of the information to determine what methods to use



# Example: Homicide

- Body dumped
  - Autopsy
    - Blunt force trauma
- Evidence collected
  - Victim
    - Fibers
    - Hairs
    - Duct tape
    - Tire tracks (scene)
    - Known blood, hairs



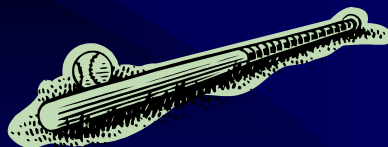
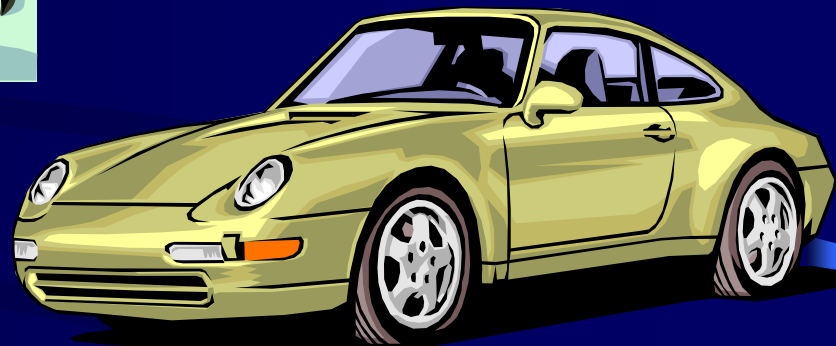


# Example: Homicide



- Suspect: Evidence

- Carpet from house
- Liner from car trunk
- Hairs from him and dog
- Fingerprints
- Baseball bat from car





# Results



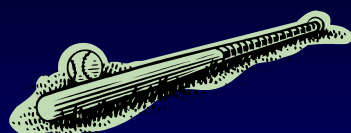
Hairs from  
suspect and his  
dog



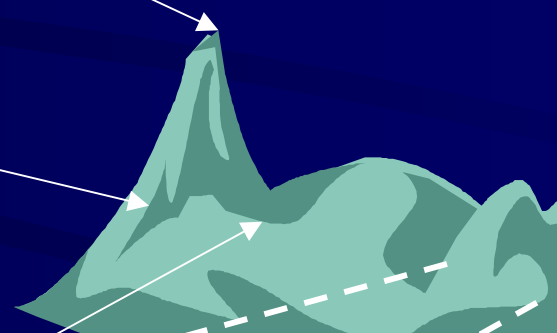
Carpet fibers  
from house and  
car trunk

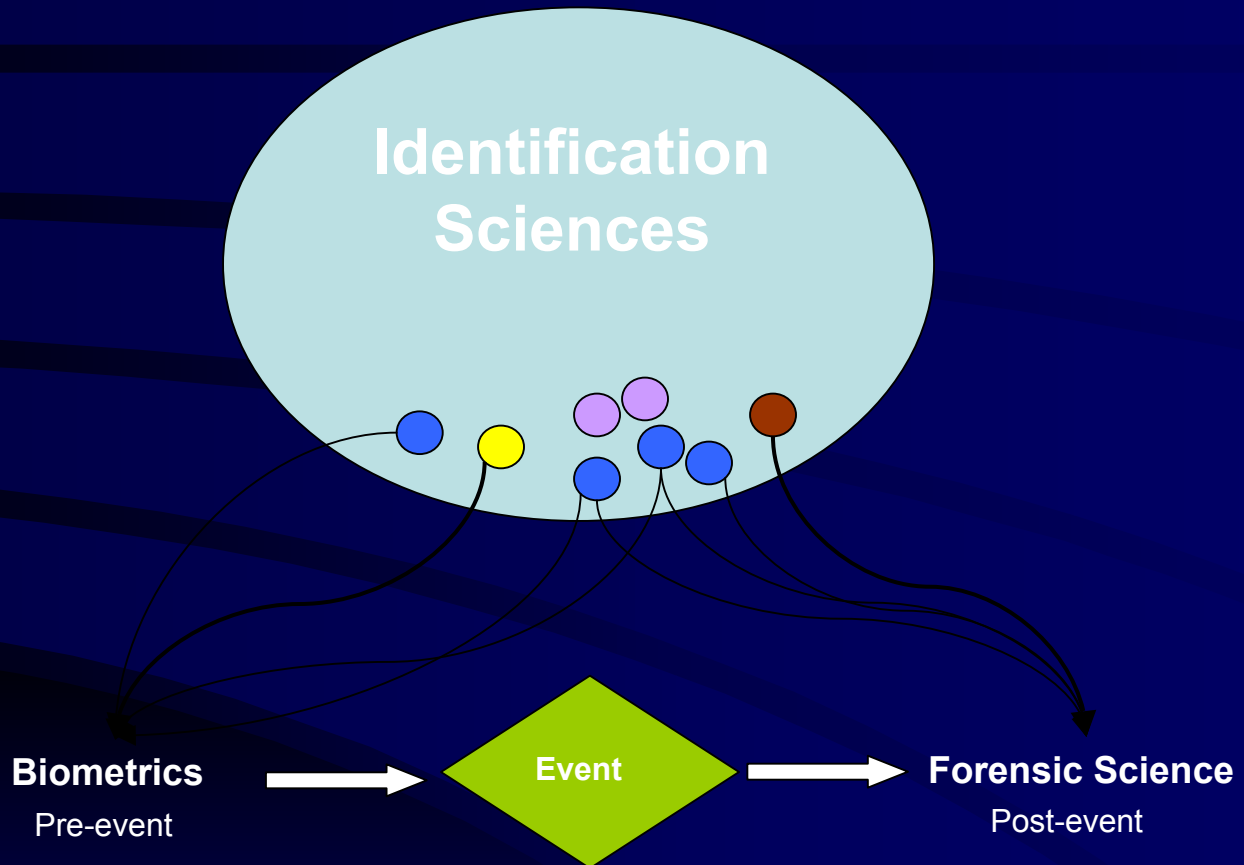


**Fingerprints**



**Blood**, hairs  
on bat

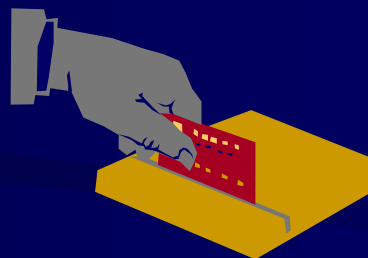






# Why define and separate?

- Differences:
  - Functions
  - Applications
  - Disciplines-Research
  - Funding sources
  - Goals
  - Outcomes
- Similarities
  - Technology
  - Metrics (human anatomy/physiology)





Richard W. Vorder Bruegge  
FBI Forensic Audio, Video and  
Image Analysis Unit (FAVIAU)  
Building 27958A, Quantico, VA 22135  
email:  
[rvorderbruegge@fbiacademy.edu](mailto:rvorderbruegge@fbiacademy.edu)  
703-632-6315