Forensic Fingerprint Analysis Basics

Training Module Workbook

Forensic Training Network
660 4th Street #285
San Francisco, CA 94107
1-866-963-6835
info@forensic-training-network.com
www.forensic-training-network.com

Thank you for your participation in this training module. The module is available online and is available 24 hours a day and 7 days a week for 30 days after enrollment. The course is self-paced, which allows you to control the progression of the training. You may pause and resume as often as needed. Simply close your browser to quit and login at http://www.forensic-training-network.com/_pages/st-signin.html to resume.

System Requirements

IMPORTANT! PLEASE READ!

To ensure proper playback, please make sure you understand the following instructions and system requirements:

- High speed Internet connection
- Adobe Flash Player version 10 or later
- Internet Browser: Mozilla Firefox 3 or later (highly recommended), Internet Explorer 6 or later, Safari 3 or later
- Always login from the same computer to be prompted to resume where you left off
- If you experience an issue downloading your certificate, please take a screen capture of your quiz results and send via email to info@forensic-training-network.com

Instructions

This training incorporates recorded audio. Therefore, it is highly recommended to turn on your computer speakers prior to starting this training. If you are unable to listen to the audio, you may click on the 'Audio Script' tab in the navigation pane to read along.

At any time during the training, you may go back to a previous slide by clicking on the desired topic in the navigation pane. However, please do not skip ahead. Please complete each slide before advancing.

Fill in the blanks throughout this workbook as you go along to provide a complete record of the material covered.

There will be a quiz at the end of the training. You must receive a score of 85% or higher to pass and receive a certificate of completion.

Course Content and Qualifications

This course was developed by certified latent print examiners and a certified crime scene analyst. Their biographies are provided below.

Boyd Baumgartner

Boyd Baumgartner is founder and owner of Forensic Science Software Design and Development. He takes a holistic approach to fingerprints having worked as a Jail Identification Technician, a Ten Print Examiner and currently as a Latent Fingerprint Examiner whose duties include Crime Scene Investigation, Digital Photography, Forensic Digital Imaging and Latent Print Analysis. He has worked with the National Police Activities League's "Science on Patrol" series and speaks with various professional and social organizations on the topic of Fingerprint Identification. Boyd holds a Bachelor of Science in Biology from Indiana University and is certified as a Ten Print Examiner by the International Association for Identification

Jennifer Hannaford

Jennifer received her B.Sc in Forensic Science from the California State University (Sacramento) and is working on her Masters in Forensic Science at Boston University. She started with the Oakland Police Department's Criminalistics Division in 1995 and worked in the areas of Latent Print comparisons, DNA analysis and Crime Scene Investigation. She was hired by the Vermont Forensic Laboratory in 2002 and assisted with the resurrection of their Latent Print Unit, responsible for fingerprint comparisons and identifications. Jennifer was hired in 2005 by the Boston Police Department as the first civilian director of the Latent Print Unit and has guided the unit through a complete restructuring after it had been closed in 2004 due to an erroneous individualization. Jennifer has been certified by the American Board of Criminalists since 1999 and became a Certified Latent Print Examiner in 2006. She has completed training in a wide variety of forensic disciplines at the California Criminalistics Institute, as well as training in fingerprint pattern recognition and comparison through both the FBI and the IAI.

Larry Barksdale

Larry Barksdale has been a police officer with the Lincoln Nebraska Police since 1971. He started as a Uniform Patrol Officer in the Planning and Research Unit before becoming a Detective Sergeant in 1977. Larry worked as a General Assignment Detective until 1995 when he was assigned the role of Case Manager for the Criminal Division. In 1996 Larry became the supervisor of the Crime Scene Tech Unit, which is a position he still holds today.

Mr. Barksdale has an Associate of Arts degree from Dodge City Community College, a Bachelor of Science in Criminal Justice from the University of Nebraska at Omaha, and a Master of Arts degree in Political Science from the University of Nebraska at Lincoln. Larry has also successfully completed additional coursework in chemistry, biology and mathematics from Southeast Community College in Lincoln, Nebraska. He also completed an additional year of graduate study in criminal justice at Sam Houston University in Huntsville, Texas.

Larry is certified by the International Association for Identification as a Crime Scene Analyst. He is also a certified Professional Law Enforcement instructor in Nebraska. Larry is currently an Adjunct Professor of Practice Forensic Science at the University of Nebraska at Lincoln. He was an adjunct instructor for 9 years in the Forensic Science Program at Wesleyan University in Nebraska. Larry has been a guest lecturer for courses at Lagos State University, Nigeria as well at numerous other colleges and schools.

Mr. Barksdale is on the editorial review committee for The Forensic Examiner. He is a member of the TALE committee of the Institute for Linguistic Evidence. Larry is a past president of the International Association of Auto Theft Investigation and the Nebraska Chapter of the International Association for Identification.

Module Duration

This module is designed to be completed from start to finish in **1 hour**. However, times may vary since the training is self-paced.

Objectives

After completing this training, you will have learned…

- gain a basic understanding of the anatomy and development of friction ridge skin
- understand why fingerprints are permanent and unique
- recognize various details used for fingerprint classification and comparison
- understand why and how fingerprints are used in criminal investigations
- gain a basic understanding of biometric fingerprint recognition and the method used to manually compare fingerprints
- be aware of existing quality assurance guidelines and resources

Agenda

- Friction Ridge Skin and Patterns
- Fingerprint Details
- Fingerprint Evidence
- Fingerprint Comparisons
- Quality Assurance
- Legal Challenges
- Case Examples

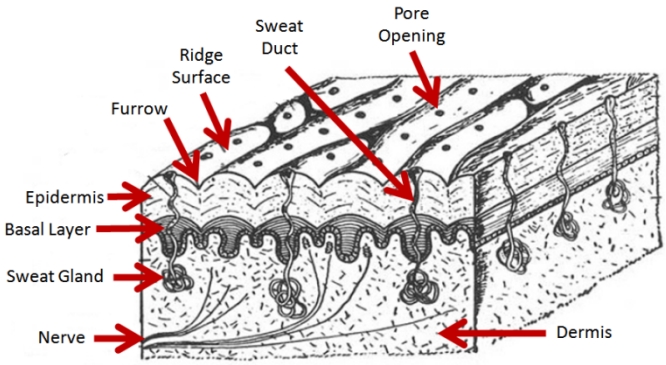
Friction Ridge Skin & Patterns

Section Objectives

- Provide a basic understanding of the anatomy and development of friction ridge skin
- Introduce the concepts of friction ridge skin permanence and uniqueness

Friction Ridge Skin

Friction ridge skin covers our fingertips, palms and soles of our feet and is made up of "_____" or raised areas and "_____" or crevices that create unique patterns. Unlike other skin types, friction ridge skin only contains one type of gland and does not contain _____ follicles.

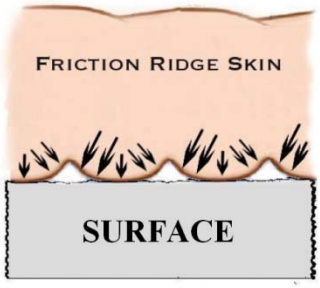


A cross section of friction ridge skin with the various layers and structures labeled is shown.

Friction Skin, Ridges and Furrows website. Available at: http://ridgesandfurrows.homestead.com/friction_skin.html. Accessed July 20, 2010.

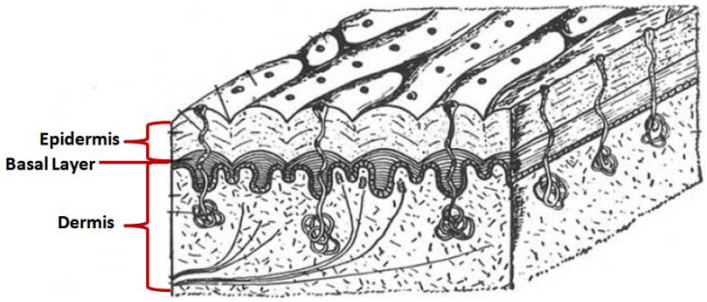
Ridges and Furrows

The ridges and furrows that exist on the surface of the skin are actually reflections of structures located deep within the skin. Friction ridge skin is specialized to provide _____ and prevent _____. The raised ridges interact with surfaces as shown below and aid us in _____ and _____.



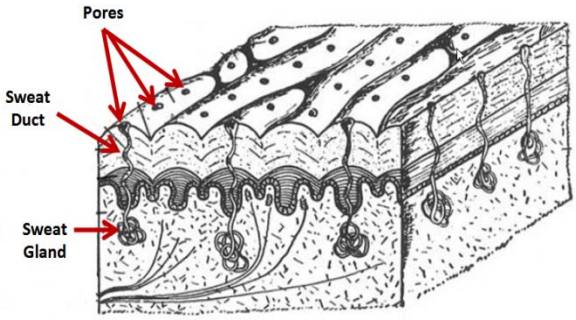
Try this!
Place your hand palm side up on a table, so that the back of your hand is touching the table and slide your hand across the table. Now, flip your hand over so that your palm is touching the table and slide your hand again. Do you notice a difference? It should be more difficult to slide your hand across the table with your palm facing down due to the friction ridge skin.

Dermis and Epidermis



The skin consists of two major layers known as the dermis or _____ skin and the epidermis or _____ skin. The upper layer of the dermis is known as the _____layer, which is responsible for generating new epidermal skin as it continuously wears down. In order to change the pattern of your friction ridge skin, you would need to cut the skin deep enough to reach the basal layer. This would affect the proliferation of new skin and leave a scar. However, scars help make fingerprints even more unique.

Sweat Glands, Ducts and Pores



The sweat glands contain a variety of compounds generated and stored by the body. In friction ridge skin, they are responsible for releasing _____ into the sweat ducts and through the _____ in the surface of the skin. This perspiration keeps friction ridge skin _____ and creates good _____ between skin and surfaces.

Who Has Friction Ridge Skin?

HUMAN

KOALA

Henneberg, Macie, Kosette Lambert and Chris Leigh (1997) Fingerprint Homoplasmy: Koalas and Humans. *NaturalScience.* Available at: http://naturalscience.com/ns/articles/01-04/ns_hll.html. Accessed on April 22, 2010.

Development of Friction Ridge Skin

- Begins to form between _____th and _____th week of pregnancy (Babler)
- Fully formed by the _____th week (Babler)
- Ridge patterns are _____ until death (Ashbaugh)
- _____ configuration of ridges (Ashbaugh)

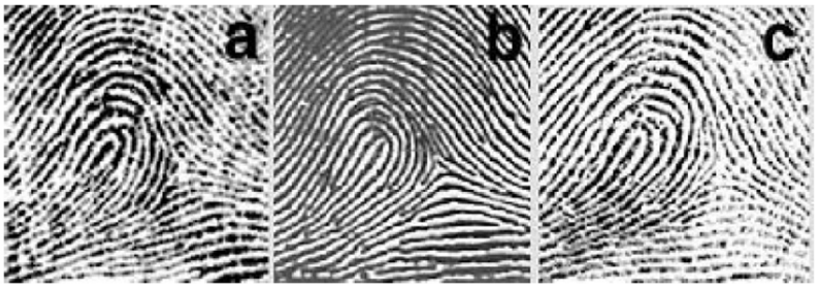
Friction Ridge Patterns

- _____
  - Directly affect the developmental timeline of the fetus
  - Determines what type of pattern forms
- _____ in the womb
  - Surface tension across the skin
  - Force of gravity
  - Amniotic fluid pressure
  - Presence of twin
  - Placement of hands in the womb
- Since no two individuals have the same genetic material AND environmental fetal stresses, fingerprints are unique

Ashbaugh, David R. (1999) *Quantitative-Qualitative Friction Ridge Analysis*. New York: CRC Press.

Friction Ridge Patterns

No two areas of friction ridge skin on any two individuals, including identical twins, contain the exact same pattern



What are Fingerprints?

- Fingerprints are impressions of friction ridge patterns on fingertips
- Sweat covers ridges and leaves impressions on touched surfaces
- Oils and other chemicals coat ridges and leave impressions on touched surfaces

Fingerprint Details

Section Objectives

- Provide a basic understanding of the various levels of fingerprint details currently used to classify and compare fingerprints
- Upon completion, one is expected to…
  - Determine ridge flow
  - Identify ridge events
  - Understand the concept of ridge dimensions

Fingerprint Details

- Level **1** Detail
  - Ridge _____: direction ridges flow
- Level **2** Detail
  - Ridge _____: breaks, splits and endings within the ridge pattern
- Level **3** Detail
  - Ridge _____: dimensional attributes and spatial location of pores along the ridges

Ridge Flow

Federal Bureau of Investigation (1973) *The Science of Fingerprints: Classifications and Uses*. Project Gutenburg Website. Available at: htm.h-19022/h-19022/19022/files/org.gutenberg.www//:http. Accessed on July 20, 2010.

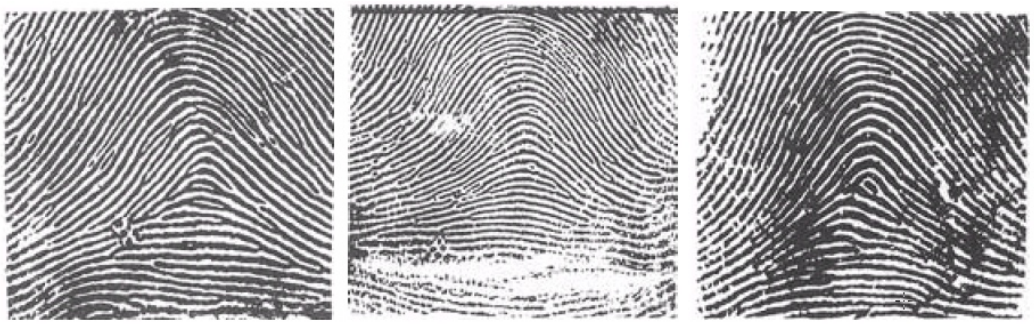
The ridge flow is determined by the configuration and direction the ridges flow, which defines the "_____."

Loop

In the **LOOP** pattern, the ridges enter from either side, re-curve and exit the same side they entered

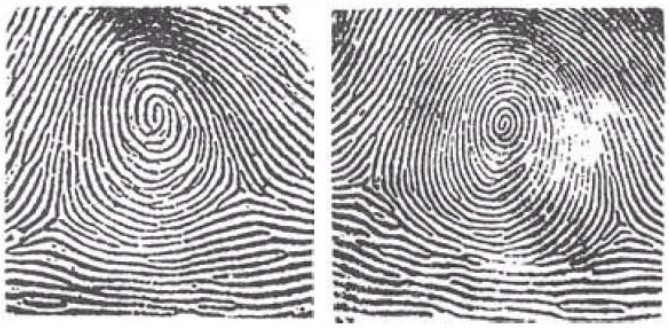
Arch

In the **ARCH** pattern, the ridges enter from one side, rise and generally exit the _____ side



Whorl

In the **WHORL** pattern, the ridges tend to make a _____



Ridge Events (Level 2 Detail)

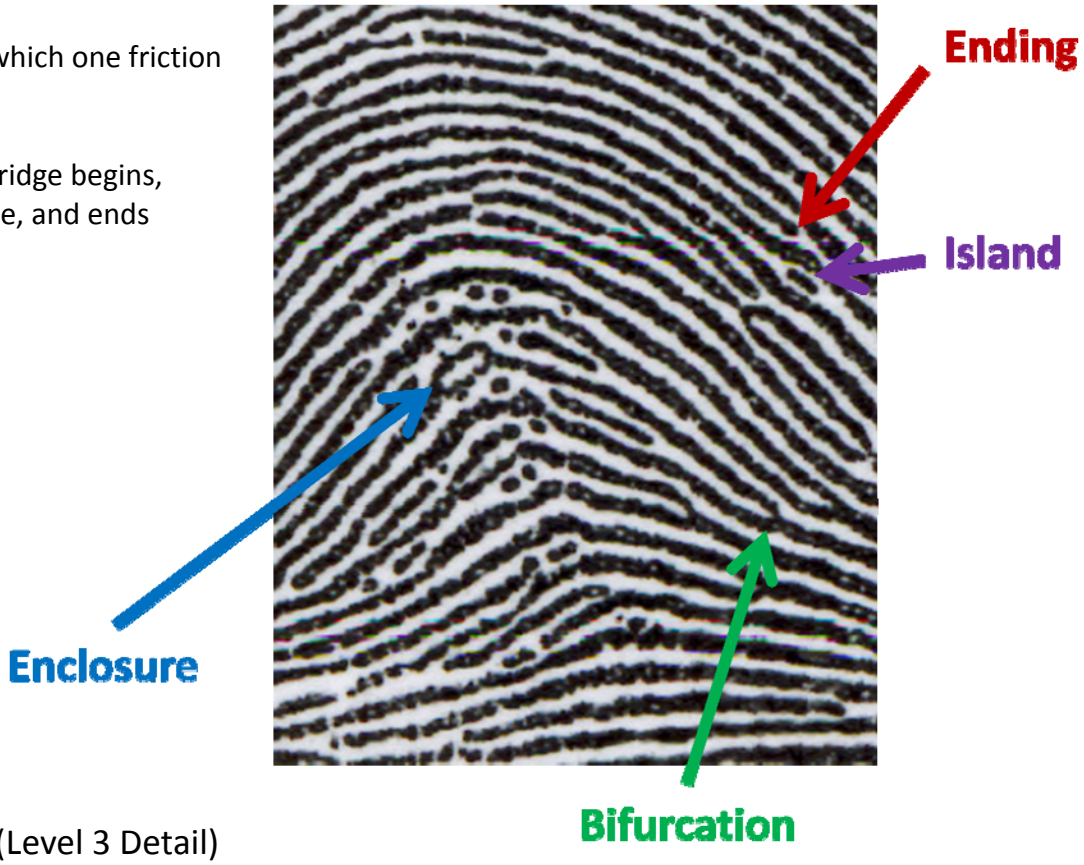
Ridge events are used to _____ a fingerprint

Ending: point at which one friction ridge terminates within the friction ridge structure

Enclosure: single friction ridge that splits and rejoins after a short course and continues as a single friction ridge

Bifurcation: point at which one friction ridge divides into two

Island: Single friction ridge begins, travels a short distance, and ends



Ridge Dimensions (Level 3 Detail)

- Each ridge has a unique…
  - Width
  - Shape
  - Edge contour

- Pores vary in…
  - Number
  - Shape
  - Placement
  - Centrally
  - Abutting one side

Fingerprint Evidence

Section Objectives

- Explain why fingerprints are used in forensic science
- Provide a basic historical perspective
- Provide a basic understanding of what fingerprint evidence may or may not mean
- Explain various types of fingerprint evidence and detection methods utilized

Fingerprints and Forensic Science

- Combination of ridge patterns , events and dimensions is _____
- Friction ridges develop at the _____ stage and are in their final form before birth
- Ridges are _____ throughout life except for severe trauma which leaves permanent scarring
- Friction ridge patterns vary within limits which allow for _____

History of Fingerprint Analysis

In recorded history, the use of fingerprint impressions date back thousands of years and were first encountered on artistic clay pieces left by artists as possible signatures. Today's use of fingerprints, include their examination for personal identification, such as criminal cases, and more recently, computer file security, as keys on door locks and as a means of payment.

While fingerprints have been present throughout history, the discovery of their persistence and uniqueness and their application to criminal identification have all been relatively new discoveries. Within the past 200 years, many contributions to the advancement of fingerprint analysis have been pioneered.

1685	
1686	
1788	
1823	
1858	
1880	

1882	
1888	
1892	
1896	
1903	
1924	
1999	
2010	

Meaney, Jim (2005) *History of Fingerprints Timeline.* Fingerprint America Website. Available at: http://www.fingerprintamerica.com/fingerprintHistory.asp. Accessed April 16, 2010.

German, Ed (2010) *The History of Fingerprints.* Onin.com website. Available at: http://onin.com/fp/fphistory.html. Accessed April 16, 2010.

Significant Dates and Events. Ridges and Furrows website. Available at: http://ridgesandfurrows.homestead.com/landmark.html. Accessed July 20, 2010.

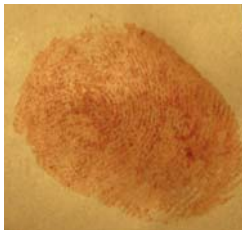
Barnes, Jeffery (2009) *The Fingerprint Sourcebook* (Chapter 1). National Institute of Justice website. Available at: http://www.ncjrs.gov/pdffiles1/nij/225321.pdf. Accessed July 20, 2010.

Fingerprints as Evidence

- Fingerprints often left behind at crime scenes
- Many criminal cases rely solely on fingerprint evidence
- Provide information about…
  - _____
  - _____
- Lack of prints does NOT prove _____
- Presence of prints does NOT prove _____
- All identifications must be followed up by the investigator

Fingerprint Evidence Detection

- _____
  - Cannot be seen by the naked eye
  - Most commonly detected by brushing surfaces with fingerprint power



- _____
  - Visible to the naked eye
  - Result of medium transfer, such as blood or grease

- _____
  - Impression on soft surface

Factors Affecting Recovery

- Surface
  - Porous versus non porous
- Fingerprint Residue
  - Blood
  - Sweat
  - Foreign Material
- Skin Condition
  - Sweaty
  - Dry
  - Gloved
- Environmental Conditions
  - Rain and snow
  - Heat and cold
  - Humidity and aridity
- Additional Factors
  - Touched or handled by others
  - Contamination

Latent Print Detection

Record relevant notes below

_____

_____

_____

_____

_____

_____

_____

_____

_____

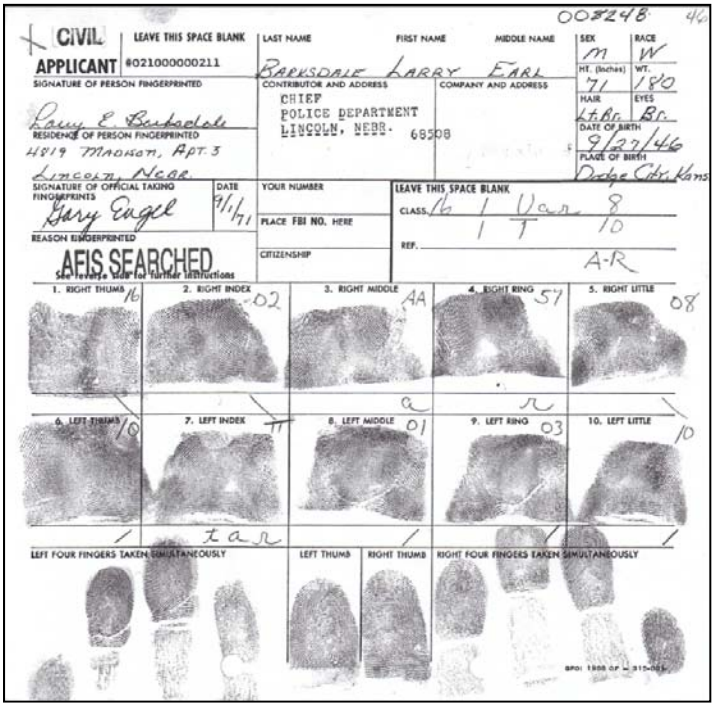
Federal Bureau of Investigation (2000) *Processing Guide for Developing Latent Prints*. FBI Website. Available at: http://www.fbi.gov/hq/lab/fsc/backissu/jan2001/lpu.pdf. Accessed April 16, 2010.

Chesapeake Bay Division IAI (2007) *Latent Fingerprint Processing Techniques - Selection & Sequencing Guide*. CBD-IAI Website. Available at: http://www.cbdiai.org/Reagents/main.html. Accessed July 21, 2010.

Chemical and Physical Development Methods for Latent and Patent Friction Ridge Impressions. Ridges and Furrows Website. Available at: http://ridgesandfurrows.homestead.com/latent_print_development.html. Accessed July 21, 2010.

Known Print Collection

- Collected from victims, suspects and others with access to evidence
- Captured in ink on a tenprint card or electronically



Fingerprint Comparisons

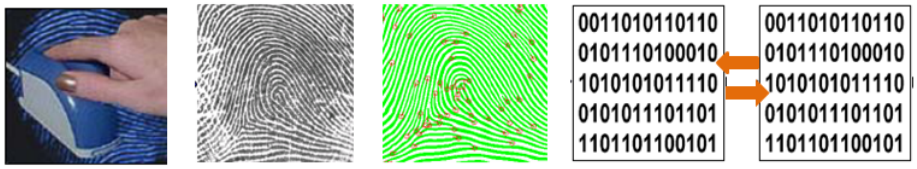
Section Objectives

- Explain the basic concept of biometrics and automated fingerprint recognition
- Provide a basic understanding of the function of AFIS
- Describe the ACE-V method used to compare fingerprints and draw conclusions
  Introduce the concept of blind verification

Comparing Fingerprints

- Evidence compared against known exemplar fingerprints
- Evidence compared against fingerprint data stored within _____ and _____ using biometrics
- Biometrics
  - Characteristic
    - *"A measurable biological (anatomical and physiological) and behavioral characteristic that can be used for _____ recognition"* (NSTC)
  - Process
    - *"Automated methods of recognizing an individual based on measurable biological (anatomical and physiological) and behavioral characteristics"* (NSTC)
  - Fingerprint Identification
    - Level __ and/or Level __ details are automatically compared (NSTC)

Biometric Process and Components



Sensor used to collect fingerprint	System captures image and software processes it	Software extracts features	Signal processing algorithms create a template	Matching algorithms compares biometric templates
			Templates are stored for future comparisons	Results from comparison are used during the final decision process

NSTC (2006) Biometrics Overview. Biometrics.gov Website. Accessed July 21, 2010.

AFIS

- Digital imaging system used to obtain, store and compare fingerprint data
- Automated recognition
  - Evidentiary prints are uploaded into system
  - Examiner plots point for comparison (level 1 and/or level 2 detail)
  - Specialized software searches database for similar characteristics
- Provides list of candidates for examiner to further compare
- Does NOT determine whether fingerprints match or not

NSTC (2006) *Fingerprint Recog*nition. Biometrics.gov Website. Available at: http://www.biometrics.gov/Documents/FingerprintRec.pdf. Accessed on July 20, 2010.

Fingerprint Comparison Method

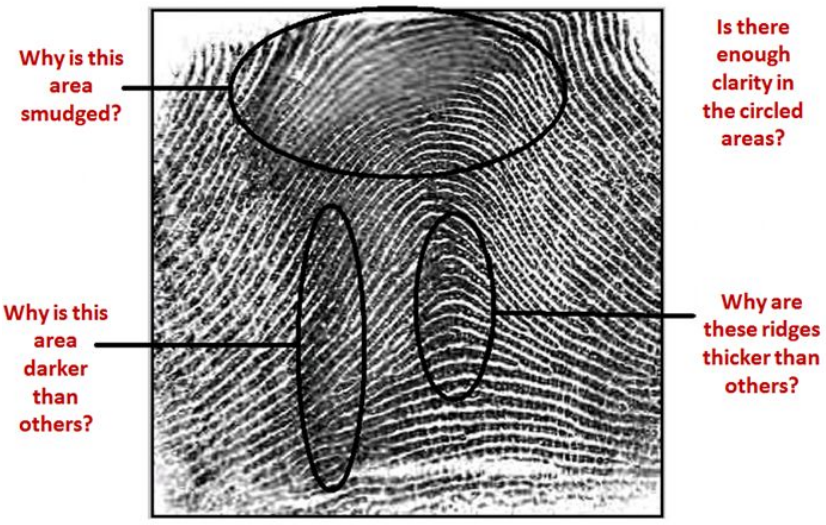
ACE-V: **A**_____, **C**_____, **E**_____ and **V**_____

- Relies on _____ testing (Wertheim)
  - Method used by many scientific disciplines to draw valid conclusions
  - Basic steps include:
    - Making an _____
    - Forming a hypothesis
      - Tentative explanation for an observation that can be tested by further investigation
    - Testing the hypothesis through _____
    - Drawing a _____ based on the test results

ACE-V

The ACE-V method is thoroughly defined in Michelle Triplett's Fingerprint Dictionary. The detailed descriptions provided in this dictionary are presented here for your reference.

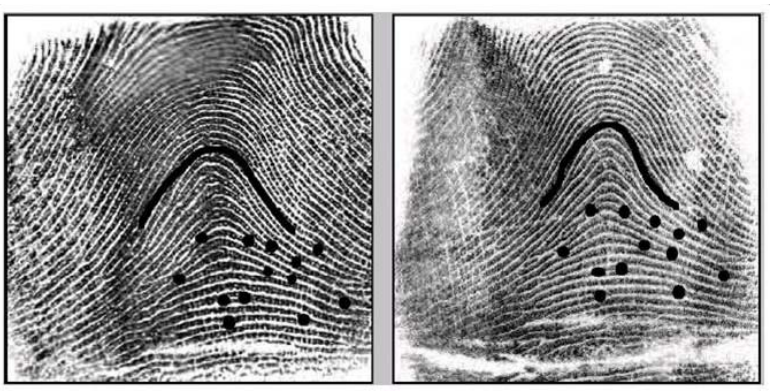
Analysis



"The first step, analysis, requires the expert to examine and analyze all variables influencing the friction ridge impression in question. This begins with an understanding of friction ridged skin and the transition of the three dimensional skin structure to a two dimensional image. When examining latent fingerprints, several factors must be accounted for and understood. Some of these factors are the material upon which the latent print has been deposited, the development process(es), pressure distortion, and external elements (blood, grease, etc.). The quantity and quality of the latent print ridges influences the examiners ability to perform the next phase. The conclusion of the analysis process is a determination as to whether sufficient information exists to proceed to the next phase."

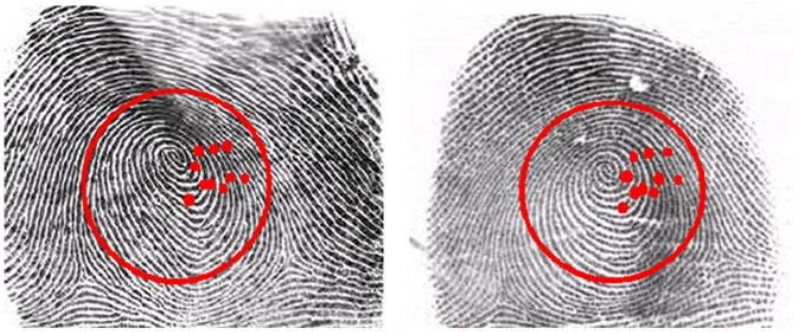
Comparison

"The comparison process introduces the known exemplar with which the latent print is to be compared. At this point, there is also another analysis phase taking place. This analysis is of the known exemplar in an effort to determine the suitability for achieving the conclusion stated above. It is possible that the known exemplar may contain fingerprint images that are too heavily inked or smudged, and thereby unreliable, thus preventing a conclusive comparison. The comparison process begins with determining the general ridge flow and shape (Level 1 Detail) in an effort to properly orient the latent print with a corresponding area of the known exemplar fingerprints. This is generally followed by selecting key focal characteristics (Level 2 Detail), understanding their position, direction and relationship and then comparing this formation with the formations in the known exemplar. The quality and quantity of this information directly affects the ease or difficulty of this process."



Evaluation

"The result of the comparison is the evaluation process or making a conclusion. The general fingerprint community refers to the conclusions drawn as being one of three choices. First, the two impressions (latent fingerprint and the known fingerprint) were made by the same finger of the same person. Second, the latent impression was not made by any of the fingers of the exemplar fingerprints. And third, a conclusive comparison could not be achieved, generally due to the lack of adequate clarity or the absence of comparable area in the known exemplar. In order to establish an identification decision, this process must insure that all of the fingerprint details are the same and maintain the same relationship, with no existing unexplainable differences."



IDENTIFICATION

Verification

"The final process is verification. The general rule is that all identifications must be verified by a second qualified expert. This verification process by a second examiner is an independent examination of the two fingerprint impressions (latent fingerprint and known exemplar fingerprint) applying the scientific methodology of analysis, comparison and evaluation..."

Hypothesis & Conclusions

Were the fingerprints in question made by the same individual's finger, or were they made by two different individuals' fingers?

Conclusions
Fingerprints were made by the same individual – _____
Fingerprints were not made by the same individual – _____
Can't be determined with the information available - _____

SWGFAST Standards for Conclusions

Identifications

- Current standard
  - Standardization committee of the IAI – 1973/74 report
    - *"No valid basis exists at this time for requiring that a pre-determined minimum number of friction ridge characteristics must be present in two impressions in order to establish positive identification."*
    - *"…the I.A.I. adopted the position that each identification represents a unique set of circumstances, and the number of required matching characteristics is dependent upon a variety of conditions which automatically rule out the practicality of mandating a pre-determined minimum."*
      http://www.latent-prints.com/iai_standardization_committee.htm
- Based upon lab protocols and examiner's experience and training
  - _____
  - _____

Blind Verification

- Studies have shown that the context or conclusions of others may create _____ and lead to false identifications or exclusions (Dror et al)
- FBI performs blind verification on select cases to rule out contextual or confirmation bias (Soltis)
- Difficult to implement due to _____ and limited _____

Quality Assurance

Section Objectives

- Introduce SWGFAST and relevant publications
- Provide information about latent print certification and laboratory accreditation
- Bring awareness to recent legal challenges and steps taken to address them

SWGFAST

- Scientific Working Group on Friction Ridge Analysis, Study and Technology
- Sponsored by the FBI and National Institute of Justice (NIJ)
- Publish guidelines and standards to improve quality of latent print analysis
    - Methodology
    - Examiner Conduct
    - Quality Assurance
    - Documentation
    - Examiner Qualifications
    - Training
    - Proficiency Testing
    - Digital Imaging
    - Conclusions

Quality Assurance

- Actions taken throughout the entire agency to assure the quality of latent print examination meets specified standards
- SWGFAST Quality Assurance Guidelines for Latent Print Examiners
    - Training
    - Documentation
    - Verification
    - Proficiency Testing
    - Corrective Action
    - Professional Development/Continuing Education
- Moving toward more _____ standards and requirements

Certification

- Provides confidence that an examiner meets specific qualifications
    - Education/Continuing Education
    - Training
    - Proficiency Testing
    - Casework Experience
    - Examination
- Currently not required, but highly recommended by the National Academy of Science (NAS) in 2009 report
- Types of certification currently available
    - International Association for Identification
        - Tenprint Examiner
        - Certified Latent Print Examiner (C.L.P.E.)
    - American Board of Criminalists

Accreditation

- Formal recognition that an agency meets established standards
- Provided by internationally recognized nonprofit forensic associations composed of experienced forensic scientists
- National Academy of Sciences 2009 report states it should be mandatory
- Accrediting agencies
    - American Society of Crime Lab Directors/Laboratory Accreditation Board (ASCLD/LAB)
    - Forensic Quality Services – International (FQS-I)

Legal Challenges

- Subjected to many _____ challenges
- Main objections (Zabel)
    - Lack of _____ basis
    - Lack of _____
    - Lack of _____
    - Lack of peer-reviewed publications
- Action taken to overcome objections
    - Adopt NAS recommendations
    - SWGFAST developing new standards
        - Terminology
        - Validation and performance checks

Case Examples

Clark Rockefeller Care

Use this space below to record notes about this case if you wish.

_____

_____

_____

_____

_____

_____

_____

_____

_____

The Power of AFIS

The "Night Stalker" (Lerner et al, Lyle, Lodi News-Sentinel)

- String of brutal murders and rapes took place in California between June 1984 and August 1985
- An attack on August 24, 1985 led to the discovery of a stolen vehicle believed to be used by the perpetrator
- A latent print was detected in the vehicle using Super Glue fuming and laser light
- The latent print was searched against known prints within AFIS
- Richard Ramirez was identified as the source of the latent print
- Authorities released a photograph of Richard Ramirez
- Ramirez was recognized and detained by members of the public until police arrived on August 31, 1985

False Identification – The Brandon Mayfield Case

Use the space below to record notes about this case if you wish.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Office of the Inspector General (2006) *Special Report: A Review of the FBI's Handling of the Brandon Mayfield Case (Unclassified and Redacted).* The United States Department of Justice Website. Available at: http://www.justice.gov/oig/special/s0601/PDF_list.htm. Accessed on April 26, 2010.

Conclusion

- Friction ridge skin is made up of ridges and furrows to create a unique pattern fully developed before birth
- Fingerprints are chance impressions of friction ridge patterns found on fingertips
- Fingerprints have been used in criminal investigations for over 100 years
- Since fingerprints are unique and permanent, they are ideal for use in forensics
- Three types of fingerprints are discovered at crime scenes – latent, patent and plastic. Latent prints are the most common and require the use of special techniques to be detected.
- Fingerprints are classified and compared on three levels of detail: Ridge flow, Ridge Events and Ridge Dimensions
- Evidence is compared against suspect and/or fingerprint data stored in AFIS
- Comparing fingerprints is performed using a method known as ACE-V, which is similar to using the scientific method of hypothesis testing

Citations

Henneberg, Macie, Kosette Lambert and Chris Leigh (1997) Fingerprint Homoplasmy: Koalas and Humans. *NaturalScience.* Available at: http://naturalscience.com/ns/articles/01-04/ns_hll.html. Accessed on April 22, 2010.

Friction Skin, Ridges and Furrows website. Available at: http://ridgesandfurrows.homestead.com/friction_skin.html. Accessed July 20, 2010.

Babler, William J. (1991) *Embryologic Development of Epidermal Ridges and Their Configurations.* CPLEX Website. Available at: http://www.clpex.com/Information/Babler/Babler_W_1991.pdf. Accessed on April 16, 2010.

Ashbaugh, David R. (1999) *Quantitative-Qualitative Friction Ridge Analysis*. New York: CRC Press.

Federal Bureau of Investigation (1973) *The Science of Fingerprints: Classifications and Uses*. Project Gutenburg Website. Available at: htm.h-19022/h-19022/19022/files/org.gutenberg.www//:http. Accessed on July 20, 2010.

Meaney, Jim (2005) *History of Fingerprints Timeline.* Fingerprint America Website. Available at: http://www.fingerprintamerica.com/fingerprintHistory.asp. Accessed April 16, 2010.

German, Ed (2010) *The History of Fingerprints.* Onin.com website. Available at: http://onin.com/fp/fphistory.html. Accessed April 16, 2010.

Significant Dates and Events. Ridges and Furrows website. Available at: http://ridgesandfurrows.homestead.com/landmark.html. Accessed July 20, 2010.

Barnes, Jeffery (2009) *The Fingerprint Sourcebook* (Chapter 1). National Institute of Justice website. Available at: http://www.ncjrs.gov/pdffiles1/nij/225321.pdf. Accessed July 20, 2010.

Olsen, Robert (1987) The Will and William West Case :A Fingerprint Fable. SCAFO Website. Available at: http://www.scafo.org/library/110105.html. Accessed July 21, 2010.

Federal Bureau of Investigation (2008) The Integrated Automated Fingerprint Identification System. FBI Website. Available at: http://www.fbi.gov/hq/cjisd/iafis.htm. Accessed July 21, 2010.

Federal Bureau of Investigation (2010) *IAFIS Fact Sheet*. FBI Website. Available at: http://www.fbi.gov/hq/cjisd/iafis/iafis_facts.htm. Accessed July 21, 2010.

Federal Bureau of Investigation (2000) *Processing Guide for Developing Latent Prints*. FBI Website. Available at: http://www.fbi.gov/hq/lab/fsc/backissu/jan2001/lpu.pdf. Accessed April 16, 2010.

Chesapeake Bay Division IAI (2007) *Latent Fingerprint Processing Techniques - Selection & Sequencing Guide*. CBD-IAI Website. Available at: http://www.cbdiai.org/Reagents/main.html. Accessed July 21, 2010.

Chemical and Physical Development Methods for Latent and Patent Friction Ridge Impressions. Ridges and Furrows Website. Available at: http://ridgesandfurrows.homestead.com/latent_print_development.html. Accessed July 21, 2010.

Spear, Terry, Neda Khoshkebari, Jeanne Clark and Michael Murphy. *Summary of Experiments Investigating the Impact of Fingerprint Processing and Fingerprint Reagents on PCR-based DNA Typing Profiles*. CAC Website. Available at: http://www.cacnews.org/training/fingerprint_effects_DNA.pdf. Accessed July 21, 2010.

Federal Bureau of Investigation. *Recording Legible Fingerprints.* FBI Website. Available at: http://www.fbi.gov/hq/cjisd/takingfps.html. Accessed April 16, 2010.

NSTC Subcommittee on Biometrics (2006) *Biometric Overview*. Biometrics.gov Website. Available at: http://www.biometrics.gov/Documents/BioOverview.pdf. Accessed July 21, 2010.

NSTC Subcommittee on Biometrics (2006) *Fingerprint Recognition*. Biometrics.gov Website. Available at: http://www.biometrics.gov/Documents/FingerprintRec.pdf. Accessed July 21, 2010.

Wertheim, Pat (2000) *Scientific Comparison and Identification of Fingerprint Evidence.* SCAFO Website. Available at: http://www.scafo.org/library/160501.html. Accessed on April 20, 2010.

Triplett, Michelle (2010) *Michelle Triplett's Fingerprint Terms*. Available at: http://www.fprints.nwlean.net/. Accessed April 16, 2010.

SWGFAST (2003) *Standards for Conclusions*. SWGFAST Website. Available at: http://www.swgfast.org/documents/conclusions/030911_Standards_Conclusions_1.0.pdf. Accessed on April 16, 2010.

IAI Standardication Committee. Latent-Prints.com Website. Available at: http://www.latent-prints.com/iai_standardization_committee.htm. Accessed July 21, 2010.

Dror, Itiel E., David Charlton and Ailsa E. Péron (2006) Contextual information renders experts vulnerable to making erroneous identifications. *Forensic Science International.* 156: 74-78.

Soltis, Greg (2008) *The State of FBI Laboratory's Latent Print Operation: Four Years After Madrid*. Onin.com Website. Available at: http://www.onin.com/fp/FBI_LPOU_SLIDES_IAI_2008_AUG_18.pdf. Accessed on April 20, 2010.

SWGFAST Website. Available at: http://www.swgfast.org/. Accessed July 21, 2010.

SWGFAST (2006) *Quality Assurance Guidelines for Latent Print Examiners.* SWGFAST Website. Available at: http://www.swgfast.org/documents/quality-assurance/060928_Quality-Assurance_Latent_3.0.pdf. Accessed on April 16, 2010.

National Research Council of the National Academies (2009). *Strengthening Forensic Science in the United States: A Path Forward.* The National Academies Press Website. Available at: http://www.nap.edu/catalog.php?record_id=12589. Accessed on April 16, 2010.

International Association for Identification Website. Available at: http://www.theiai.org/. Accessed July 21, 2010.

American Board of Criminalistics Website. Available at http://www.criminalistics.com/. Accessed July 21, 2010.

ASCLD-LAB Website. Available at: http://www.ascld-lab.org/. Accessed July 21, 2010.

Forensic Quality Services Website. Available at: http://www.forquality.org/. Accessed July 21, 2010.

German, Ed (2005) *Legal Challenges to Fingerprints.* Onin.com website. Available at: http://onin.com/fp/daubert_links.html. Accessed April 16, 2010.

Zabel, Sandy L. (2005) *Fingerprint Evidence.* Brooklyn Law School Website. Available at: http://wwy.brooklaw.edu/students/journals/bjlp/jlp13i_zabell.pdf. Accessed on April 20, 2010.

SWGFAST (2010) *Standard Terminology of Friction Ridge Examination (draft)*. SWGFAST Website. Available at: http://www.swgfast.org/documents/terminology/100310_Standard_Terminology_1.pdf. Accessed on April 16, 2010.

SWGFAST (2010) *Standard for the Validation and Performance Review of Friction Ridge Impression Development and Examination Techniques (draft)*. SWGFAST Website. Available at: http://www.swgfast.org/documents/validation/100310_DRAFT_Validation_1.0.pdf. Accessed on April 16, 2010.

SWGFAST et al. (2010) The Fingerprint Sourcebook. National Institute of Justice Website. Available at: http://www.ojp.usdoj.gov/nij/pubs-sum/225320.htm. Accessed July 21, 2010.

Lerner, Lee and Brenda Lerner (2006*) Fingerprint Analysis (Famous Cases).* eNotes.com Website. Available at: http://www.enotes.com/forensic-science/fingerprint-analysis-famous-cases. Accessed on April 22, 2010.

Lyle D.P. (2009) On This Day: Richard Ramirez: The Night Stalker. The Writer's Forensic Blog Website. Available at: http://writersforensicsblog.wordpress.com/2009/08/31/on-this-day-richard-ramirez-the-night-stalker/. Accessed July 21, 2010.

Lodi News-Sentinel (1985) New State Computer Finds the 'Night Stalker' Suspect. Google News Website. Available at: http://news.google.com/newspapers?nid=2245&dat=19850904&id=axYzAAAAIBAJ&sjid=RzIHAAAAIBAJ&pg=6907,202419. Accessed April 23, 2010.

Office of the Inspector General (2006) *Special Report: A Review of the FBI's Handling of the Brandon Mayfield Case (Unclassified and Redacted).* The United States Department of Justice Website. Available at: http://www.justice.gov/oig/special/s0601/PDF_list.htm. Accessed on April 26, 2010.

Thank you for participating in this training module!
If you have any questions or comments, please contact us at:

Forensic Training Network
660 4th Street #285
San Francisco, CA 94107
1-866-963-6835
info@forensic-training-network.com
www.forensic-training-network.com

