Key Concepts of Chapter 12:

Three Types of Prints

- Fingerprint evidence is most common form of forensic evidence found at crime scenes
  - However, fingerprint evidence is still underutilized
  - Many scenes are not even examined for fingerprints
- Whenever an object is handled or touched, a copy or reproduction of the friction skin can be left on the object
- Evidence prints are:
  - Chance impressions of friction skin left at the crime scene or on objects of evidence
  - Typically only partial prints are available with varying degrees of distortion and clarity
  - Commonly called latent prints
- Types of evidence prints
  - *Latent prints*
    - Hidden or invisible prints left on a touched object
    - Must be developed or made visible by using powders, chemicals, or forensic light source
  - *Visible prints*
    - Prints that do not need development to be seen
      - Example: prints in blood, grease, dirt, or dust
    - Normally photographed for preservation
  - *Plastic or molded impressions*
    - Prints that have been impressed into a substance
      - Example: prints pressed into candle, bars of soap, window putty, or paint

Composition of Latent Prints

- Composed of a number of different substances
  - Mostly water from perspiration
  - Mixture of secretions from three major sweat glands
    - Amino acids, fatty acids, proteins, and various other inorganic and organic components
- Handled objects leave a copy of friction skin features due to secretions
- Other contaminates present on fingers, hands, or handled object may reproduce friction skin or print features
- Best technique for developing prints depends on composition of latent print
  - Fingerprint powders – adhere to moisture present in latent print. Powder development may be ineffective after moisture or other residues evaporate
  - Chemical ninhydrin – reacts with amino acids in latent print (porous surfaces)
- Unfortunately, composition of latent print is usually unknown

Determining the Age of Latent Prints

- Many factors affect how long a latent print may remain on an object
  - Condition of hands
    - Wetness, dryness, greasy, etc.
  - Particular object touched
    - Clean, dirty, smooth, porous
  - Constituents of latent print
  - Atmospheric conditions
    - Heat or dampness
- Prints that develop very strong and rapidly with fingerprint powder do not necessarily mean print is fresh
- Prints left in many different contaminates may develop very strong, days, weeks, or even months after print was placed on object
- No scientific way to examine a latent print and determine age exists due to the numerous unknown variables
- Print can be no older than the object that it was found on
- Assessment of other circumstances make it possible to date a print
  - Muddy handprint found on a window glass after a storm
  - Crime victim stated window was washed day before storm
  - Reasonable to assume print was placed on glass after it was washed

Limitations of Latent Prints

- *Limitation 1: Not being able to determine age of a latent print*
  - Probative value of latent print evidence on objects accessible to public or suspect
    - Example: "Skid Row Stabber" – Latent print of suspect obtained on public bench next to serial murder victim in L.A. used with other evidence
  - Inability to date prints may not be important
    - Example: Print obtained inside home of a burglary victim where suspect has never had legitimate access usually sufficient to prove burglary
- *Limitation 2: Not having any evidence prints at all*
  - Prints are most often not left behind on objects that are handled due to numerous variables
  - Some jurors expect fingerprint evidence
  - Negative testimony – courtroom education of jurors by fingerprint examiners explaining reasons why a person may not leave prints on an object

Latent Print Investigations

- Crime scene search for evidence prints performed with a systematic methodology
  - Victims and witnesses are interviewed to determine what happened
    - How did suspect(s) enter or leave scene?
    - What objects were touched or moved by criminals?
  - Scene is searched
    - Fingerprint investigator must determine best method to develop and preserve latent print evidence on each object examined
    - Not every surface handled by criminal will be suitable to retain latent prints
    - Most investigations conducted with fingerprint powders

- o Fingerprint powders work best on non-porous objects
  - • Ideal surfaces are hard, clean, smooth surfaces such as glass, ceramics, and shiny/polished metals
  - o Objects handled with regularity, such as door knobs, drawer pulls, or business equipment may not yield latent prints
  - o Objects with texture, dirty, or porous may not retain latent prints

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Key Concepts of Chapter 15:

- Fingerprints are ideal for personal identification because they are permanent and unique
- Fingerprints are used for identification in two critical areas of law enforcement
  - Record prints
  - Evidence prints
  - *Record prints* – criminal record identification used to establish identity of those arrested, deceased, missing, or as background check for security or employment
    - o Print exemplars usually taken of all 10 fingers for searching a records file, either manually by classification or through an automated fingerprint identification system's database
  - *Evidence prints* – investigation of crimes through evidence prints found at crime scenes
    - o Usually a single chance impression left on an object at crime scene that is normally a partial print with varying degrees of clarity
    - o Print may be checked against a known suspect's fingerprint exemplar or if it is suitable for a computer search, it may be run against an AFIS database
- Same concept for comparison applies to record and evidence prints
- Unique features present in prints are compared to establish if two prints were made by same source
  - Particular individual and specific area of friction skin
- Since all areas of friction skin are unique, when an identification is made, it is 100% conclusive
  - Friction skin identification is one of the strongest forms of identification
- Friction skin is individualized through a comparison process of ridge features, their appearance, and their unique arrangements

Ridge Features and Clarity

- Every friction ridge is a unique formation
- Although possible, it may not be practical or necessary to individualize a single ridge of a fingerprint
- Remote chance to find single ridge recorded with the necessary clarity of detail on an object and exemplar
- One of the complexities of the identification process is the various levels of clarity that may be present in the prints that are being compared
- Level of clarity affects type of detail being compared and amount of detail needed to make an identification
  - Impossible to give standardized answer for how much detail is needed to make an identification

- Every comparison is unique as every area of friction skin is unique
- Clarity can be broken down into three levels
  - All three levels may be present in different areas of same impression
  - David Ashbaugh first proposed concept of dividing clarity of detail into three levels
    - 1980 – *Ridgeology,* Royal Canadian Mounted Police publication
- 1st Level Detail: Ridge Flow
  - Lowest level of clarity and detail
  - Observations of overall pattern type or ridge flow
  - Only contains class characteristics and cannot be individualized alone
- 2nd Level Detail: The Path of the Individual Ridges
  - Observations along path of individual ridge that reveal location where ridge ends, bifurcates, or continues through pattern area
  - Observations of major ridge features such as locations of dots or islands (ridges wide as they are long) usually containing one pore
  - Allows identifications to be made
- 3rd Level Detail: Ridge Appearance
  - Highest level of clarity and greatest individualizing power
  - Observations of smallest features and areas on individual ridges
    - Incipient or nascent ridges, and scars
    - Shapes and contours of ridge, pore structure, ridge alignment or misalignment
  - Features can be analyzed, compared, and evaluated

The Identification Process
- Friction skin identification conducted with scientific methodology
- Roy A. Huber in 1959 proposed three-stage individualization process
- Three stages of individualization
  - Analysis
  - Comparison
  - Evaluation, plus verification
    - Verification – repeatability of process by a second qualified examiner
- This identification process has been embraced by the fingerprint identification community
- Method can be used in any area of comparative analysis
- Process commonly referred to by fingerprint examiners as ACE/V
- *Analysis*
  - Print being compared is examined to determine detail or features present
    - Ridge flow, flexion creases, pattern type and grouping of features
  - Quality (clarity) of detail and area of friction skin that made impression is determined
  - Known or exemplar prints are also analyzed similarly
- *Comparison*
  - Evidence print is compared to known exemplar
  - Prints are placed side by side, orienting evidence print to area in corresponding exemplar
  - Prominent area or grouping of features on evidence print is located and compared with exemplar
- *Evaluation*
  - Stage to determine if comparison features agree or are dissimilar

- Identification made based on agreement of detail (similarities) or an elimination is made, based on dissimilarity
- Insufficient detail or quality may not allow for identification or elimination
- Verification – process is repeated by another qualified fingerprint examiner

Conclusions

- Comparison between prints yields three possible conclusions:
  - **Identification** – 2 prints are one and the same
    - Examiner establishes by comparison of features present in 2 impressions that they came from same source, individual, and specific area of friction skin
    - Conclusive examination
  - **Elimination** – 2 prints are not the same
    - Examiner establishes by comparison that features are different and not made by source of comparison exemplar
    - Conclusive examination
  - **Inconclusive** – Examiner cannot identify or eliminate print
    - Results when insufficient detail needed for identification or elimination in evidence print and/or exemplar
- Since every area of friction skin is unique and from only one donor, it is not acceptable to give probable identification opinions
- Currently, no scientifically proven way to establish a probable friction skin identification by statistics or other means
- If insufficient detail to determine if two prints are identical and elimination of evidence print is not possible, then the appropriate report findings would be "inconclusive"
- Prints may be eliminated even if there is insufficient detail to make an identification
  - Print may lack individual ridge features needed for identification, but pattern type may be present
  - If examiner observes whorl type pattern in evidence print and all arch type patterns in exemplar then print can be eliminated as not being the same

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REFERENCE

Leo, W. (2004). *Fingerprint identification*. California: Lawtech Custom Publishing.