Overview

Six questions:

1) Average latent print examination
2) AFIS
3) Context information
4) Bias
5) Error rates
6) Variability among examiners
Question 1

An Average Examination

- In the U.S., significant variation
- Seven phases:
  - Collection of the evidence at the scene
  - Processing the evidence
  - ACEV
  - AFIS
  - Documentation of evidence
  - Report of findings
  - Testimony
Question 2

Q1
Average Exam
    Seven Phases

Q2
AFIS

AFIS

• AFIS record information
  • Criminal history
    - Fingerprint card
    - Charges
    - Descriptors
  • AFIS record
    - Fingerprint images
    - Fingerprint classification information
    - Unique identifier (name, numbers)
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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<tbody>
<tr>
<td>Q1</td>
<td>Average Exam Seven Phases</td>
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<tr>
<td>Q2</td>
<td>AFIS</td>
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<td>AR</td>
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<td>INTERSTATE TRANSFER?</td>
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**SCARS, MARKS, TATTOOS**

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**LEFT FINGERS TAKEN SIMULTANEOUSLY**

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<tr>
<th>Field</th>
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<td>3. R. MIDDLE</td>
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<td>4. R. RING</td>
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<td>RING FINGERS TAKEN SIMULTANEOUSLY</td>
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As in Question #1, it depends

Examiner could have no information

Examiner could be involved from beginning to end

We maintain:

- We need relevant case information
  - Manage case load
  - Decisions within a case (big picture)
  - For proper analysis of (complex) latent print

- We recognize inherent potential (negative) bias influence
### Bias

- **Context bias**
  - Case information

- **Confirmation bias**
  - Trusted colleague gives you a declared identification

- **Potential for bias exists**
  - Dror’s work
  - Schiffer (2007):
    - Analysis phase is robust to bias
  - Langenburg (in prep.):
    - Experts more resistant to bias toward individualization
    - Could be more easily influenced towards inconclusive and exclusion opinions
‘systematic blind testing is not necessary during most routine examinations; it is time consuming and unnecessarily consumes significant personnel resources. Rather, a verification structure should cater to potentially problematic latent prints and cases.’

Question 5

Examination Variation

- Expert variation (range of skills)
- Agency variation
  - Training, continuing education
  - Multiple duties
  - Accredited labs, certified examiners
- Method variation
Question 5

Question 5

Examiner Variation

- For that trial, 99% experts* declared a (correct) positive identification
  1% declared insufficient (inconclusive)

*(129/130 experts declared a match. These experts had a minimum of 10 years of experience, working as experts in England or Wales)

Question 5

Examiner Variation


\[ N = 71 \]
\[ x = 9.7 \]
\[ \sigma^2 = 0.9 \]
For that trial, 54% experts* declared a (correct) positive identification. 38% declared insufficient (inconclusive) and 8% declared an exclusion (incorrect).

Number of Minutiae Reported by Expert Participants for Three Fingerprint Comparison Trials

Q1: Average Exam
    Seven Phases

Q2: AFIS

Q3: Case information

Q4: Bias

Q5: Variability
    Evett & William
    Langenburg et.al

N = 43
Question 5

Examiner Variation

- For three trials:
  Q1 - 100% experts declared a (correct) positive identification
  Q5 - 100% experts declared a (correct) positive identification
  Q4 - 7%* erroneously excluded
  41% inconclusive
  51% positive identification (correct)

*Note: values rounded and therefore do not add to 100%
Q4
Q1
Average Exam
Seven Phases
Q2
AFIS
Q3
Case information
Q4
Bias
Q5
Variability
Evett & William
Langenburg et.al

p < .001, K-W test
Examiner Variation

- Can be significant variation among:
  - Expert ability
  - Agency standards and training
  - Method application

- Sometimes this variation is critical to the examination outcome
- Sometimes it’s not
- Appears to be most significant in ‘complex cases’
Question 6

Error Rates

- $H_0 = \text{The latent print was not made by X}$
- $H_1 = \text{The was made by X}$

<table>
<thead>
<tr>
<th></th>
<th>If $H_1$ is false (same source)</th>
<th>If $H_0$ is true (different source)</th>
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<tbody>
<tr>
<td>Accept</td>
<td>Type 1</td>
<td>No match</td>
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<tr>
<td>Reject</td>
<td>Match</td>
<td>Type 2</td>
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</table>

- Type 1 = Erroneous identification
- Type 2 = Erroneous exclusion
Question 6

### Error Rates

- **Research:**
  - Wertheim, Langenburg, and Moenssens (2006)
  - Gutowski (2007)
  - Evett & Williams (1995)
  - Langenburg (two unpublished studies)

- **Other sources:**
  - Proficiency tests
  - Cole (2005)
Questions?

Contact me for additional information, articles, or resources:

(651) 793-2967
glenn.langenburg@state.mn.us