Latent Fingerprint Processing

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Contributors

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Objectives/Rationale

- Study case processing of latent prints in large lab (HFSC)
- First, gather basic information about case flow:
  - Frequency of verifications
  - Frequency with which verifications lead to changes in original examiners’ conclusions
  - Frequency of conflict resolution
  - Examiner differences
- Later, study potential interventions, e.g.:
  - Implementation of blind verification
  - Blinding analysts to task-irrelevant information
  - New procedures for conflict resolution
Baseline, descriptive data:

- Illustrative data regarding case flow
  - Such basic data is important, but rarely accessible

- Provides a baseline for comparison:
  - With post-intervention changes at this lab
  - With procedures at other labs

- Provides an illustration of self-study (replicable in other labs):
  - Rates of verifications and outcomes,
  - Examiner differences and conflict resolution,
  - Etc.
CASE VOLUME AND INITIAL DECISIONS
Case Volume and Offense Type

- Case processing data over 2 Years
- Total Number of Cases: 2,536
- Offenses Range from Shoplifting to Capital Murder

- Burglary, 36%
- Robbery, 20%
- BMV, 17%
- Auto Theft, 8%
- Theft, 3%
- Murder, 6%
- Other, 7%

- Aggravated Assault, 1%
- Criminal Mischief, 1%
- Possession CDS, 1%
- Outside Auto Theft, 1%
Latent Prints Across 2,536 Cases

- Total Number of Latent Prints Analyzed: 12,363
- Total Number of Latent Prints of Value: 5,430

Relative Proportion of Value and No Value Prints

- Prints of Value: 44%
- Prints of No Value: 56%

Prints of Value by Type

- Fingerprints: 71%
- Palm Prints: 26%
- Joint Imp: 1%
- Other Imp: 2%
Latent Prints by Offense Type

![Boxplot of latent prints by offense type](image)
Distribution of Latent Prints Across Cases

- Range: **1-153** prints
  - Mean: **8.50**
  - Median: **4.00**
  - Mode: **1**

![Bar chart showing the distribution of number of prints across cases. The x-axis represents the number of prints (1-10), and the y-axis represents the number of cases. The bar heights indicate the frequency of cases with a specific number of prints.]
Initial Examiner Decisions for Latents of Value

- N = 12,363 Latent Prints

Relative Proportion of Value and No Value Prints

- 56% Prints of No Value
- 44% Prints of Value

Decisions About Latents of Value

- 60% Identifications
- 28% Exclusions
- 11% Inconclusive (Exemplar)
- 1% Inconclusive (Latent)
Overall Decisions

- Prints of No Value: 56%
- Identifications: 26%
- Exclusions: 13%
- Inconclusive (exemplar): 5%
- Inconclusive (latent): 0%
VERIFICATION AND CONSULTATION
Verification Policy

- Primarily based on offense type
- Generally:
  - Violent Offenses: All decisions verified
  - Property Offenses: Only identifications verified
Verification and Consultation

N = 2,536 Cases

3% of all cases proceed to Consultation

7% (n = 82) of cases that have been verified proceed to Consultation

• ➔ During Verification, analysts agree 93% of the time
Results of Consultation

- 82 cases, 132 prints
- Final decisions are typically those of the **verifier** as opposed to original analyst

- Verifier: 72%
- Analyst: 28%
## Post-Consultation Decisions: Value/No Value

<table>
<thead>
<tr>
<th>Conclusion</th>
<th>Frequency</th>
<th>Conclusion Changed During Consultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latent of No Value $\rightarrow$ Latent of Value</td>
<td>18</td>
<td>Yes</td>
</tr>
<tr>
<td>Latent of Value $\rightarrow$ Latent of No Value</td>
<td>14</td>
<td>Yes</td>
</tr>
<tr>
<td>Latent of Value Remains</td>
<td>8</td>
<td>No</td>
</tr>
<tr>
<td>Latent of No Value Remains</td>
<td>3</td>
<td>No</td>
</tr>
</tbody>
</table>
## Post-Consultation Decisions: Identification/Inconclusive/Exclusion

<table>
<thead>
<tr>
<th>Conclusion</th>
<th>Frequency</th>
<th>Conclusion Changed During Consultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclusion → Identification</td>
<td>22</td>
<td>Yes</td>
</tr>
<tr>
<td>Exclusion → Inconclusive</td>
<td>15</td>
<td>Yes</td>
</tr>
<tr>
<td>Identification → Inconclusive</td>
<td>14</td>
<td>Yes</td>
</tr>
<tr>
<td>Identification Remains (vs. Inconclusive)</td>
<td>13</td>
<td>No</td>
</tr>
<tr>
<td>Inconclusive → Identification</td>
<td>12</td>
<td>Yes</td>
</tr>
<tr>
<td>Inconclusive → Exclusion</td>
<td>10</td>
<td>Yes</td>
</tr>
<tr>
<td>Inconclusive Remains (vs. Identification)</td>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>Exclusion Remains (vs. Inconclusive)</td>
<td>1</td>
<td>No</td>
</tr>
</tbody>
</table>
CONFLICT RESOLUTION
## Conflict Resolution

- 8 Cases, 10 prints

<table>
<thead>
<tr>
<th>Conclusion</th>
<th>Frequency</th>
<th>Conclusion Changed During Conflict Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latent of Value $\rightarrow$ Latent of No Value</td>
<td>2</td>
<td>Yes</td>
</tr>
<tr>
<td>No Value Remains</td>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>Identification $\rightarrow$ Inconclusive</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Identification Remains (vs. Inconclusive)</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>Inconclusive $\rightarrow$ Identification</td>
<td>2</td>
<td>Yes</td>
</tr>
<tr>
<td>Inconclusive Remains (vs. Identification)</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>Exclusion Remains (vs. Inconclusive)</td>
<td>1</td>
<td>No</td>
</tr>
</tbody>
</table>
EXAMINER DIFFERENCES
Examiner Differences

- 12 Examiners Total

<table>
<thead>
<tr>
<th>Domain</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of Experience</td>
<td>6-28</td>
</tr>
<tr>
<td>Cases Verified</td>
<td>29-141</td>
</tr>
<tr>
<td></td>
<td>36-63%</td>
</tr>
<tr>
<td>Consultations</td>
<td>3-23</td>
</tr>
<tr>
<td></td>
<td>1-11%</td>
</tr>
<tr>
<td>Decisions Changed During Consultation</td>
<td>1-22</td>
</tr>
<tr>
<td></td>
<td>33-95%</td>
</tr>
<tr>
<td>Conflict Resolution</td>
<td>0-2</td>
</tr>
<tr>
<td>(Mode = 0)</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

Baseline Data ➔ Relevant for comparisons:
- To other labs
- Post-Intervention
  - E.g., Blind Verifications

Verification Procedures

Individual differences
- Emphasis on processes that result in individual differences
- Intersection with print quality and human factors research

More data are needed!