A Field Analysis of Laboratory Case Processing: Latent Print Comparison and Examiner Conclusions

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Introduction

- National Academy of Sciences Report, 2009
- President's Council of Advisors on Science and Technology Report, 2016
- "Resolving latent conflict: What happens when latent print examiners enter the cage?" Rairden et al., 2018

Study Rationale

Describe the casework completed by latent comparison examiners in a large laboratory over the course of one calendar year

Describe the prevalence of examiner conclusions during that year

Explore whether examiner conclusions vary according to casework variables such as latent print source, offense type, or AFIS software

Explore the extent to which there are examiner differences in examiner conclusions and case processing

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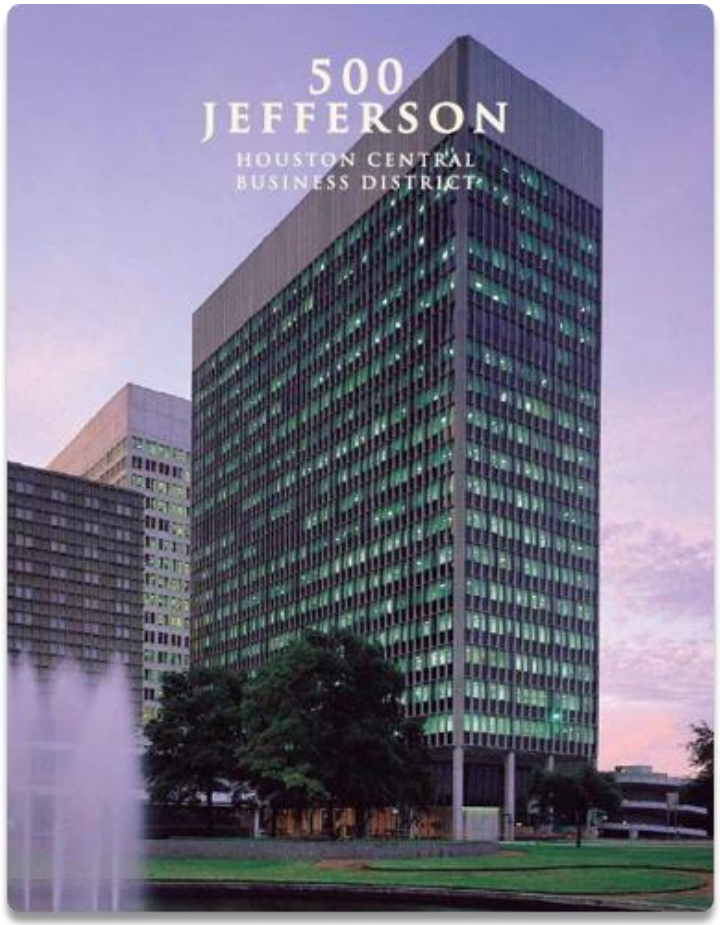

- Local government corporation
- Accredited by ANAB
- Study parameters:
  - 2018 calendar year
  - 17 latent print examiners
  - 5 to 36 years of work experience

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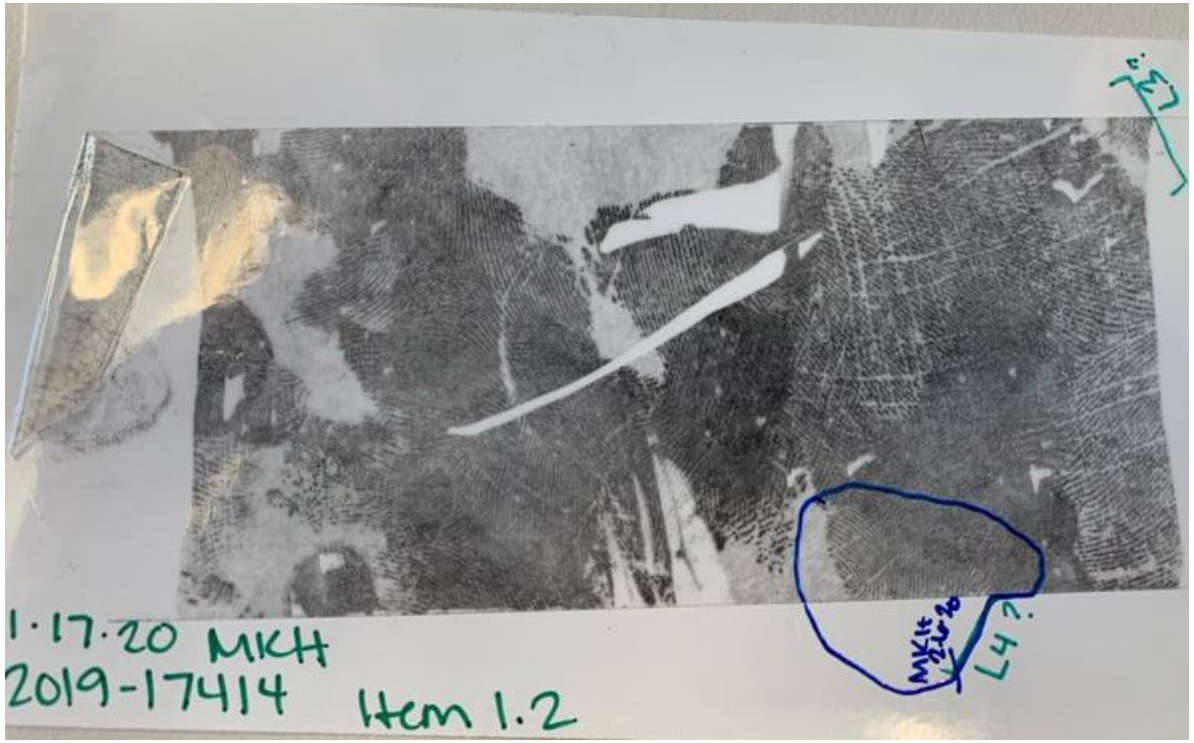
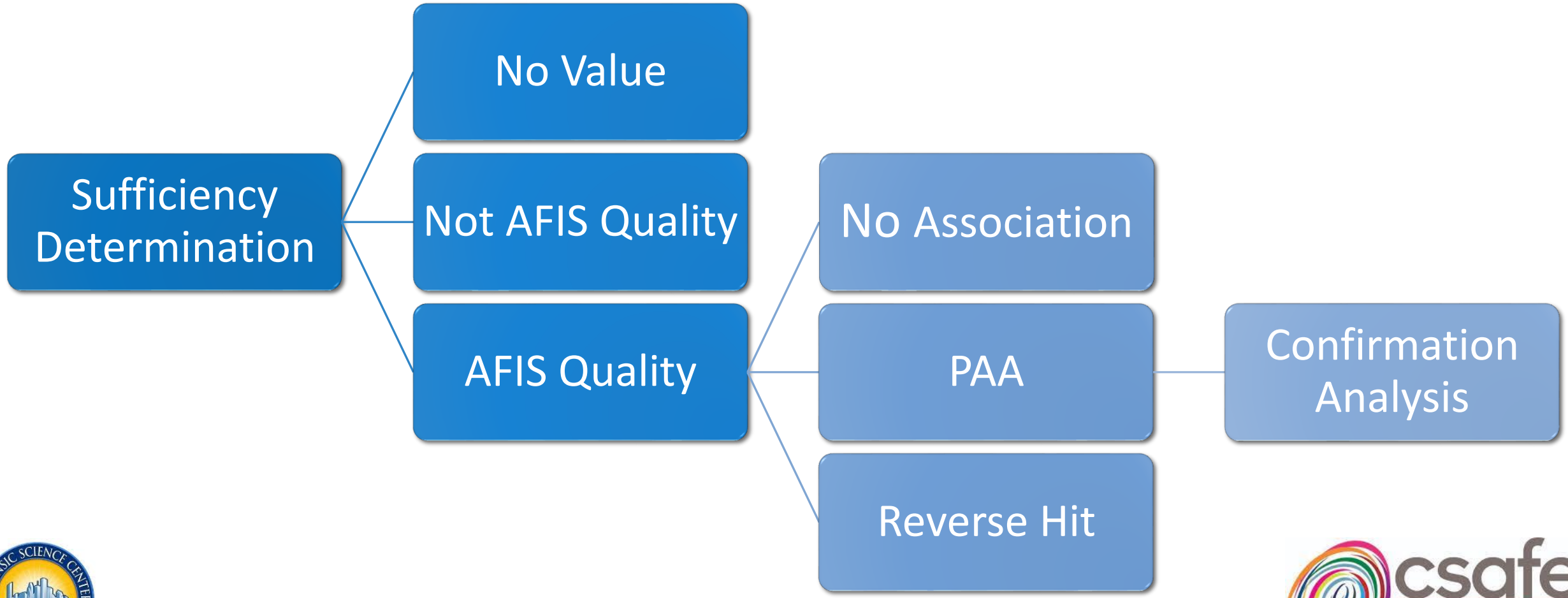
Latent Print Evidence

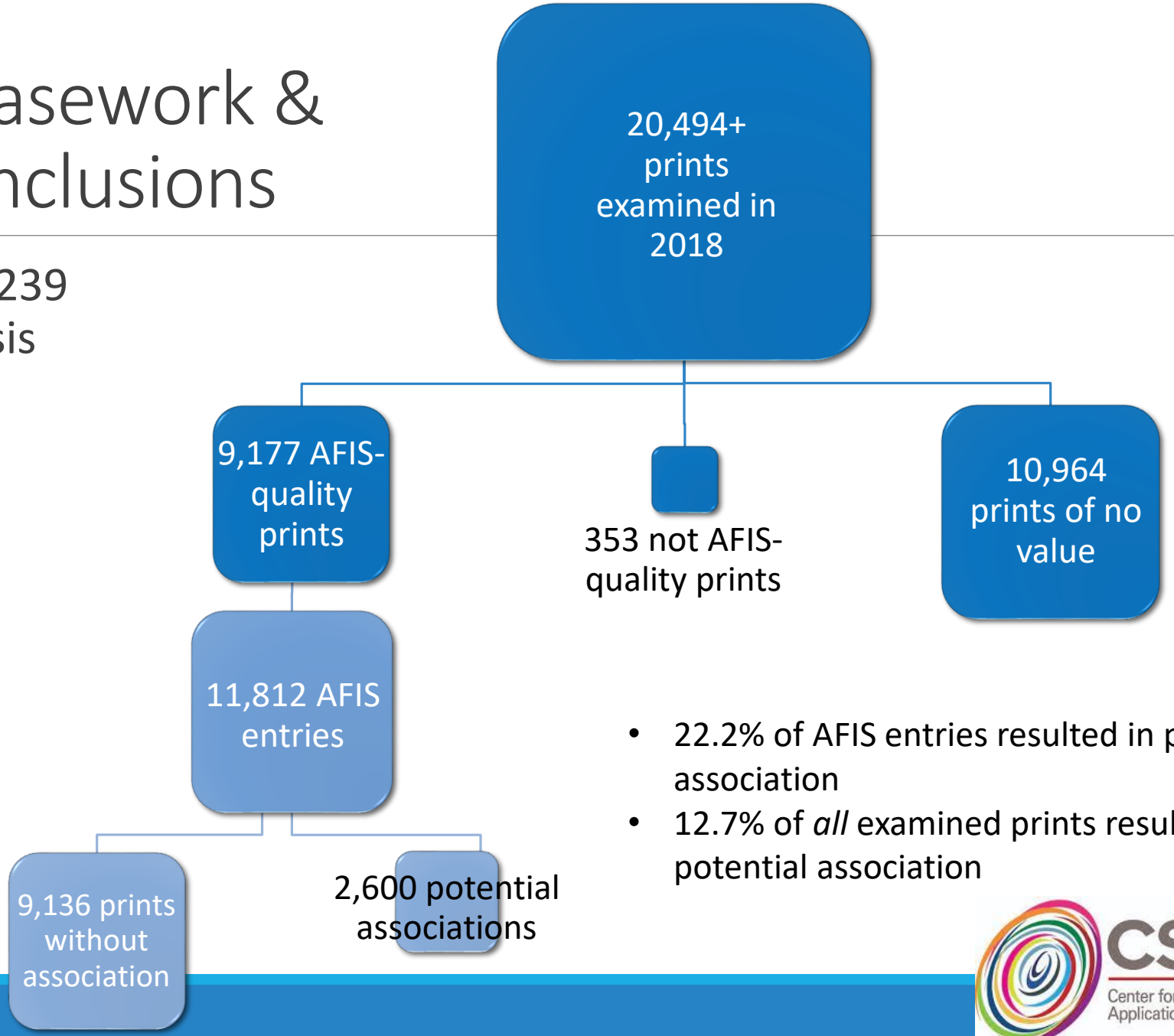


LPC Procedures



Laboratory Casework & Examiner Conclusions

- 2,975 cases and 3,239 requests for analysis
  - 69.1% burglary/theft
  - 16.3% robbery
  - 4.4% homicide
  - 10.1% other
- AFIS searches
  - 65.0% county
  - 16.9% state
  - 18.1% federal



- 22.2% of AFIS entries resulted in potential association
- 12.7% of *all* examined prints resulted in potential association

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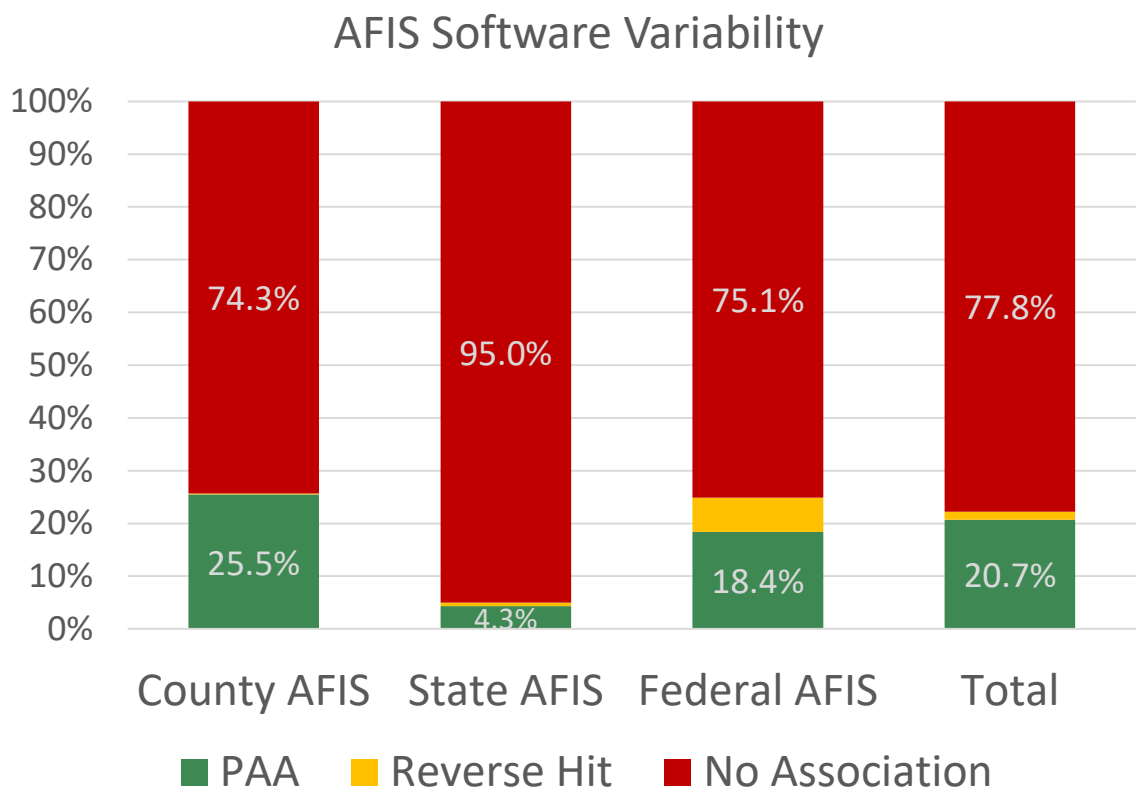
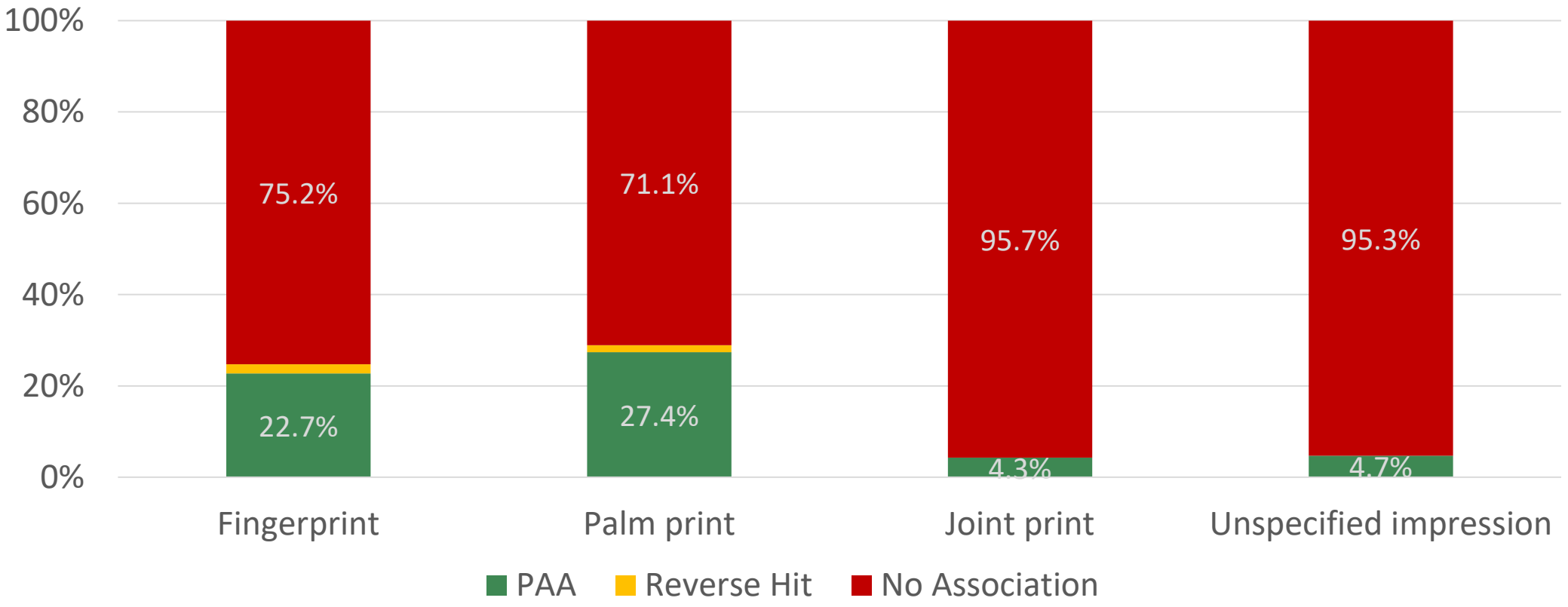
Variability within Examiner Conclusions

- Offense Type
  - Examiners were 1.3 times more likely to conclude a print was sufficient to enter into AFIS in cases involving a person offense
    - 25.0% vs. 19.6%
- AFIS Software
  - County and Federal AFIS ≈5 times more likely to result in potential association
- Print Source



Variability According to Print Source



Individual Differences

Examiner	Case Processing					Sufficiency Determination			AFIS Conclusion		
	Months Employed	Requests	Requests/ Month	Prints/cards Examined	Prints/ Month	% AFIS Qual.	% Not AQ	% NLoV	% PAA	% Reverse Hit	% No Hit
A	4.7	118	25.1	747	158.9	37.8%	0.1%	62.1%	22.4%	0.7%	76.9%
B	12	155	12.9	1,201	100.1	56.5%	0.3%	43.1%	17.8%	2.3%	79.9%
C	12	336	28.0	1,862	155.2	45.0%	3.3%	51.8%	27.1%	0.0%	72.9%
D	12	220	18.3	1,209	100.8	48.5%	1.3%	50.2%	17.3%	2.2%	80.5%
E	12	172	14.3	1,121	93.4	44.6%	0.2%	55.2%	13.3%	2.8%	83.9%
F	11	254	23.1	1,411	128.3	40.7%	1.5%	57.8%	25.4%	2.5%	72.2%
G	12	146	12.2	794	66.2	44.3%	1.0%	54.7%	16.8%	4.2%	79.1%
H	12	206	17.2	1,197	99.8	40.7%	2.7%	56.6%	15.2%	0.6%	84.2%
I	12	550	45.8	3,222	268.5	38.6%	0.2%	61.1%	24.5%	1.7%	73.8%
J	7	149	21.3	980	140.0	35.8%	0.1%	64.1%	13.7%	0.2%	86.0%
K	12	136	11.3	1,134	94.5	52.3%	0.4%	47.4%	23.0%	1.4%	75.6%
L	12	293	24.4	2,248	187.3	46.6%	5.4%	48.0%	18.9%	0.4%	80.7%
M	11.3	217	19.2	1,576	139.5	50.4%	2.0%	47.7%	20.4%	0.5%	79.1%
N	12	178	14.8	1,221	101.8	49.8%	1.7%	48.5%	22.8%	1.5%	75.8%
Total	*M* = 11		*M* = 20.6		*M* = 141.5	44.8%	1.7%	53.5%	20.7%	1.5%	77.8%

Note. Three examiners were excluded because they only completed independent casework for a single month during the data collection period

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Comparison with Previous HFSC Casework

2014 – 2016 (RAIRDEN ET AL., 2018)

- 2,535 cases
- 12 examiners
- ≈45% of prints deemed of sufficient quality for AFIS entry

2018 (CURRENT STUDY)

- 2,975 cases
- 17 examiners
- Implementation of PAAs
- ≈45% of prints deemed of sufficient quality for AFIS entry

Examiner Differences

- Examiners varied in their sufficiency determinations (36% to 57% AFIS-quality) and ultimate conclusions (13% to 27% PAAs)
- Differences in case assignment
- Differences in decision-making tendencies/threshold
  - Examination is subjective
  - Previous research suggests a lack of consensus in sufficiency thresholds (Ulery et al., 2011)

Future Directions

- Further research on AFIS databases
  - Differences in AFIS algorithms and included prints
  - Interactions between examiners and AFIS databases
- Analysis of workflow and case outcomes across multiple laboratories
  - Results only reflect work of one laboratory over one year
- Use of quality metrics to explain variability in case outcomes (Gardner et al., 2021)
  - Quality metrics were significantly associated with sufficiency determinations, examiner conclusions, and examiner accuracy in a blind quality control program
  - *Good* prints more than twice as likely to result in correct conclusions as *Ugly* prints

Increasing Laboratory Transparency

- ≈50% of examined prints are determined to be of some value, and ≈13% of all examined prints result in potential associations, with variability relating to examiner differences, case details, print source, and AFIS database.

Thanks!

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