

Expertise in forensic face matching

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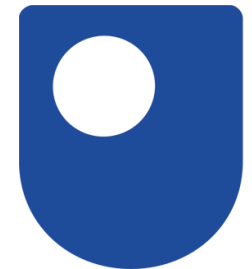


Familiar vs. unfamiliar faces

Expertise in familiar faces does not generalise to new faces

Matching unfamiliar faces can be surprisingly challenging

Large individual differences in face-matching ability



Unfamiliar faces

Unfamiliar face-matching is made challenging due to *within-person variability* and *between-person similarity*



Defining expertise

Demonstrating consistently superior performance in a specific task, acquired through practice and experience

Forensic face examiners

Super recognisers

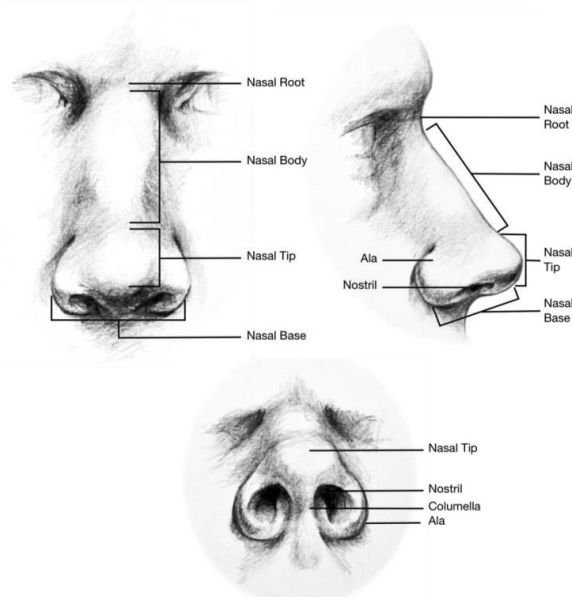
Artificial intelligence algorithms



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Forensic face examiners

Forensic experts who compare faces using a structured *morphological* (feature-based approach), using knowledge and skills acquired through training and experience.



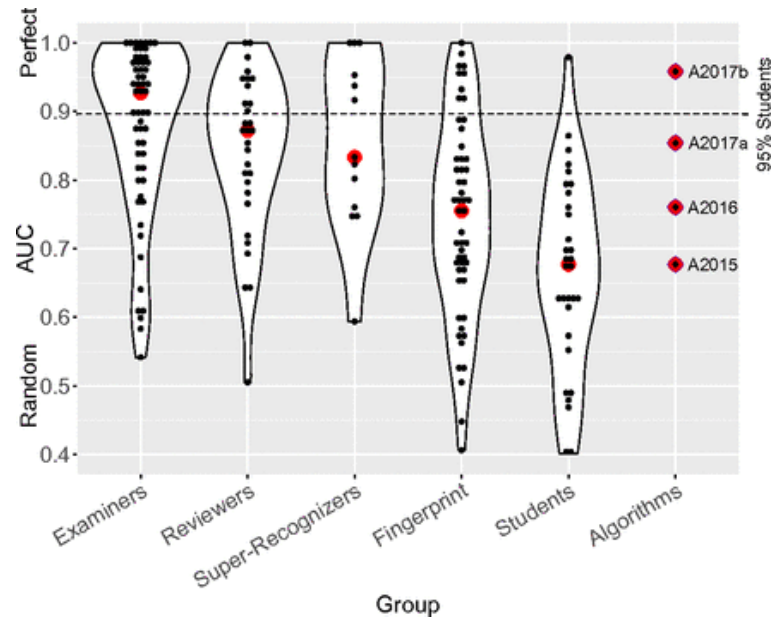
https://fiswg.org/FISWG_Morph_Analysis_Feature_List_v2.0_20180911.pdf



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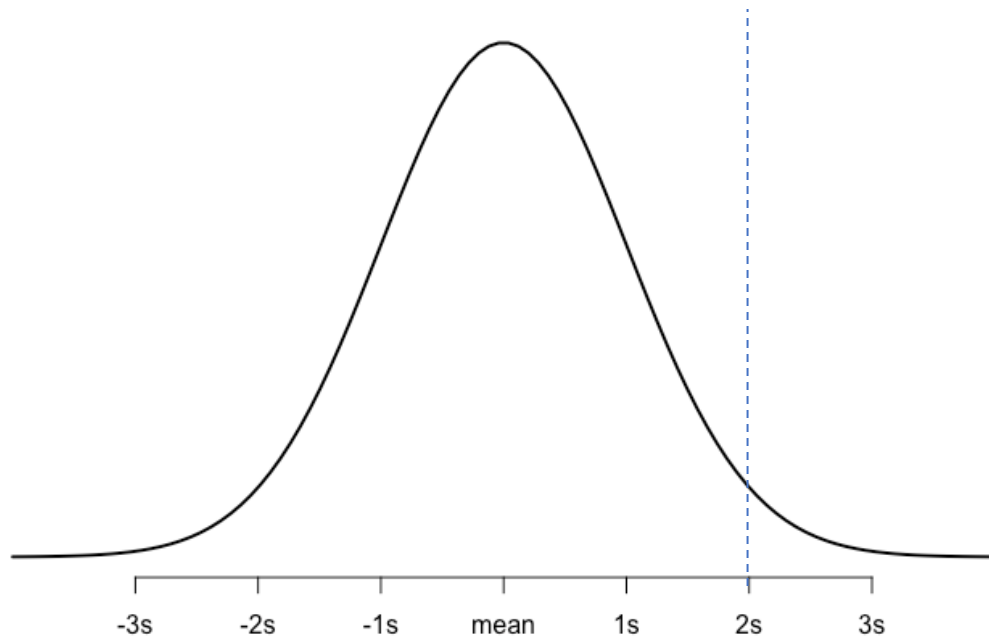
Forensic face examiners

Limited studies of face examiners show superior face-matching ability at the group level, but large individual differences



Super recognisers

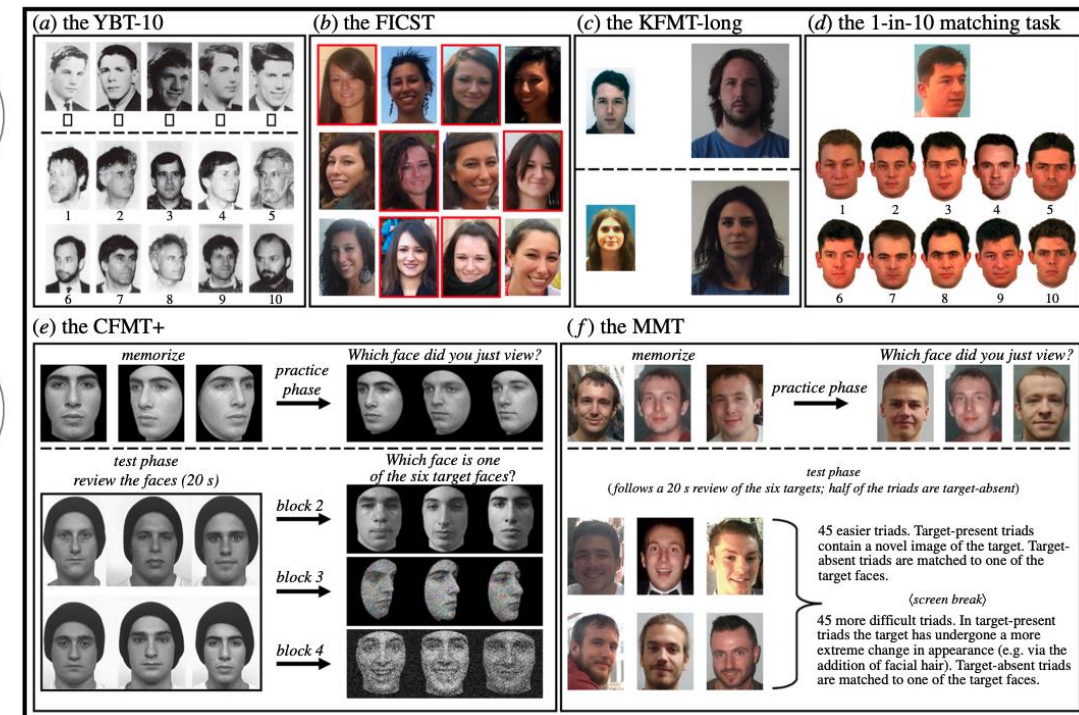
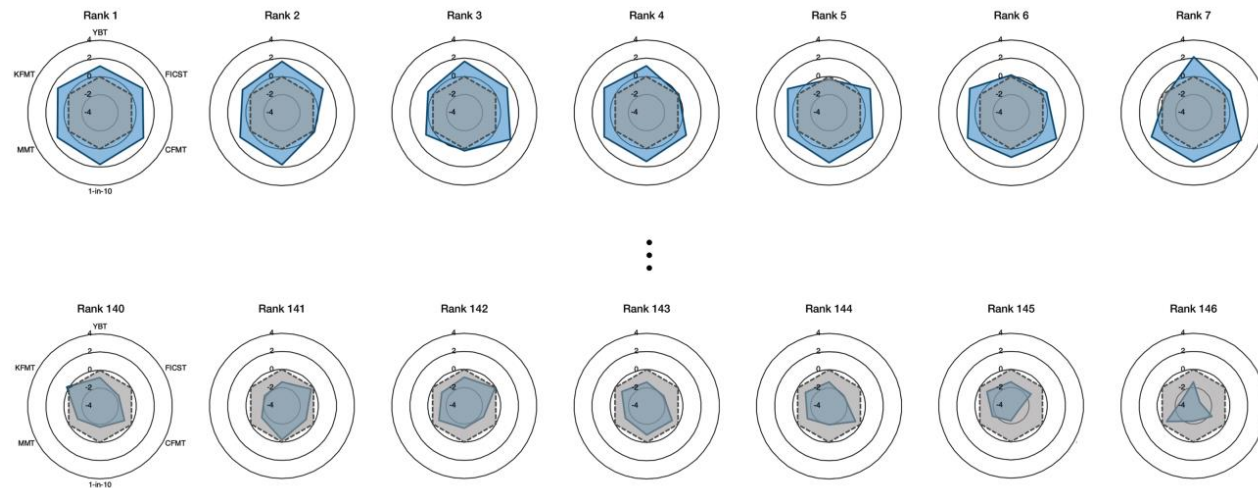
Individuals with superior natural ability in face perception tasks. Typically those who perform 2 SDs above the mean in standardised tests.



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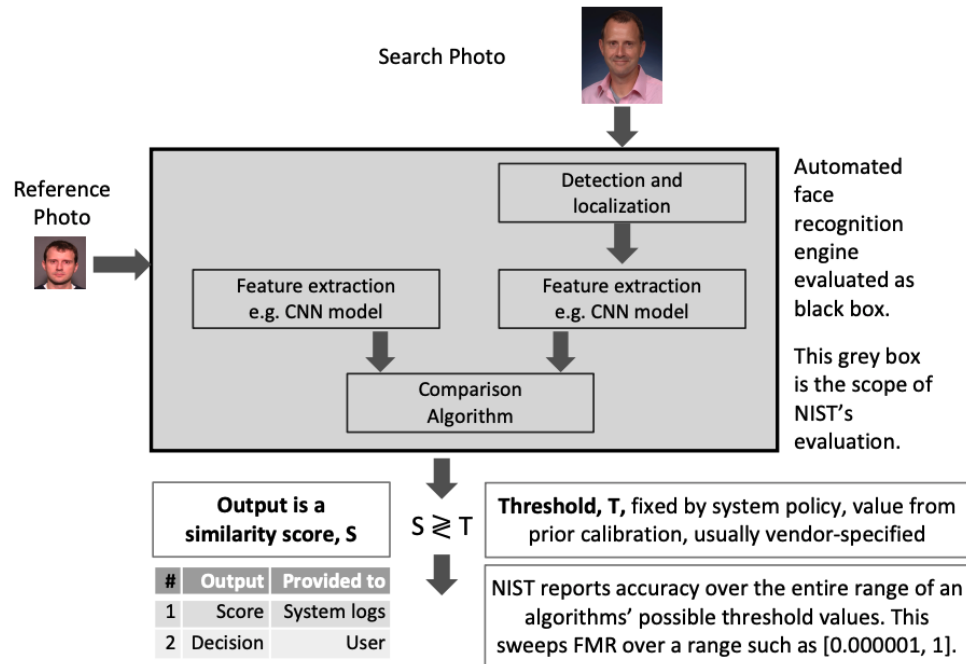
Super recognisers

Performance varies between individual super recognisers and on different types of face perception tasks, as for typical perceivers.



AI algorithms

Algorithms trained to detect faces, extract feature sets and compare faces to generate a similarity score. Individual algorithm accuracy is highly varied.



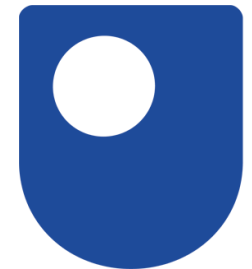
Evaluating expertise

How accurate are face-matching experts?

Forensic face examiners

Super recognisers

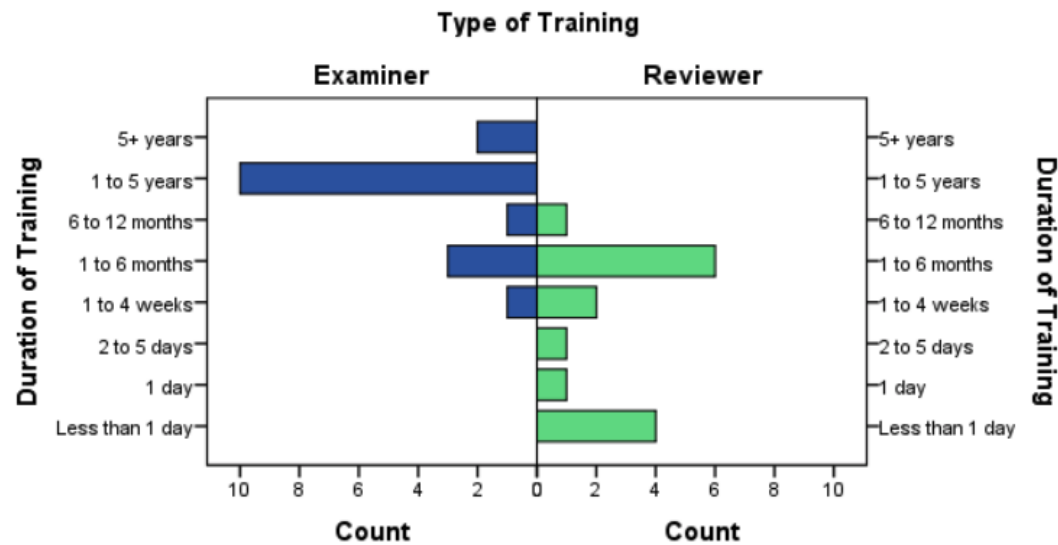
Artificial intelligence algorithms



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Training

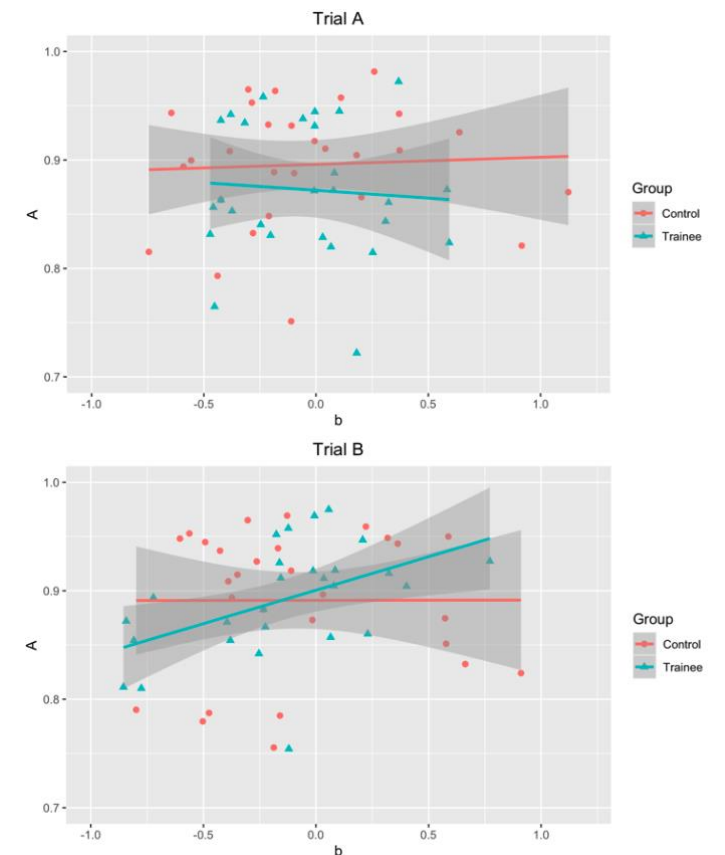
Programmes for training face-matching professionals are highly varied in duration and content, with little empirical evidence of effectiveness.



Delivery Method	Reviewer Training (n=15)		Examiner Training (n=18)	
Online training	40.0%	(6)	22.2%	(4)
Independent learning	46.7%	(7)	66.7%	(12)
Instructor driven seminars	73.3%	(11)	77.8%	(14)
One-to-one mentoring	60.0%	(9)	88.9%	(16)
Other	0.0%	(0)	11.1%	(2)

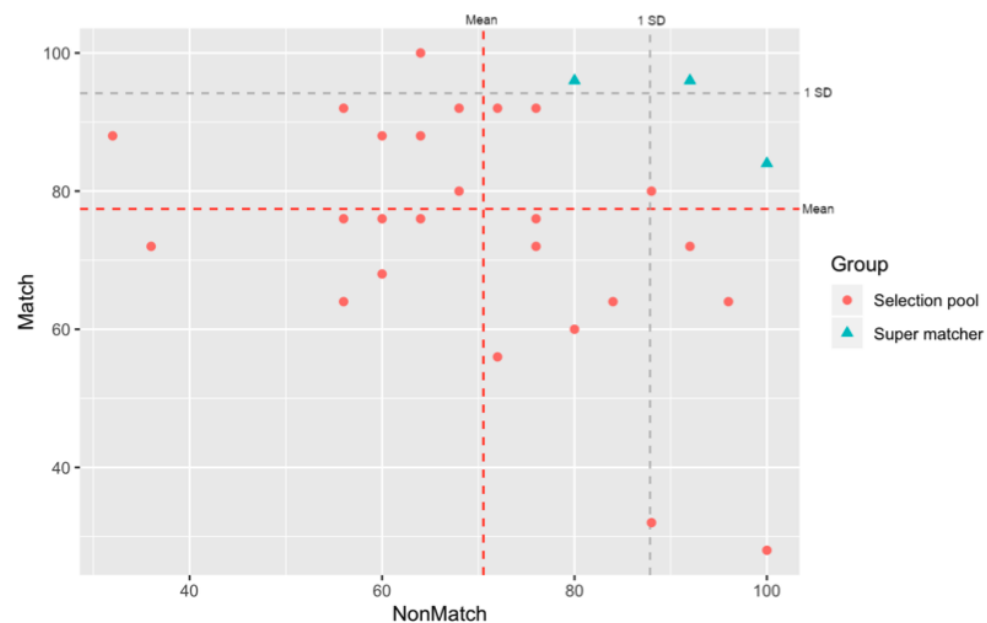
Training

Two-day face-matching training course did not improve police trainee accuracy. Some evidence for introduction of match bias in lower performing trainees.



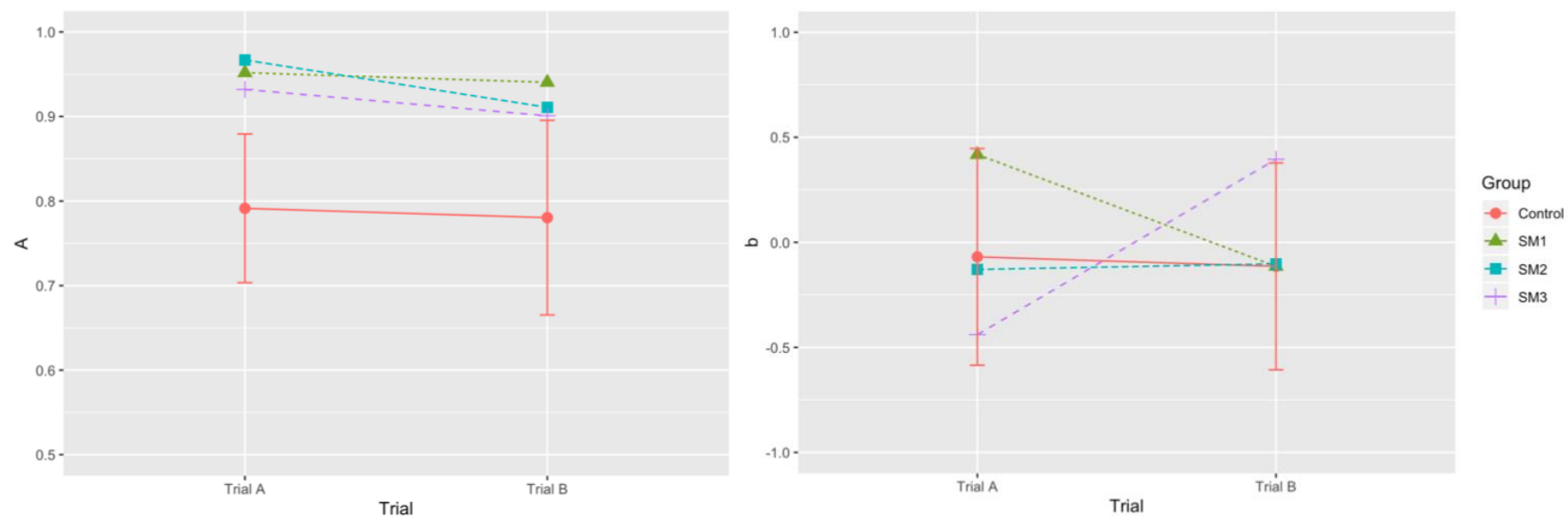
Selecting 'superior face matchers'

Comparison of face-matching performance of 'superior face matchers' selected from a pool of 28 police personnel on a before and after face-matching test.



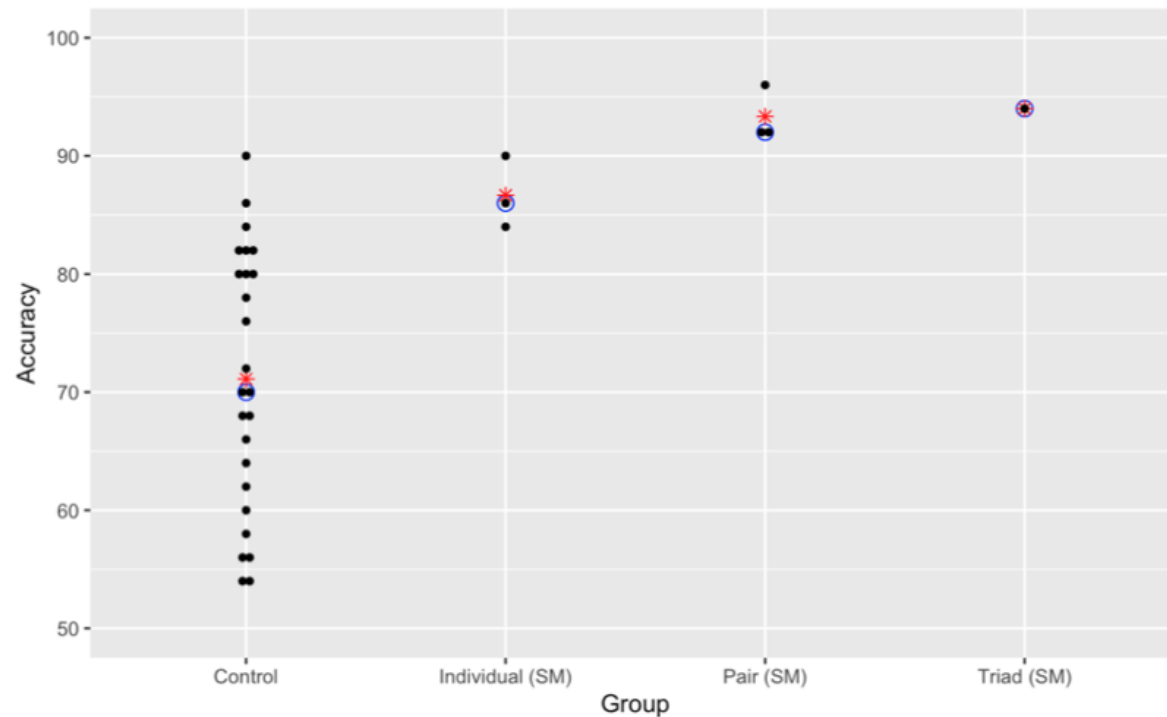
Selecting 'superior face matchers'

All SMs significantly outperformed controls on Trial A (one-tailed t -test). None of the SMs were consistently superior at re-test. Response bias varied between test.



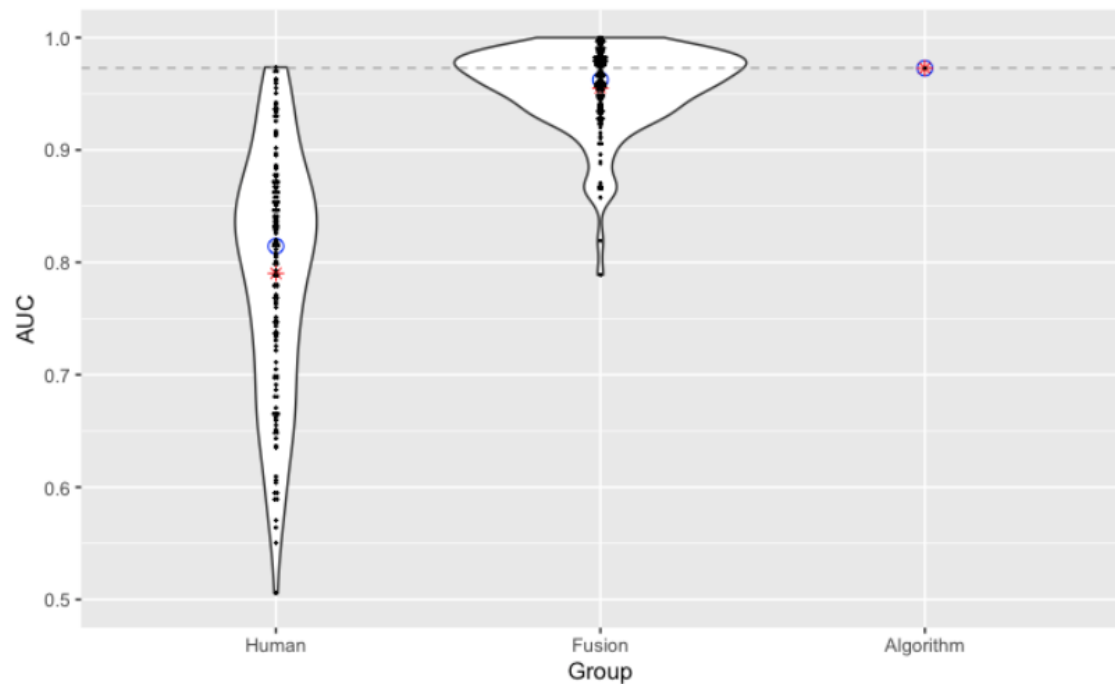
Improving performance

Combining decisions from multiple SMs gave significant gains in accuracy.



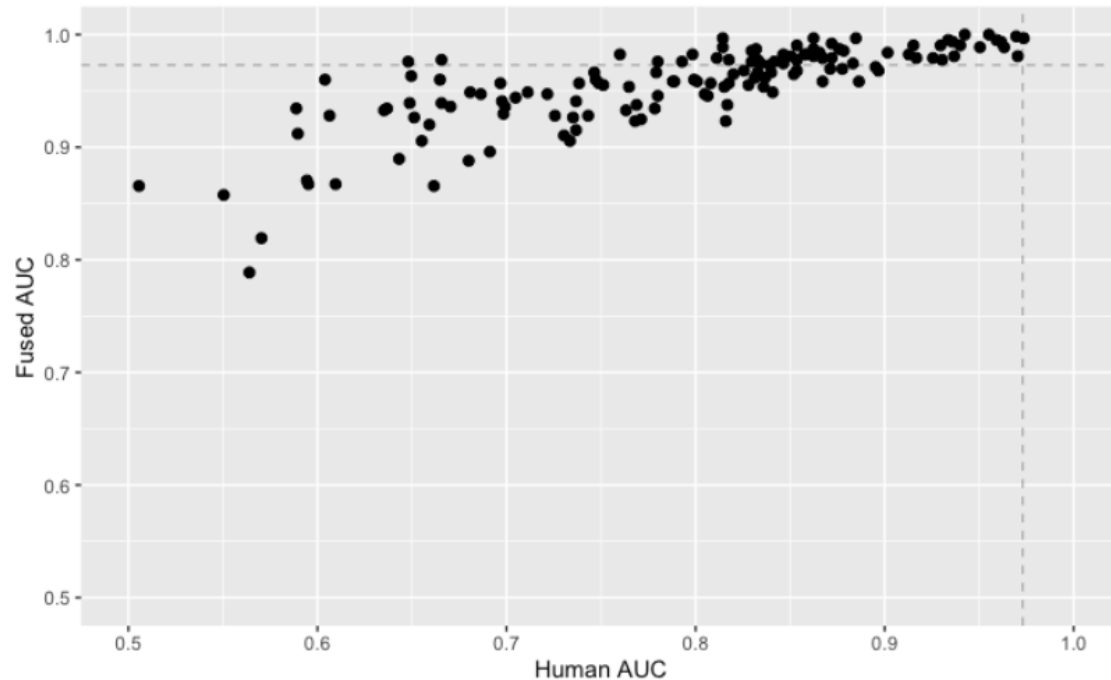
Improving performance

Fusing human decisions with similarity scores from an algorithm gave largest gains for quick-decision face matching.



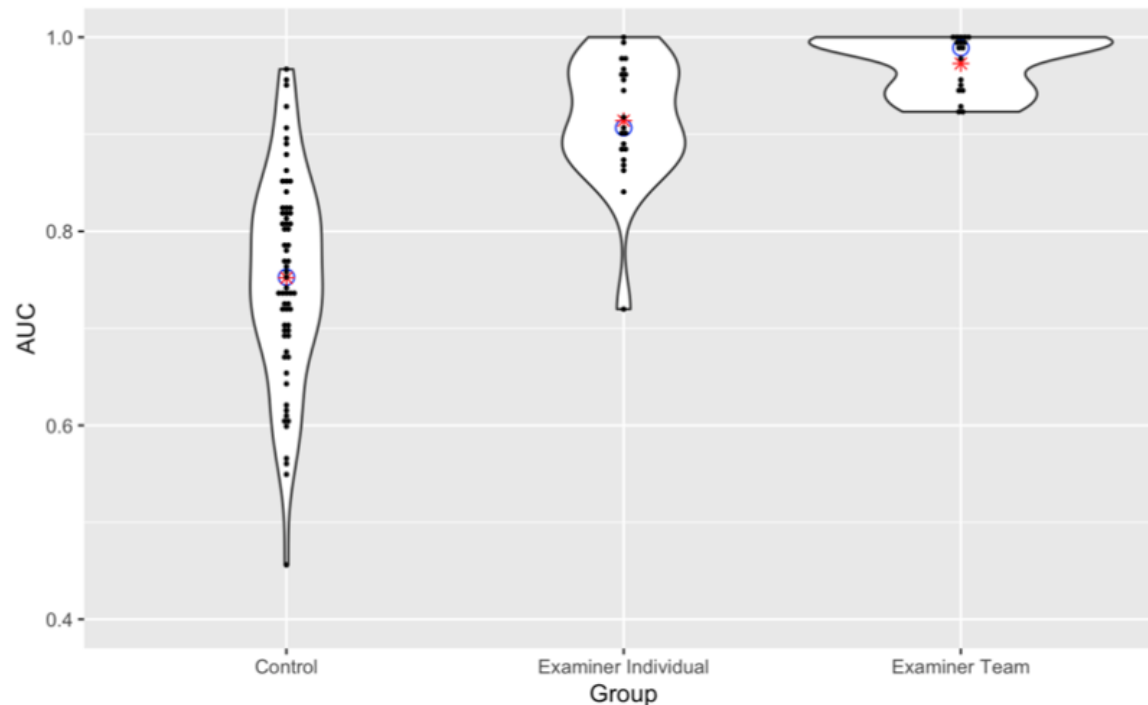
Improving performance

Benefits of fusion are greatest with higher performing humans and allow for less stringent selection cut-offs for superior performance.



Improving performance

In forensic casework conditions facial examiner teams are highest performers and least likely to make high confidence errors.



Recommendations

Forensic face examination



(e.g. expert evidence)

Quick decision face-matching



(e.g. passport control, CCTV)

Not recommended

- ✗ Do not rely on examinations made by a single examiner

Recommended

- ✗ If a facial recognition algorithm is unavailable
- ✗ If a facial recognition algorithm is available
- ✓ Use examiner teams to make face-matching decisions
- ✓ If an examiner team is unavailable individual examiners use algorithm fusion techniques to make face-matching decisions
- ✓ Use examiner teams and algorithm fusion techniques to make face-matching decisions for higher levels of performance

Not recommended

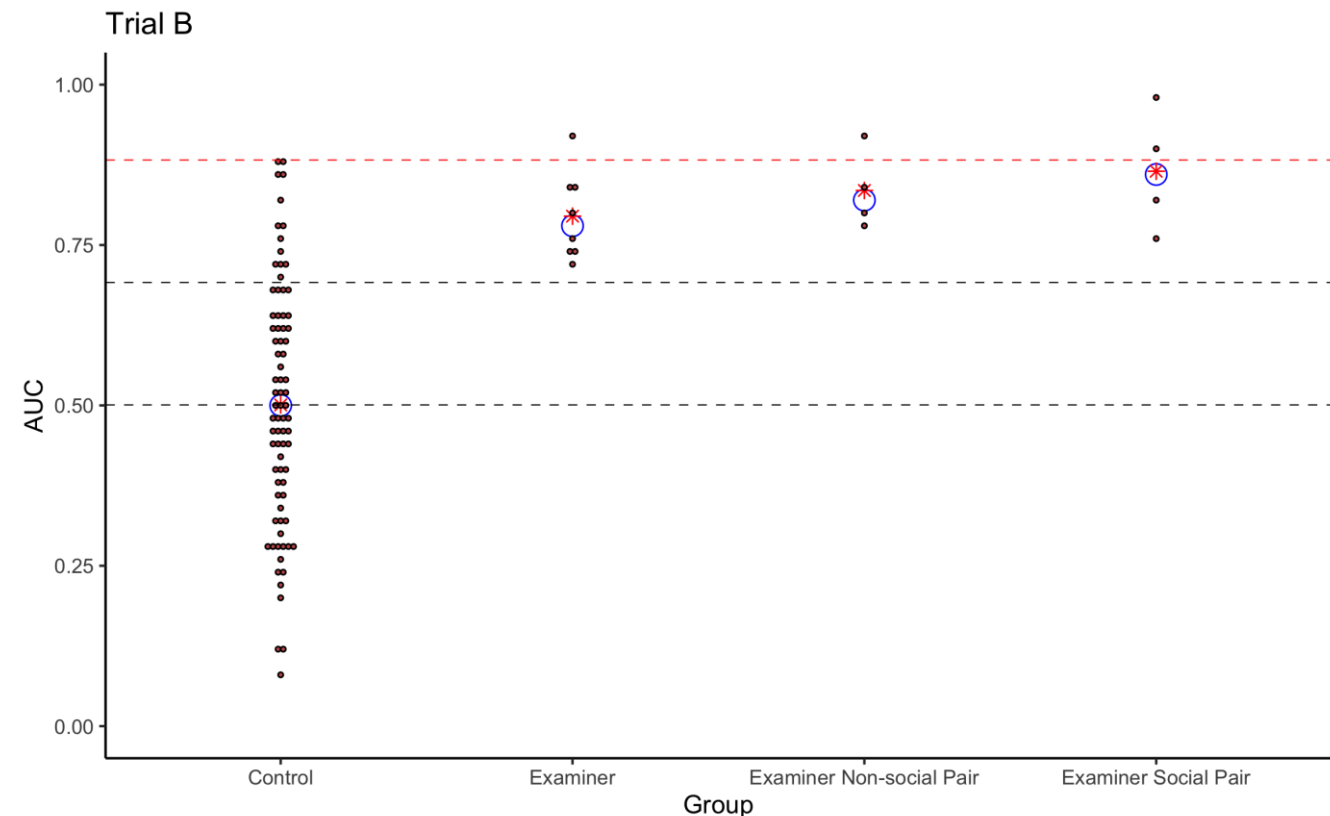
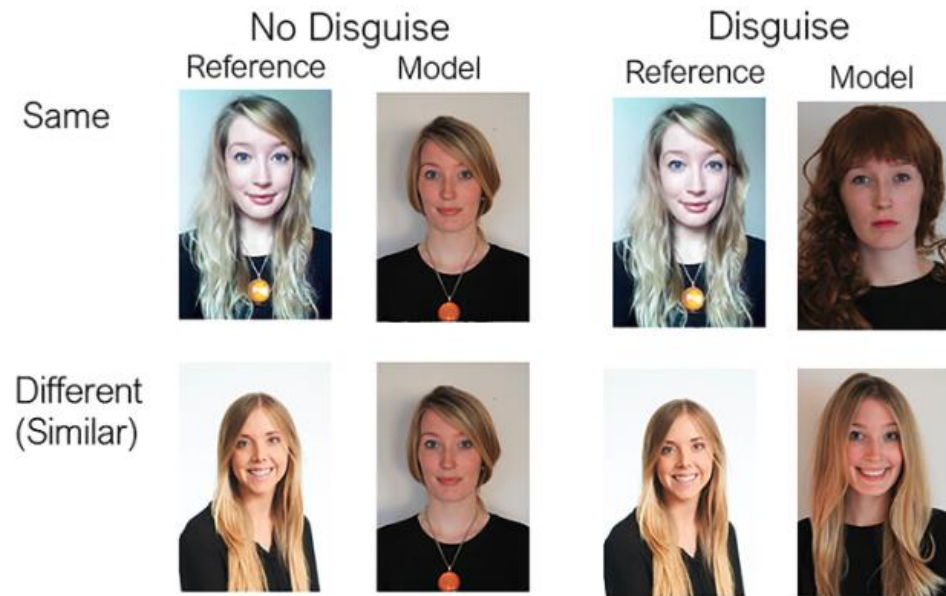
- ✗ Do not rely only on short professional training courses
- ✗ Do not rely only on selection of superior matchers from small samples

Recommended

- ✗ If a facial recognition algorithm is unavailable
- ✗ If a facial recognition algorithm is available
- ✓ Select superior face matchers by pre-screening and use the wisdom of crowds for face-matching decisions
- ✓ Select superior face matchers by pre-screening and use algorithm fusion techniques for face-matching decisions

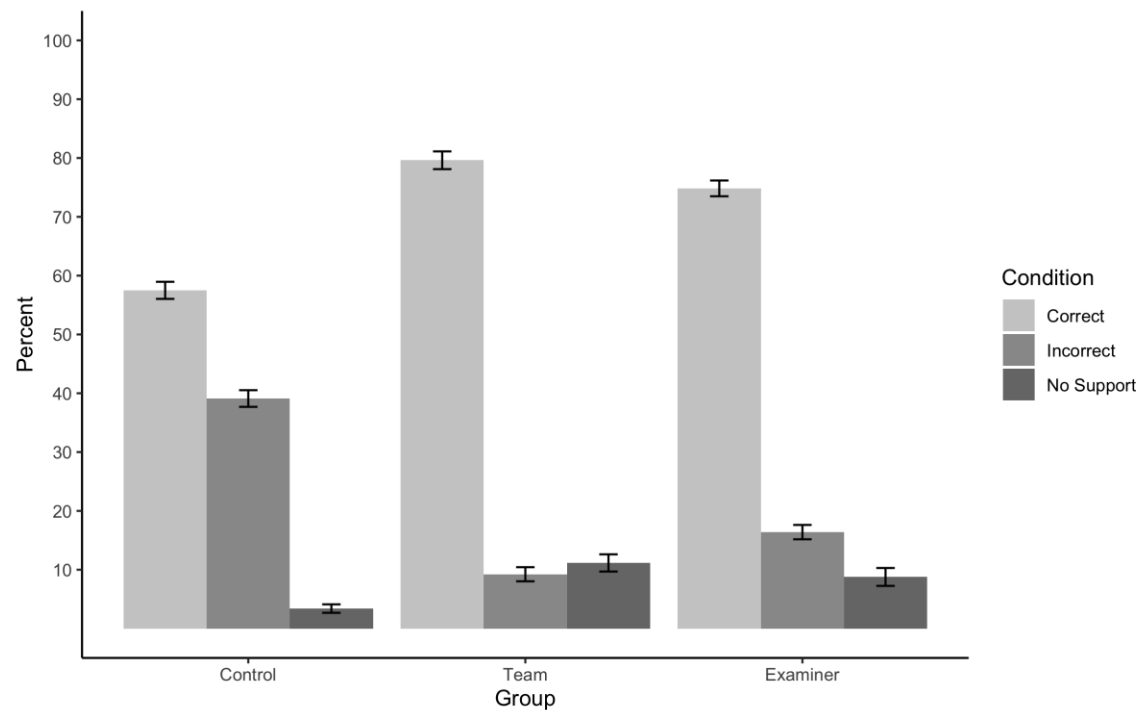
Current research

Collaborative and non-collaborative decision making for forensic face examiners for challenging face pairs



Current research

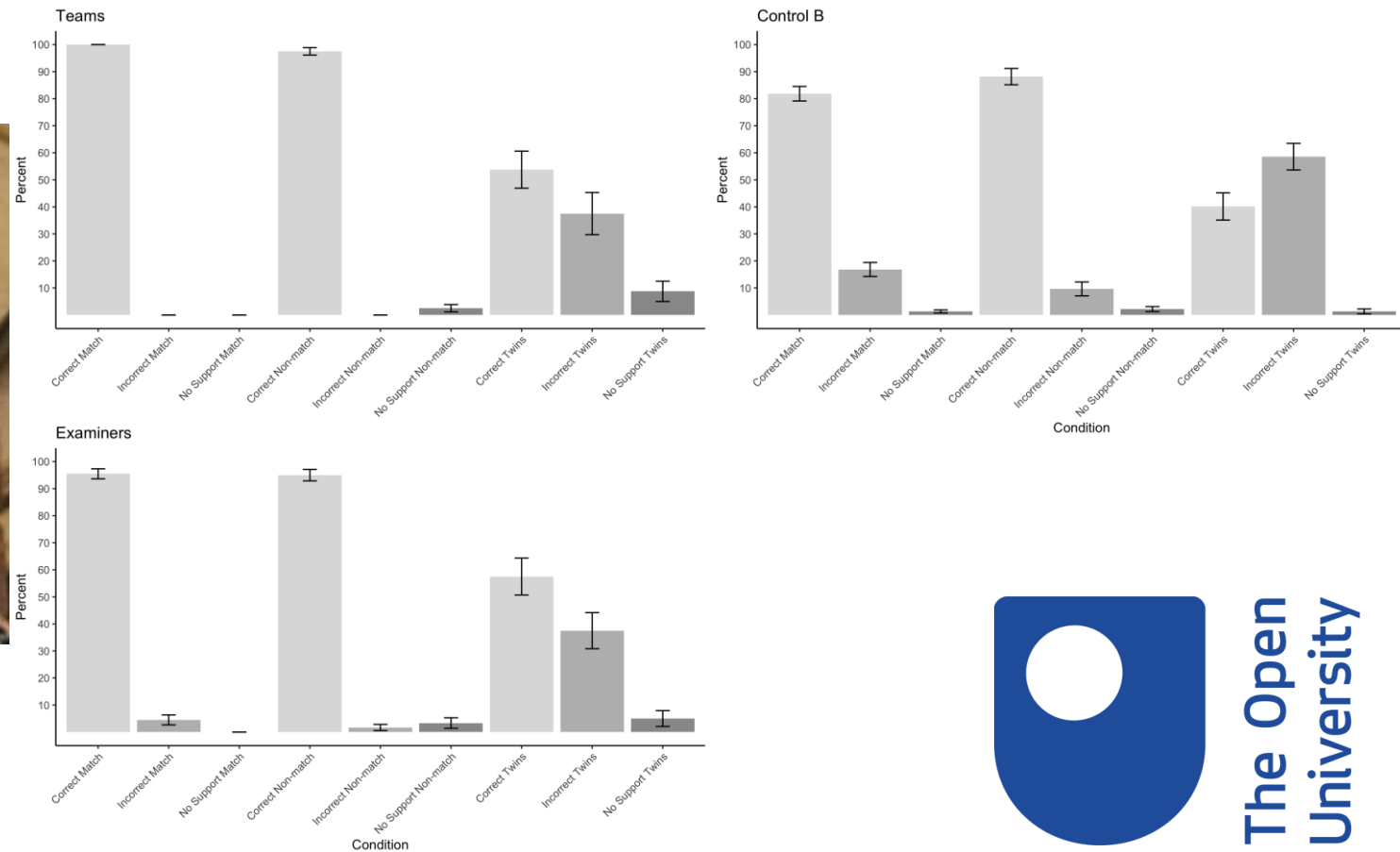
Forensic face examiner performance for masked to unmasked face comparisons



Noyes, E. Moreton, R. Hancock, P. Ritche, K. Gray, K. Davis, J.

Current research

Forensic face examiner ability in detecting identical and non-identical twins



Moreton, R. Noyes, E. Shilani,, J.

Questions?



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