Confirmation bias in biometric and forensic identification

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Face Comparison tasks

• Biometric
  – Review of candidate faces from an automatic facial recognition system (e.g. biometric security system at border control).

• Forensic
  – Matching identity of a face from CCTV to a person physically present or a photograph (e.g. a judge or juror).
  – Expert forensic facial comparison (e.g. facial comparison ‘expert’ witness).
Confirmation bias

• A type of cognitive bias to search for, interpret or remember information in a way that confirms preconceptions, expectations or hypotheses.

• Sometimes referred to as ‘contextual bias’
Confirmation bias in auditory evidence

- Use of a transcript to assist the jury to understand a poor quality voice recording.
- Experimental evidence of confirmation bias in interpretation of degrading auditory recordings.
  - E.g. “I got scared when I saw what it’d done to him.”

Lange, Thomas, Dana, & Dawes (2010)
*Law and Human Behavior*
Thompson Illusion
Thompson Illusion
Perceptual biases

• Perception is an active process
• Strive for meaning
• Predisposed to see what
  – we expect to see,
  – is familiar,
  – fits the context.
• Perception and memory can be distorted to fit our interpretation especially under conditions of uncertainty
Confirmation bias in forensic science

fingerprints
Decision making in forensic science

Decisions should be:
• Valid
• Reliable
• Therefore:
  – an expert should reach the same conclusion if a decision is repeated
  – different experts should reach the same conclusion
  – decisions should not be affected by cognitive biases
    • Context (e.g. prosecution vs. defence work)

Error in fingerprint identification.

- Mayfield Fingerprint (USA)
  - Latent print on a plastic bag recovered from the Madrid bomb erroneously identified by FBI.
Evaluation of fingerprint experts: effect of context

- Covert procedure
- 5 experts from international pool, mean 17 years experience.
- For each expert a pair of fingerprints were selected which he or she had previously judged to be match.
- Pair of fingerprints given to expert, led to believe it was the Mayfield print.

Dror, Charlton & Peron (2006) Forensic Science International
Covert empirical data of Fingerprint experts

Consistent decision

Inconsistent decisions

Inconsistent decision

No match
Can't decide
Match
In addition to investigating the limits of the techniques themselves, studies should also examine sources and rates of human error. As part of this effort, more research should be done on "contextual bias," which occurs when the results of forensic analysis are influenced by an examiner's knowledge about the suspect's background or an investigator's knowledge of a case.
Research of confirmation bias in forensic science

• Recent studies of confirmation bias in forensic science
  – Shoe print examination. (Kerstholt et al., 2009. *Forensic Science International.*)
  – Bullet comparison. (Kerstholt et al., 2010. *Forensic Science International.*)

• All find no evidence of bias
• In all studies experts knew they were taking part in an experiment.
Facial comparison
Facial comparison

- Judgement under uncertainty
  - The same face can look very different in two photographs.
  - Different faces can look very similar to each other.
Facial Comparison is error prone.

- Comparison of person in video to a person physically present in the room.
- Task that faces a jury
- Error rate approx. 20%
  - Both false positives and false negatives
  - Large variation in error rates between individual pairs.

Davis & Valentine (2009)
Applied Cognitive Psychology
Example video clip
Experiment 2

- Would error rates be as high if video footage was of higher quality and taken from close-up and at the same time as the identification session?
Error rate
(Error bars denote standard error of the mean)
Facial comparison by experts
Methods of Facial comparison

• Photo-anthropometric measurement
  – Measurement of ratios and angles of facial landmarks

• Morphological comparison
  – Subjective classification of features into sub-types
Is the science of facial comparison ‘generally accepted’?

- Research has highlighted inadequacy of methods and research base.
  - Mardia et al. (1996). *On statistical problems with face identification from photographs*
  - Kleinberg et al. (2007). *Failure of anthropometry as a facial identification technique using high quality photographs*

- A recent review has been very critical of methods (Edmond, et al. 2009)
  - “Extant … safeguards … might not adequately protect those accused … when .. confronted with incriminating expert identification evidence.”

- Recent test of morphological comparison by two experts (Wilkinson & Evans, 2009).
  - 25% error rate in target absent conditions when the full head is visible.

- There is no generally accepted scientific method for facial comparison.
- There is no measured rate of error.
Conclusion of photo-anthropometric study

- Attempted to distinguish targets and foils from human performance study.
- 37 distance measures & 25 angles from full-face and profile views
- A reliable identification of a target face (from a database of 70 homogeneous faces) required all measurements from studio-quality full-face and profile views available from both the imagery to be identified and the reference imagery.
- Unrealistic in practice:
  - Reduced resolution
  - Limited views available
  - Occluded facial images
  - Image artefacts
- The limited measurements presented in court are not capable of establishing a match of identity and are highly susceptible to false positives.

Select naturally ‘good’ face recognisers

- Strong individual differences in face recognition.
- Limited efficacy of training.
  - Some individuals are highly skilled, but their efficacy is not science-based.
  - Potential for selection of people for whose work a good ability in facial comparison is critical.
Confirmation bias in facial comparison

- Judgement under uncertainty.
- Expert usually knows whether he or she is working for prosecution or defence.
- May well know evidence against the suspect.
  - Likely to induce a propensity (conscious or unconscious) to interpret evidence in a favourable light for the relevant ‘side’.
Control for confirmation bias in clinical trials

• If the patient knew whether they were taking a drug or a placebo
  – They may be more (less) inclined to report benefit.
  – They may be more (less) declined to report a negative side effect.
• If the doctor knew whether the patient was in a drug or placebo condition.
  – They may be more (less) inclined to report benefit.
  – They may be more (less) declined to report a negative side effect.
• For many years all medical clinical trials have been run double-blind.
Measures to safeguard against confirmation bias

- Remove contact between investigators or defence solicitors and experts.
- Do not disclose to the expert whether they are instructed by prosecution or defence.
- Include innocent foils in the comparison.
- Require independent blind confirmation.
- Isolate forensic video labs from commercial or institutional pressure.
Thank you!

Research papers available at:

www.valentinemoore.co.uk/research