Qualitative differences between professional forensic face examiners and untrained people in person recognition revealed by item analysis

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Introduction

Goal

- understand face recognition by forensic face examiners at a qualitative/strategic level

Background

- professional forensic face examiners surpass untrained participant groups on challenging face identity-matching tasks (White et al., 2015)
- quantitative performance comparisons are informative, but incomplete

Approach

- use data from 2 tests of professional forensic examiners and controls (White et al., 2015)
- quantify performance between groups by looking at patterns of errors

Base Study (White et al., 2015)

Participants

- **examiners**: international group of professional forensic face examiners (*n* = 27)
- **FISWG controls**: Facial Identification Scientific Working Group (FISWG) attendees, face recognition policy, but not trained (*n* = 14)
- **student controls**: untrained undergrads, typical sample in literature (*n* = 32)

Identity Matching Paradigm

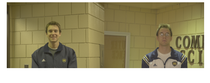
1.) sure same person; 2.) think same; 3.) don't know; 4.) think different; 5.) sure different people

Identity Matching Tests

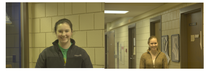
Person Identification Challenge Test (PICT)

- reliance on face versus body for identification
- screened by computer algorithm to represent a worst-case scenario

Matched identity (low similarity)



Non-matched identity (high similarity)



whole face body

- Image pair type
  - face- informative = whole (info: face > body)
  - body-informative = whole (info: body > face)

(Rice et al., 2013)

Expertise in Facial Comparison Test (EFCT)

- strategic differences with same- versus different- identity trials
- selected to be challenging for computers & humans

Matched identity

Non-matched identity

(Phillips et al., 2012)

Methods

Item Winner Analysis

- formulate the analysis of each item as a competition between the three groups

define ideal response: same-identity: "1" (sure same) different-identity: "5" (sure different) ⇨ challenge level score = absolute (actual response - ideal response) ⇨ item winner = group with the lowest challenge level score

Fusion Analysis

- examine the "wisdom-of-the-crowd" effect as a function of varying sample size

1. randomly sample *n* participants from within each group
2. average item responses for each sampled participant
3. compute mean challenge level score for groups
4. assign the winners
5. repeat steps 1-4 100 times and calculate the percentage of wins for each group

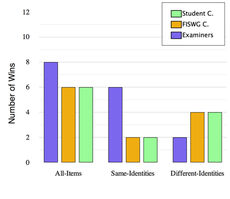
Chi-Square Analysis

- test the difference between the distribution of winners for image pairs in different conditions (PICT ⟷ FI vs. BI; EFCT ⟷ same- vs. different- identity)

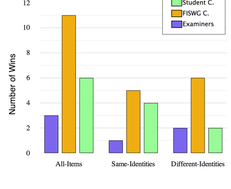
Results

PICT: Item Winner

Face: Tally of Item Wins



Body: Tally of Item Wins



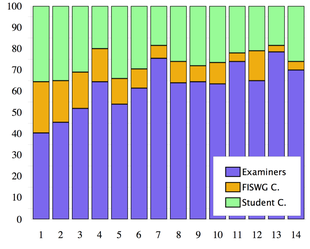
- Do examiners and untrained students perform differently on *face-informative* and *body-informative* stimuli?

⇨ YES (All-Items; Same-Identities)
Face-informative: examiners > controls
Body-informative: controls > examiners

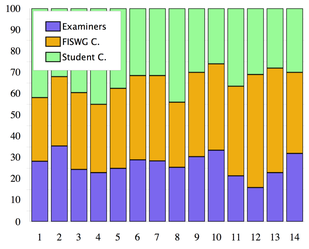
PICT: Fusion

- Is distribution of wins different for *face- vs. body-informative* stimuli across groups for *all* items? YES: $p\ (n = 14) < .01$

Face: All-Items

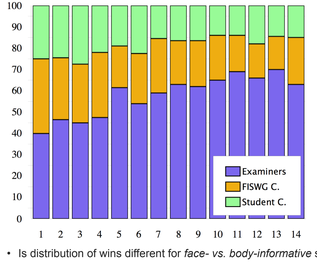


Body: All-Items

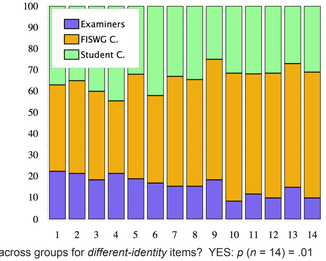


- Is distribution of wins different for *face- vs. body-informative* stimuli across groups for *same-identity* items? YES: $p\ (n = 14) < .01$

Face: Same-Identities

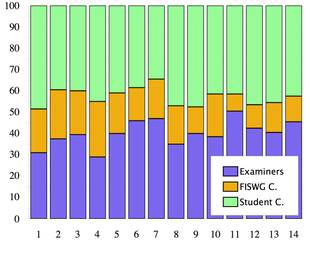


Body: Same-Identities

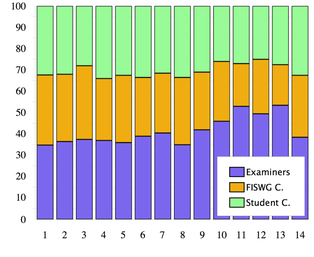


- Is distribution of wins different for *face- vs. body-informative* stimuli across groups for *different-identity* items? YES: $p\ (n = 14) = .01$

Face: Different-Identities

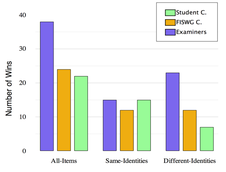


Body: Different-Identities



EFCT: Item Winner

EFCT: Tally of Item Wins



Do examiners perform differently from untrained students on same- vs. different-identity stimuli?

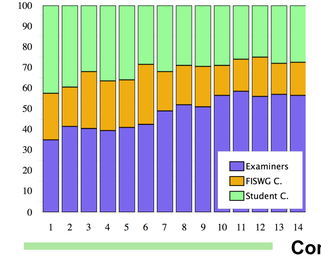
⇩

YES
Same-identity: examiners = controls
Different-Identity: examiners > controls

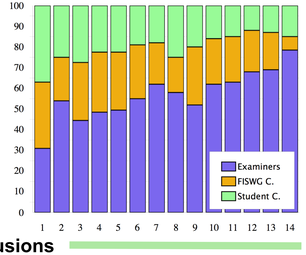
EFCT: Fusion

- Is distribution of wins different for *same-vs. different-identity items across groups*? YES: $p\ (n = 14) < .01$

EFCT: Same-Identities



EFCT: Different-Identities



Conclusions

- examiners surpassed untrained participants when internal face contains better information for identity than external face & body
- accuracy measures for examiners and controls must include **both** 1) same-identity verification and 2) different-identity rejection to understand the role of perceptual skill and response bias in performance

Discussion

- **Possibilities**
  - examiners concentrate on the face alone due to the extensive training
  - examiners believe that internal face is more stable over time than the external face and body
  - examiners process unfamiliar faces in the same way untrained people process familiar faces
  - examiners and untrained people approach the response scales in different ways
    - "retreat to the center of the scale" effect
- **Implications**
  - improve the training process by combining the external features with the internal features

References & Acknowledgement

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