Contributing Factors to Human Performance on Person Recognition from Videos

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Background

Goal
Examine person recognition in natural environments when viewing a person approach

Background
- Humans are highly skilled at recognizing and discriminating between familiar people
- Information from face[1,3,4,6], body[4,5,6], and gait[2] support person recognition
  - research has largely concentrated on face
  - body can support recognition
  - "preference" to use face when both are accessible
- How is this information combined over time when making recognition judgments?
- Which factors mitigate use of each in natural viewing environments?

Approach
Examine recognition in natural environments with *whole people approaching in motion* – quality of identity information from the face and body is in flux over changes in distance
- build robust representation of identities in a learning phase
- test recognition to examine
  - time course of recognition and contribution of faces and bodies
  - continuous unfolding of decisions over time/across distances in motion

1) *How do recognition decisions evolve* as someone approaches?
2) Is information *accumulated* across the video, *or are decisions based on the quality of most recent information*?
3) How do the *contributions of the face and body shift* over distance?
4) *When* are decisions made spontaneously?

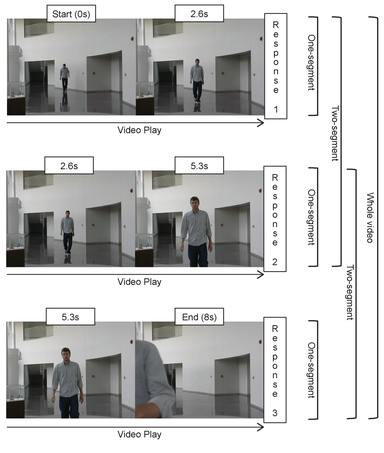
Method

Learning phase

- Familiarized with 30 identities: saw each performing four actions using videos
- 120 videos total

Recognition test (all experiments)
- Tested with 60 identities: half familiar/half unfamiliar
  - When familiar, video taken on different day (so hair and clothes not an identity cue)
- All videos: 8 seconds long; walking toward the camera

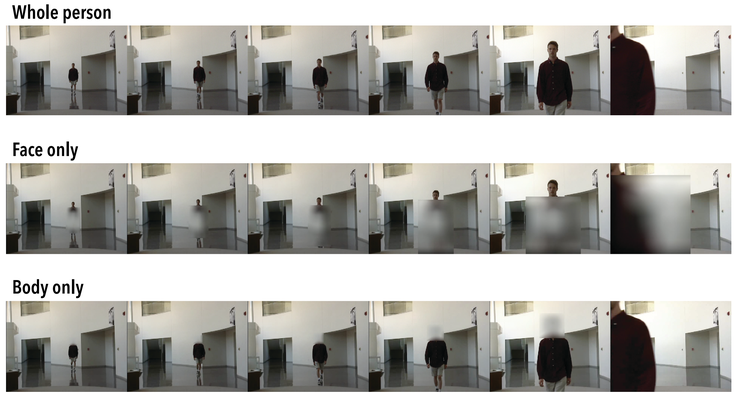
Experiment 1 – Segmented videos



Three between-subjects *video-quantity conditions*:
Whole video: see entire video (*n* = 16)
Two-segment: see 2/3 of video per identity (*n* = 18)
One-segment: see only 1/3 of video per identity (*n* = 16)

At each response, participants indicated if identity was unfamiliar to familiar on scale of 1 to 5 (sure unfamiliar to sure familiar)

Experiment 2 – Blurred faces and bodies



Three between-subjects *person-visibility conditions:*
Whole person: *n* = 33
Face only: *n* = 18
Body only *n* = 15

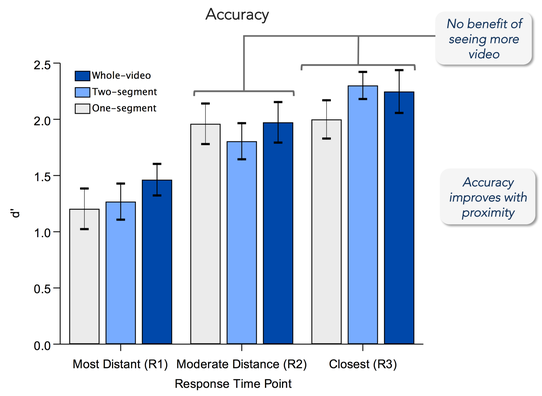
Two within-subjects test types:

Prompted responses
Same as Experiment 1's whole video condition

Free Response
Videos shown uninterrupted
Participants instructed to respond as soon as they felt confident
Binary Response: familiar or unfamiliar

Results

Experiment 1 – Segmented videos



Effect of response time point: $F(2, 94) = 55.53$, $p < .001$, partial $\eta^2 = .54$.

Response time point: Closest (R3)
If accumulation occurred: whole video > two-segment > one-segment
Simple effect ANOVA: $F(2,47) < 1$

Response time point: Moderate Distance (R2)
If accumulation occurred: (whole video = two-segment) > one-segment
(note: excludes R2 responses from two-segment that preceded the third segment)
Simple effects ANOVA: $F(2,47) < 1$

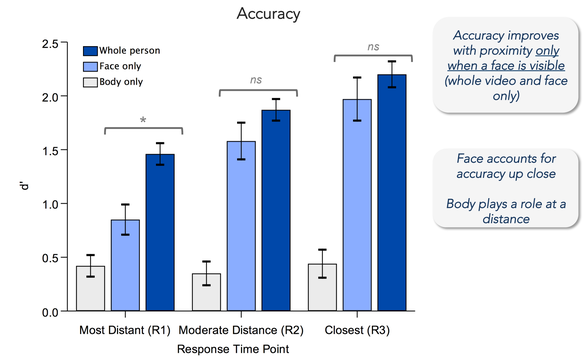
Quality of "recent" information drives recognition
No evidence for accumulation

Two possibilities:
1) Quality of a one source of identity information improves (e.g., increase in face resolution with proximity)
2) Different sources of identity information (e.g., face, body) may shift in contribution over distances

Experiment 2 dissects these two possibilities

Experiment 2 – Blurred faces and bodies

Prompted responses

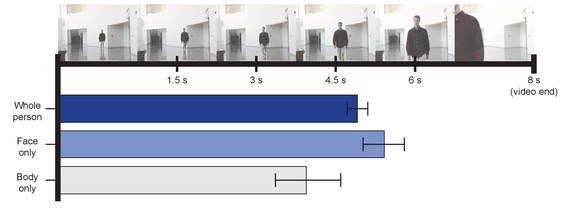


Effect of response time point: $F(2, 126) = 36.05$, $p < .001$, partial $\eta^2 = .36$
Effect of video type condition: $F(2, 63) = 31.73$, $p < .001$, partial $\eta^2 = .50$
2-way interaction: $F(4, 126) = 8.27$, $p < .001$, partial $\eta^2 = .21$

Response time point: Moderate (R2) and Closest (R3):
Simple main effects contrasts: whole people = faces only, $F < 1$

Response time point: Most Distant (R1)
Simple main effects contrast: whole people > faces only
$F(1, 63) = 4.25$, $p = .044$, partial $\eta^2 = 06$.

Free response
Accurate trials only



Different sources of information shift in contribution over distances

- Face contributes up-close
- Body contributes at a distance – does not increase contribution with proximity
  - Reflected in (1) accuracy over response time points and (2) quicker responses with the body alone

Conclusion

Decision source at given time point
- People *use the most recent information* to make recognition decisions
  - Reliance on face/body varies with proximity:
    - *At a distance*: Sources of identity information are from *both* faces and bodies
    - *Up-close*: Face is primary cue for identity

Face and Bodies
- Highest accuracy with close up view of the face
- Quality of information from face, but not body, improves with proximity
- Body as identity cue stable over distance
- Reflected in participants' behavior: fastest responses with bodies alone
- Visibility/utility of the face and body influences when people make judgments

References

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