Early neural dehumanization of other race faces?

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Introduction

- Other race effects for faces consist of faster categorization, and slower recognition of other compared to own race faces[1,2].
- Social cognition/motivation accounts propose faces are first categorized, with other race faces capturing observer attention such that further identity processing is precluded without intentional observer effort[3,4].
- Perceptual accounts instead suggest perceptual experiences with other and own race faces differ, ultimately affecting the efficiency with which race and identity features are processed[5].
- Classical event-related potentials (ERP) have produced equivocal results, but ERPs have limitations[6]. Our objective was to circumvent some of these limits by using machine learning (decoding)[7].

Methods

- ***Participants***
  - N = 19 White subjects.
- ***Procedure***
  - Visual 1-back (Fig. 1A).
  - 5,600 trials/subject.
- ***Stimuli***
  - 160 images (Fig. 1B).
  - 32 subordinate/identity-level conditions (5 exemplary each).
    · 50% light tone, 50% dark tone.
    · 50% human*, 50% nonhuman.
    · 25% female*, 25% male*, 25% nonhuman primate, 25% chess.
    *Human faces depicted German public figures unfamiliar to participants[7].
- ***Data acquisition***
  - 64-channel electroencephalography (EEG).
- ***Analyses***
  - 1,000ms epochs (-200ms to +800ms from stimulus onset).
  - Time-resolved EEG decoding using a cross-validated SVM[8,9].
  - 95% CI of decoding accuracy estimated using bootstrap.

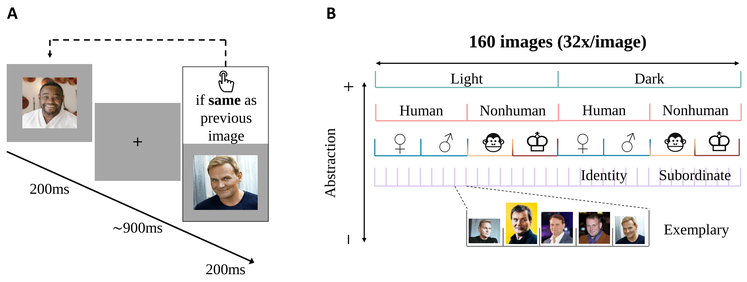

Figure 1. (A) Experimental procedure. Participants viewed a continuous stream of images (200ms), each separated by a 800-1,000ms interstimulus interval. They were instructed to press a key whenever the presented image was identical to the previous one, i.e., a 1-back. (B) Image categories used in the 1-back experiment, organized from most (top) to least (bottom) abstract. Each exemplary level image was presented 32 times total.

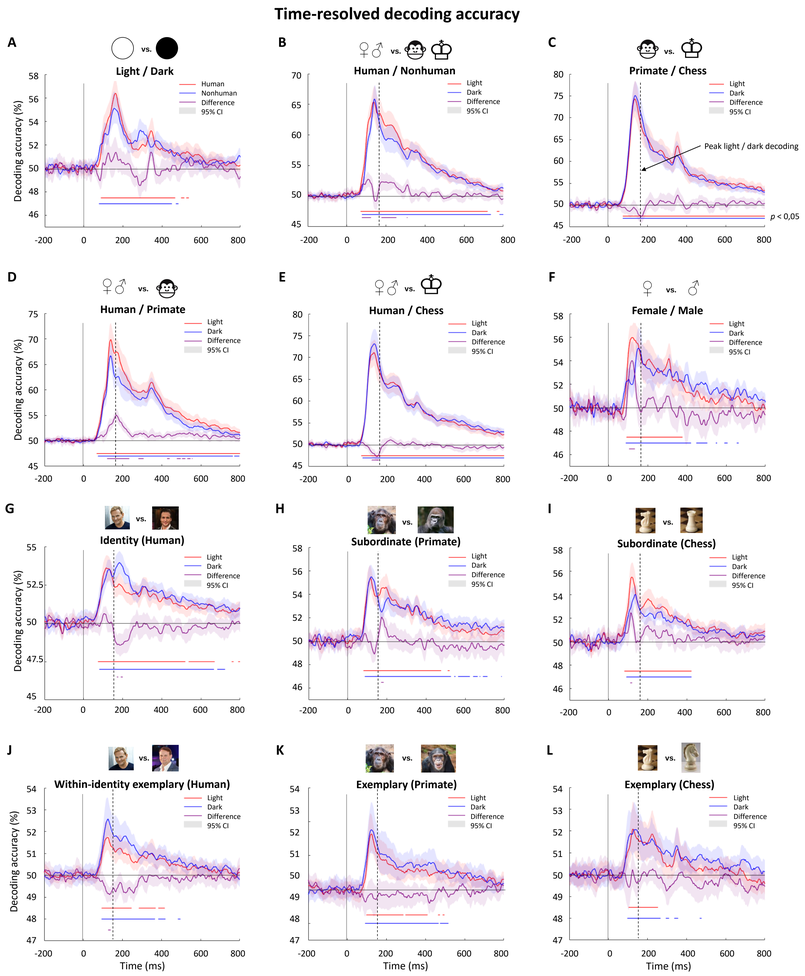

Figure 2. Time-resolved decoding accuracy averaged over N = 19 subjects, from −200ms to +800ms relative to onset. Shaded areas constitute 95% CIs, estimated with bootstrap analysis (10,000 iterations). Horizontal red and blue lines represent decoding that is statistically above chance level for their respective conditions; purple lines represent statistically significant differences in decoding across plotted conditions, $p < 0.05$. The light / dark decoding peak (A) is indexed with vertical dotted lines (B-I).

References

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Results

- ***Light / dark*** classification was observed from ~ 80ms to 500ms (peak: 160ms), $p < 0.05$. It was similar for human and nonhuman targets (Fig. 2A), $p > 0.1$.
- ***Human / nonhuman*** classification was mostly observed from ~ 70ms to 720ms (peak: 140ms). From 80ms to 120ms, and from 180ms to 250ms, decoding accuracy was higher (2.5%) for light targets (Fig. 2B). Strikingly, this was due to a 5% confusion increase between dark ***human / primate*** targets (Fig. 2D; see also Fig. 3), as confusion was in fact decreased (2.5%) between dark ***human / chess*** targets (Fig. 2E), all *p*s < 0.05.
- ***Gender*** classification was mostly observed from ~ 87ms to 397ms. Decoding peaked earlier for light (120ms) than dark (150ms) faces. From 110ms to 140ms, accuracy was higher (4%) for light faces (Fig. 2E), all *p*s < 0.05.
- ***Identity*** classification was mostly observed from ~ 73ms to 670ms. It peaked earlier for light (117ms) than dark (183ms) faces. From 170ms to 200ms, accuracy was higher (1.5%) for dark faces (Fig. 2G), all *p*s < 0.05.
- ***Within-identity exemplary*** classification was mostly observed from ~ 93ms to 417ms (peak: 127ms). From 127ms to 140ms, decoding was 1% higher for dark faces, $p < 0.05$ (Fig. 2J), but also marginally so from 207ms to 263ms, $p < 0.1$.

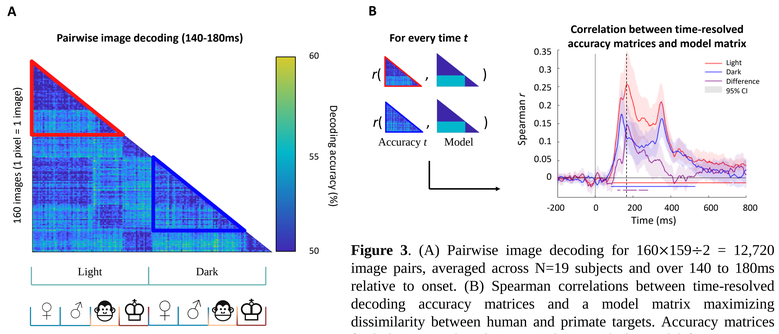

Figure 3. (A) Pairwise image decoding for 160×159÷2 = 12,720 image pairs, averaged across N=19 subjects and over 140 to 180ms relative to onset. (B) Spearman correlations between time-resolved decoding accuracy matrices and a model matrix maximizing dissimilarity between human and primate targets. Accuracy matrices for light targets shared more similarity with the model from ~ 117ms to 280ms, compared to dark targets, $p < 0.05$. Vertical dotted line indexes peak light / dark decoding (Fig. 2A).

Discussion

- Light / dark decoding peaked roughly 20 to 45ms later than most other categories tested, including gender, identity and exemplary. This is hard to reconcile with social cognition/motivation accounts of OREs.
- The fact both identity and gender decoding peaked later for dark faces suggests other race faces are processed relatively inefficiently. Sensitivity does not seem to be the issue—the fact there was increased exemplary discrimination suggests the culprit could be lack of abstraction[10].
- Increased neural confusion between dark human and primate targets is concerning. This might point toward an early—perceptual—origin to blatant dehumanization of dark-skinned people[11].

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