Judging books by their covers:
A candidate neurocognitive mechanism underpinning bias towards facial anomalies

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Background

The anomalous-is-bad stereotype facilitates biases against people with facial anomalies (e.g., scars), reduced by corrective surgery (refs 1,2)

- *Explicit bias:* overall bias against facial anomalies not endorsed, but anomalies predict unfavorable character judgments

- *Implicit bias:* unconscious associations between negative words (vs. positive), visible anomalies (vs. same face after surgery)

Open questions:

- *Psychological:* Do facial anomalies trigger pathogen avoidance? Or seen as physical manifestations of moral corruption?

- *Neural:* Does blunted dmPFC responding to anomalies (pre- vs. post-surgery; ref 2) underpin the stereotype?

Hypotheses:

1. Facial anomalies signal **poor health.** *Predictions:* dmPFC blunting, which is modulated by sensitivity to **pathogen disgust.**

2. Facial anomalies signal **moral corruption.** *Predictions:* dmPFC blunting, which is modulated by sensitivity to **moral disgust.**

Good-Looking

Average-Looking

Anomalous

M: male, F: female, N: novel.
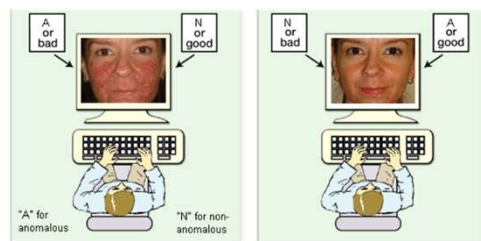
F | M | F | **N** | F | M | F | F | M | F | **N** | F

Method

- Participants:
  - N = 27 (17 female; age = 25.5 ± 7.1)

- Dispositional and attitudinal measures:
  - 3 Domains of Disgust subscales for sensitivity to pathogen and moral disgust
  - Implicit Association Test (IAT)

- Oddball fMRI task:
  - Average-looking faces (450; Chicago Face Database [CFD]); participants learned these faces before scanning via a 1-back task (100% recognition confirmed with post-testing)
  - Novel faces (90) *not shown* to participants before scanning: 1) Good-Looking (30; CFD); 2) Average-Looking (30; CFD); 3) Anomalous (30; ChatLab Anomalous Face Database; ref 3)
 - Counted and reported the number of novel faces they saw after each of 5 fMRI scans
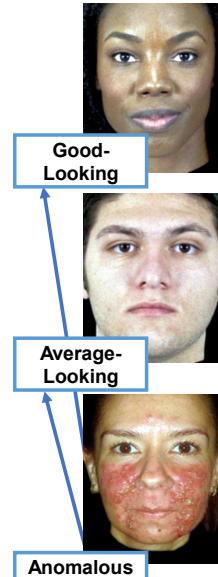
Results

Whole-brain voxelwise analysis: ($p < 0.05$ cluster-level FWE-corrected)

- *Anomalous > Good-Looking + Average-Looking faces:*
  - Bilateral fusiform, middle occipital gyri, amygdala, inferior frontal gyri, inferior parietal lobules
  - IAT scores correlate positively with activations across a similar occipito-temporal network
- *Anomalous < Good-Looking + Average-Looking faces:* no significant clusters

Region-of-interest analysis:

- Response in ventral striatum (VS) was negatively predicted by moral disgust sensitivity (slopes similar bilaterally)
  - Right VS: $r_s(27) = -0.49$, 95% CI [-0.94, -0.14], $p = 0.009$
  - Left VS: $r_s(27) = -0.44$, 95% CI [-0.88, -0.08], $p = 0.02$
- Pathogen disgust sensitivity: non-significant

3DD: 3 Domains of Disgust; VS, ventral striatum
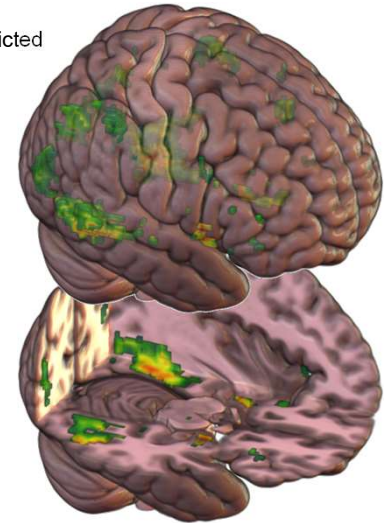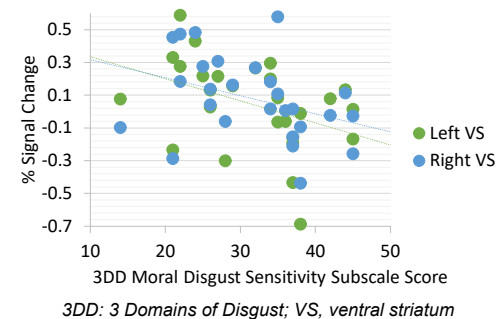
Discussion

- Stronger occipital activations in response to anomalous faces replicates previous study (ref 2), but a similar pattern of dmPFC blunting was not detected

- Results nevertheless favor Hypothesis 2: moral disgust sensitivity, but not pathogen-related disgust sensitivity, predicted VS blunting in response to anomalous faces

- Consistent with evidence that filmmakers use facial anomalies to signify villainy (ref 4)

- These results point toward a candidate neurocognitive mechanism that may underpin the anomalous-is-bad stereotype: moral disgust-sensitive encoding in reward circuitry

Acknowledgements & References

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2. Hartung et al. (2019). Behavioral and neural responses to facial disfigurement. *Sci Rep*. doi: 10.1038/s41598-019-44408-8
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4. Croley et al. (2017). Dermatologic features of classic movie villains. *JAMA Dermatology*. doi: 10.1001/jamadermatol.2016.5979