Approaches to Improving Face Processing in Prosopagnosia

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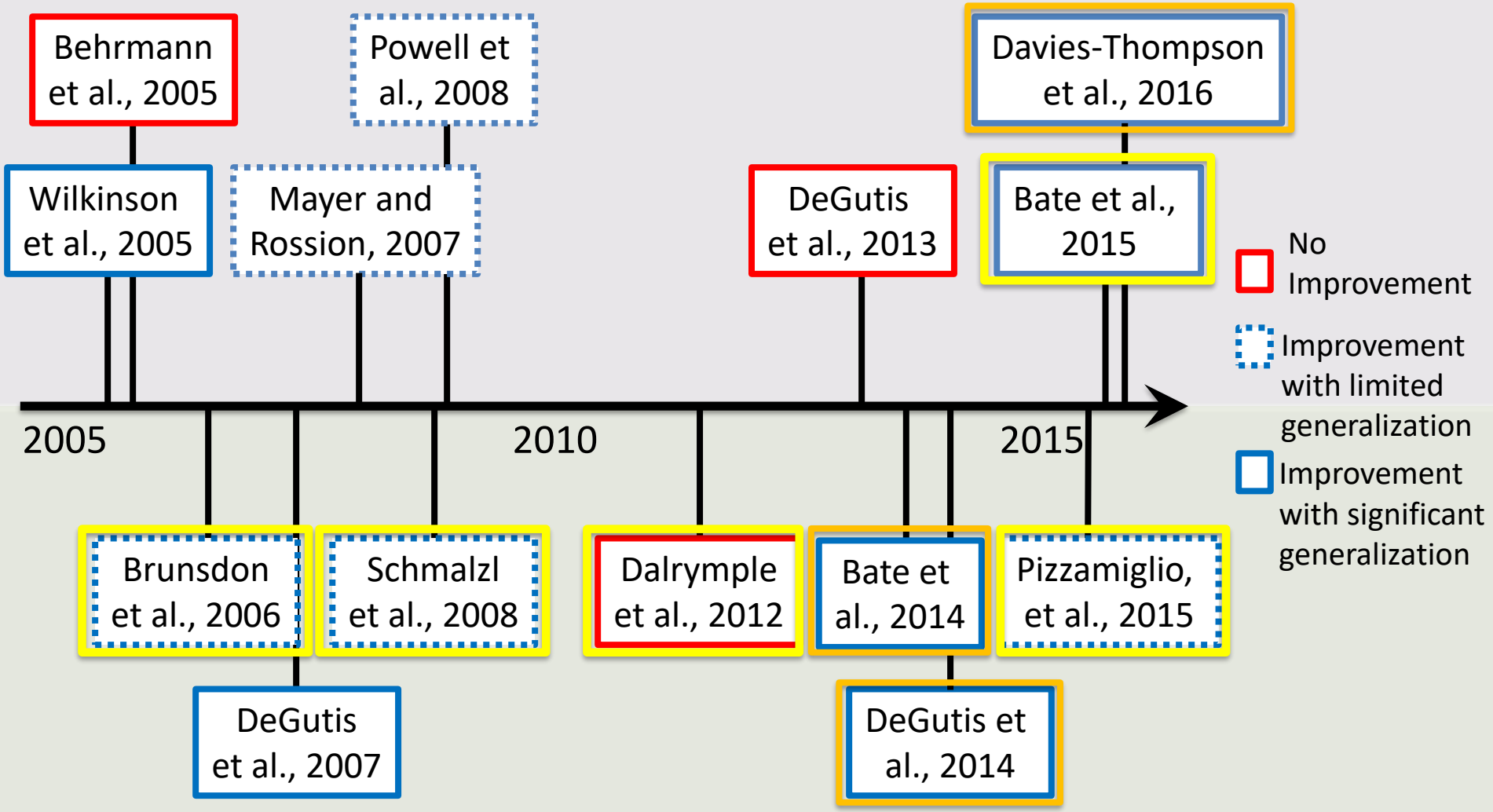
Can prosopagnosics improve at face processing?

"There may be domains of cognition for which an impairment caused by brain damage is such that restoration of normal processing is ***impossible***. It is conceivable that face processing is one such domain."

-Max Coltheart, Macquarie University, 2005

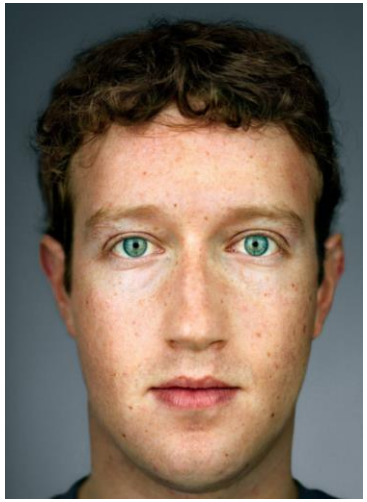
Acquired Prosopagnosia

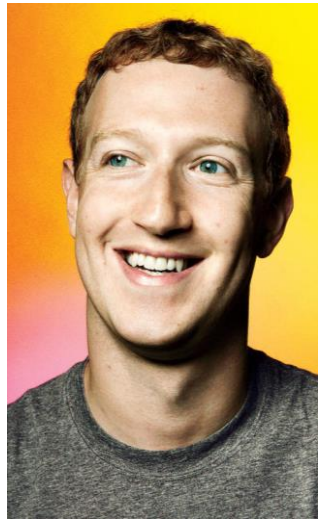


Developmental Prosopagnosia

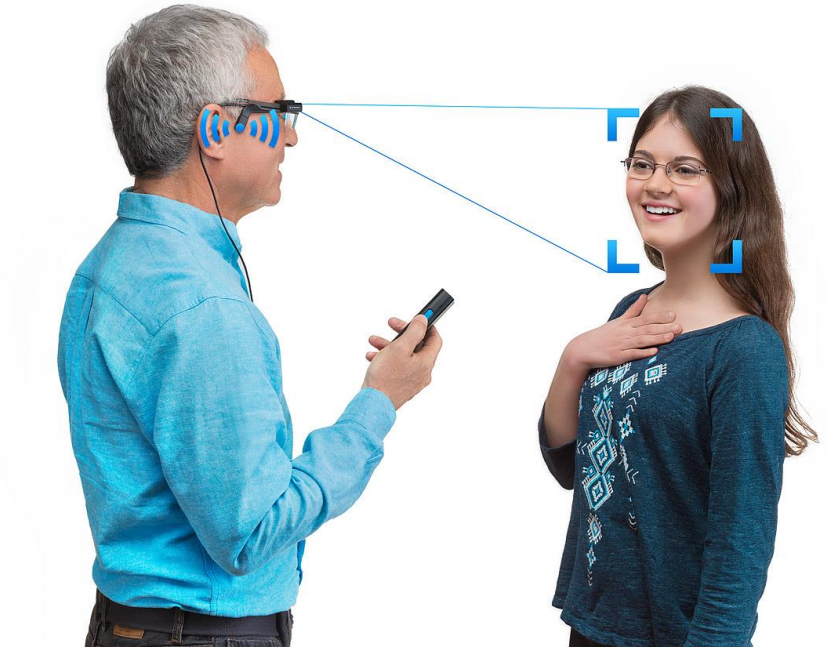
Compensatory Methods

- Learning and verbalizing distinct *internal* facial features (e.g., Brundson, 2006)
  - green eyes, long nose, light eyebrows



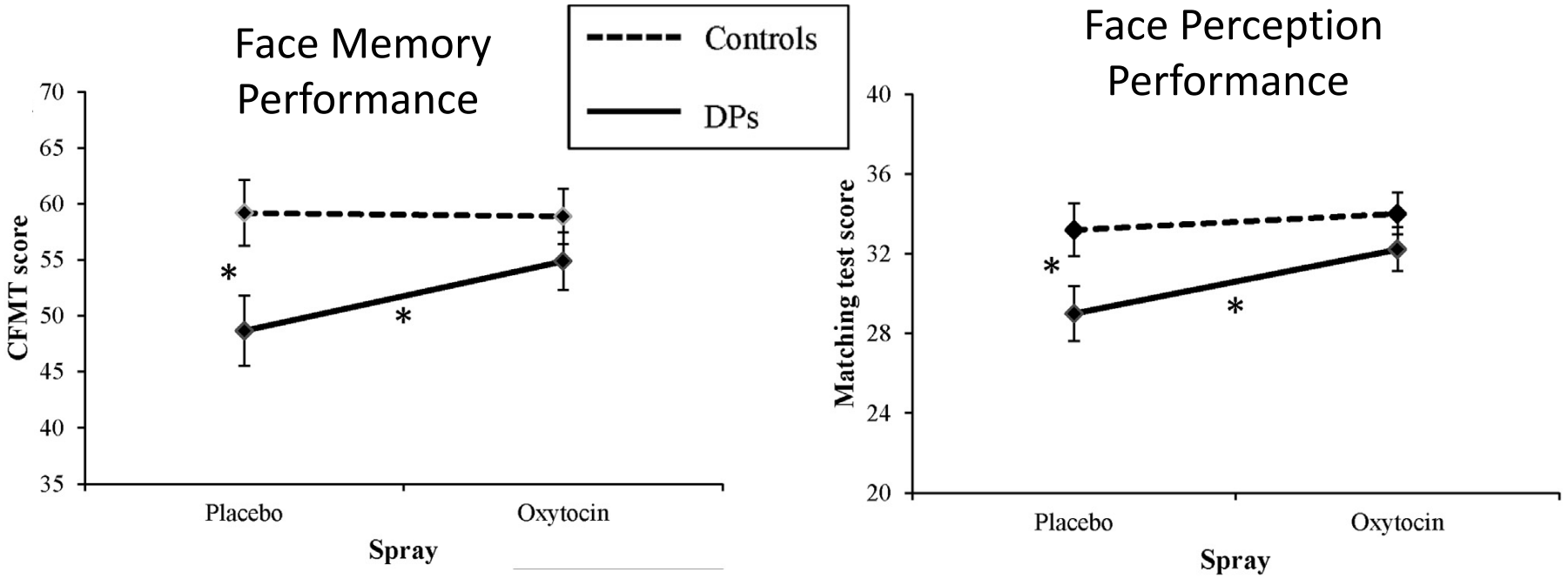


- Face Recognition Technology
  - Blippar app, 1st smart phone face recognition program
  - ORCAM, assistive device
    - currently recruiting prosopagnosics



Oxytocin

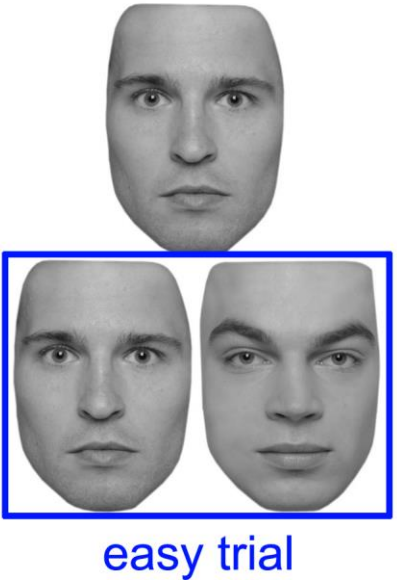
- Neuropeptide important for social cognition
  - Increase trust, eye fixation, reduce social anxiety
- 10 Developmental Prosopagnosics vs. 10 Controls
  - Intranasal OXT spray vs placebo spray, tested 45 mins later



Bate et al., 2014

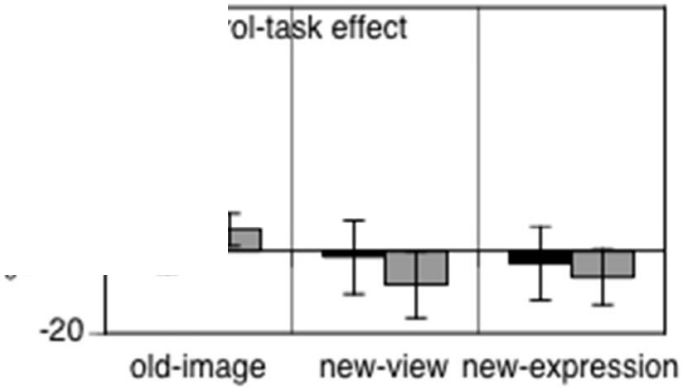
Cognitive Training: Morph Faces

- Discriminating increasingly difficult face morphs
  - 9 Acquired prosopagnosics performed both 11 weeks of training or kept track of characters in a TV program



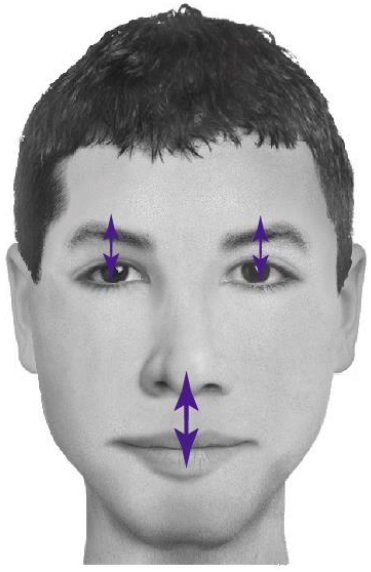
easy trial

- Barton Lab, UBC
- hvemlab.org/faces.html

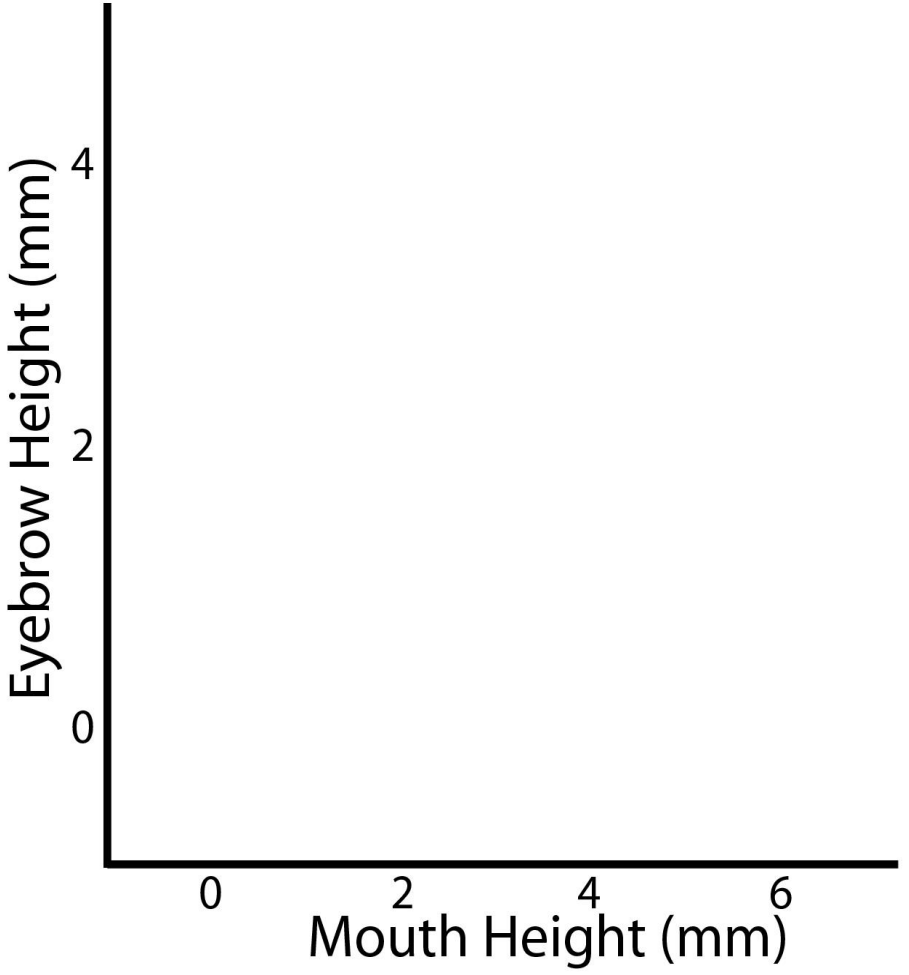


Davies-Thompson et al., 2016

Cognitive Training: 'Holistic' Face Training in Non-Prosopagnosics



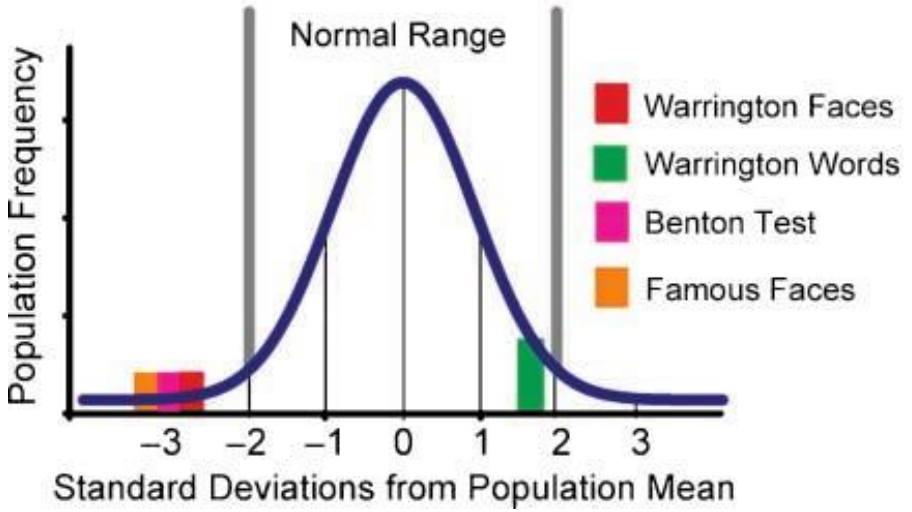
Training Task



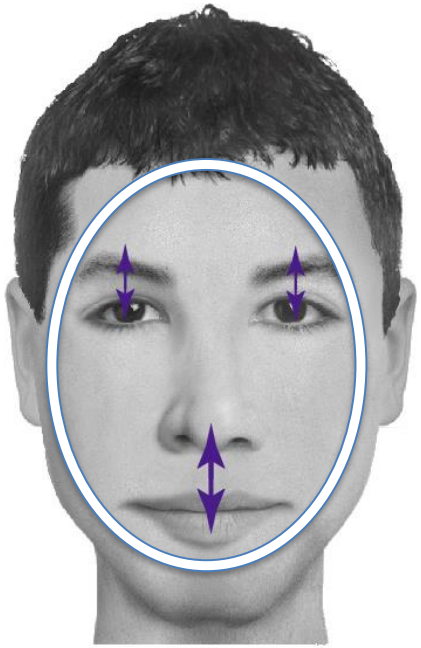
DeGutis et al., 2009

Developmental Prosopagnosic MZ

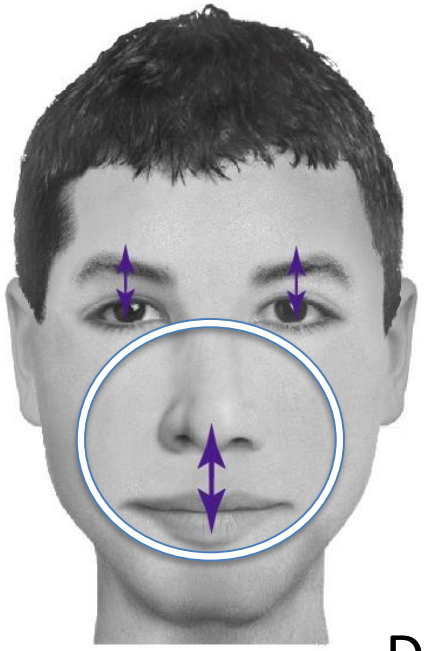
- 51 year-old woman
- Normal vision and above average intelligence



Non-prosopagnosics

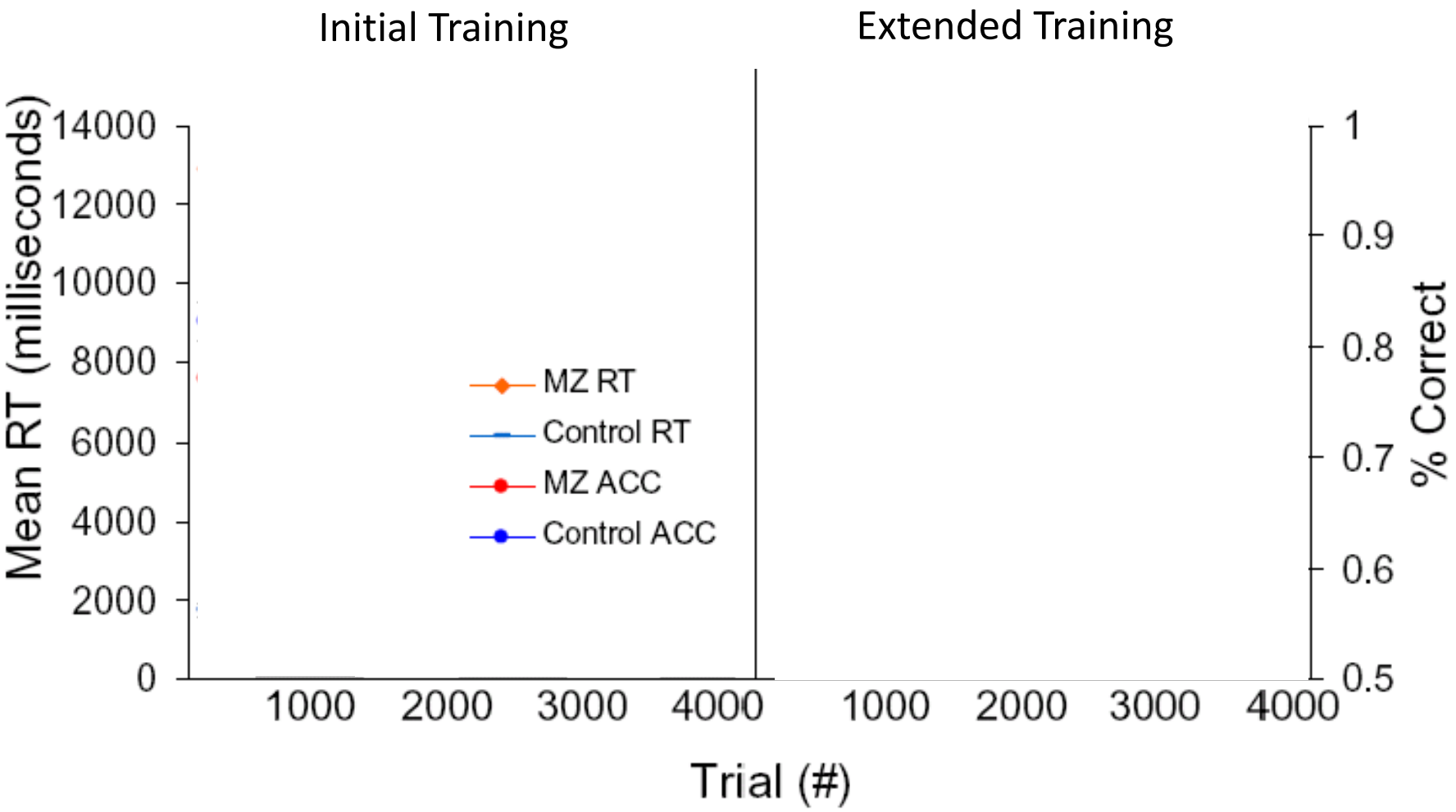


Prosopagnosics



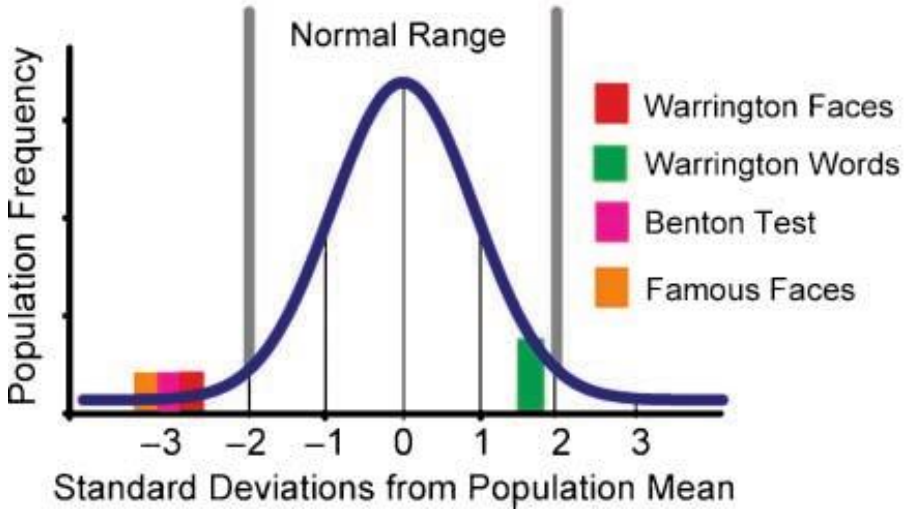
DeGutis et al., 2007

Holistic Face Training: Training Task Performance

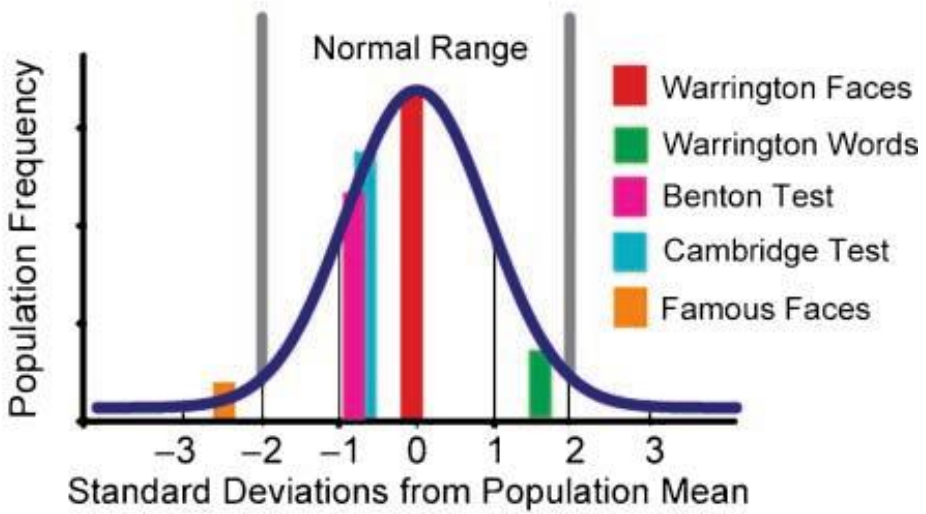


Holistic Face Training: Pre/Post Behavioral Performance

Before Training

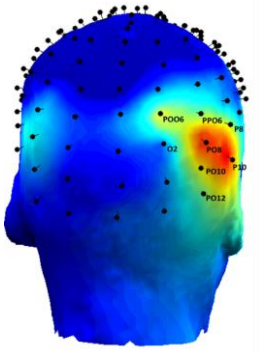


After Training



Holistic Face Training: Pre/Post Event-related Potentials

Neural Response (N170) to Faces vs. Objects

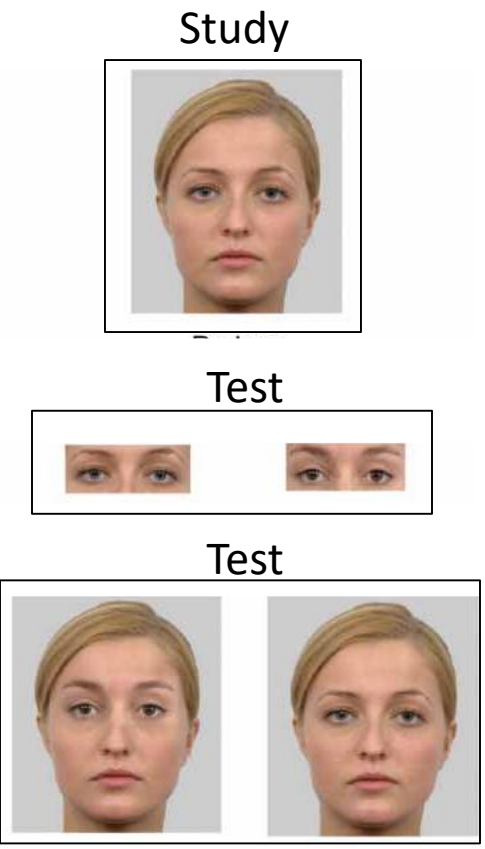


Holistic Face Training in 24 DPs

- Waitlist control design – 12 train only, 12 wait-then-train
- 15 x 40 mins training sessions over 3 weeks
- Pre/post Assessments
  - Front view face discrimination, discriminating faces across views, face diary

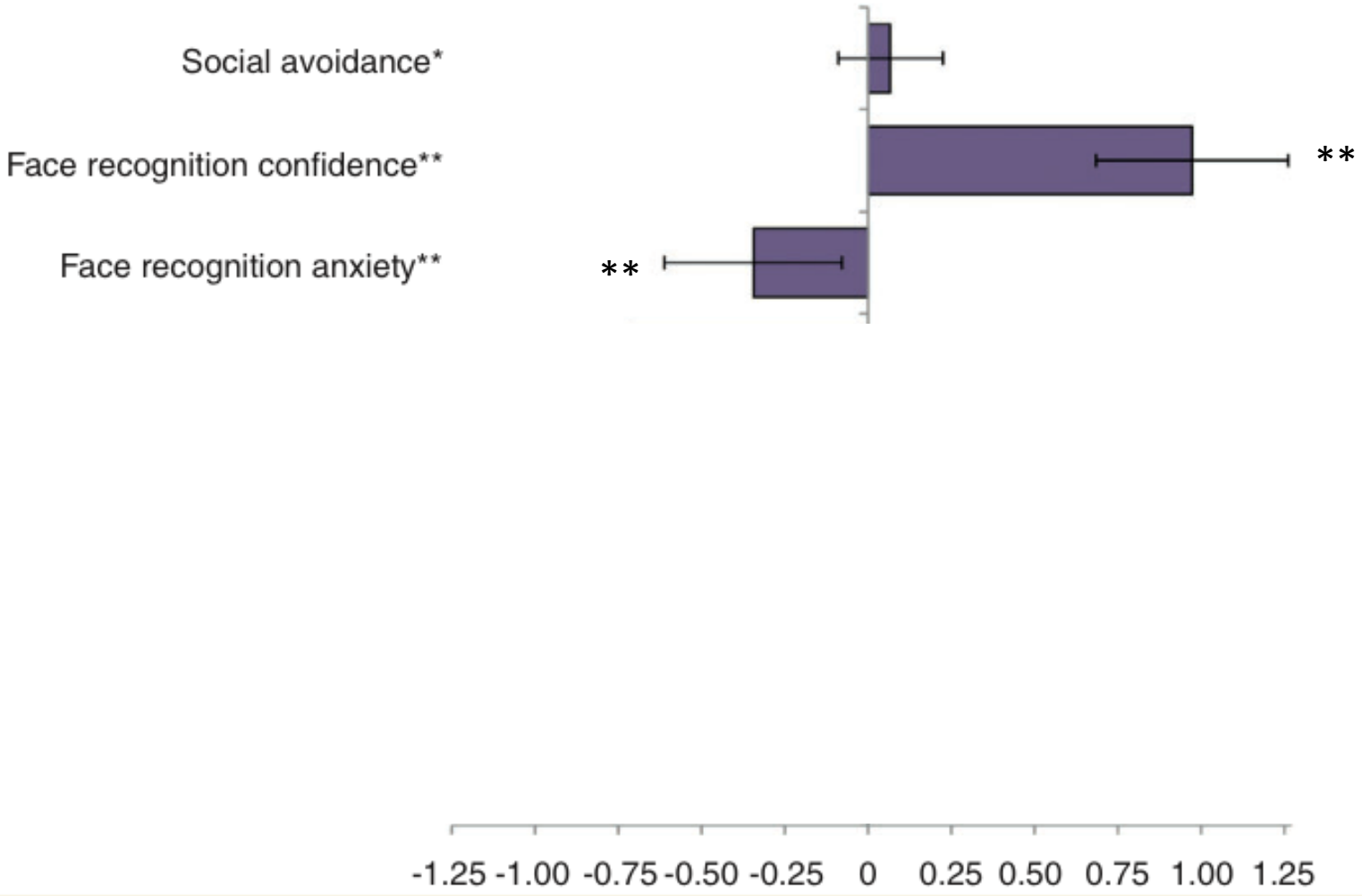
Front-view Face Discrimination

Holistic Face Training (N=24): Pre/post Part-whole performance



DeGutis et al., 2014

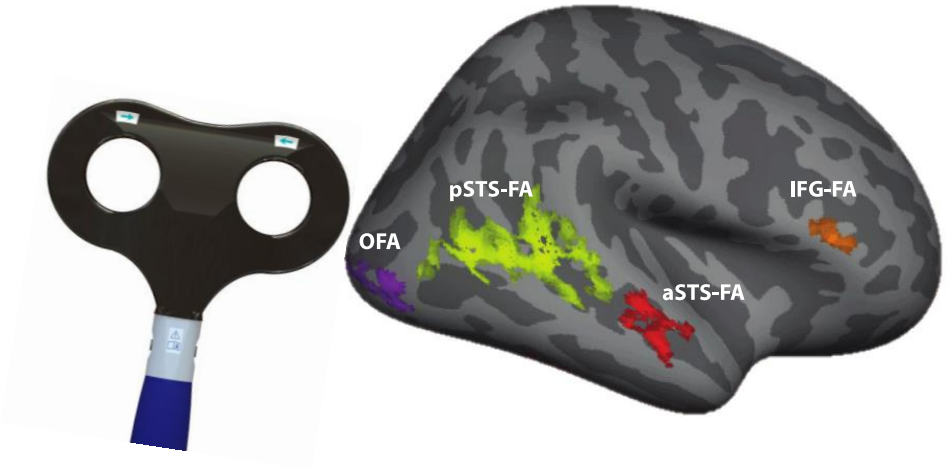
Holistic Face Training (N=24): Self-report Diary Improvements



DeGutis et al., 2014

Future Directions

- Transcranial magnetic and electrical stimulation



- Examine individual variation in treatment response
- Investigate pre/post neural changes
- Combine interventions

Acknowledgements

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NATIONAL INSTITUTES OF HEALTH

BAL LAB
BOSTON ATTENTION & LEARNING LABORATORY

- Prosopagnosia can be debilitating
  - Reduced social engagement, anxiety, difficulties with job prospects

- Prosopagnosia varies in type and severity
  - Deficit in perceptual processing
  - Deficit in storing and retrieving memories

Duchaine and Yovel, 2015