The recognition of static versus dynamic faces in prosopagnosia

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OBJECTIVE
- compare static versus dynamic face recognition
- prosopagnosia and neurologically intact controls

BACKGROUND
- Two-stream hypothesis (Haxby et al., 2000)
  - invariant information (identity)
  - fusiform gyrus (FFA)
  - inferior occipital gyrus (OFA)
  - changeable information (social communication)
  - superior temporal sulcus (STS)
- pSTS - a “back-up” face recognition system
  - O'Toole, Roark & Abd, 2002; Roark et al., 2003
  - dynamic identity signatures
  - structure-from-motion

RATIONALE
- Can prosopagnosics recognize moving faces?
  - with sparing of the pSTS “back-up system”
  - possible that pSTS can support recognition
  - detectable when faces are learned in motion

Previous work
- “CS” developmental prosopagnosia
- could discriminate identity in moving faces
  - (Steed et al., 2007)

What about prosopagnosia from a lesion?
- (cf. also Lander et al., 2004; Humphreys & Riddoch, 1987)

PARTICIPANTS
- 19 neurologically intact controls
- 2 prosopagnosics with intact STS (Barton et al., 2009)
- MR and BP

STIMULI
- dynamic face stimuli (5 s video clips)
  - person speaking or expressing (smile, laugh)
- static face stimuli
  - 5 frames from video presented in random order

EXPERIMENTAL SETUP
- Face Recognition Task
  - learn - 20 faces
  - from static or dynamic face presentations
  - within-subject
  - test 80 faces
  - 20 images/videos identical to learned stimuli
  - 20 images/videos “changed” (hair style, etc.)
  - 40 images/videos from 20 novel identities
- response - Old? or New?
- d' - face recognition accuracy
- measured on first occurrence of identity in test

RESULTS - Does Motion Affect Recognition?

Recognition Scores for Static and Dynamic Face Stimuli

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<tr>
<th></th>
<th>FFA</th>
<th>OFA</th>
<th>STS</th>
<th>Anterior temporal areas</th>
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PATIENT BRAIN SCANS

MR (70 yr. old male)
- lesions
  - fusiform temporal

BP (30 yr. old female)
- lesions
  - anterior temporal

IMPACTED (BP and MR)
- Warrington face test
- Cambridge face memory test
- famous face recognition

CONCLUSION
- motion advantage for MR and BP in the challenging changed stimulus condition
- prosopagnosics with pSTS may be able to use this system to recognize moving faces
- no motion advantage for MR and BP for the identical stimulus condition
- matching on external features (e.g., hair?)
- no motion effect for neurologically intact controls
- for either identical or changed stimulus conditions
- consistent with previous work (cf. O’Ttoole et al., 2002)

REFERENCES

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