Prosopagnosia - How face recognition does not work

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What is prosopagnosia (PA)?

"... die Prosopagnosie [ist] die elektive Störung im Erfassen von Physiognomien, sowohl des eigenen Gesichts wie von Fremdphysiognomien, die zwar gesehen, aber nicht als einem bestimmten Träger zugeordnete Physiognomien erkannt werden."

"... Prosopagnosia [is] the (s)elective dysfunction in realizing physiognomies, both the own face and alien physiognomies, which are perceived, but not recognized as physiognomies attributed to a specific bearer"

(Bodamer, J., 1947. "Die Prosop-Agnosie")

Short description of prosopagnosia (PA)

- Manifestation of PA
  - impaired/dysfunctional face recognition with intact object recognition (double dissociation)
  - can result in severe consequences for social life (in children often misdiagnosed as Autism)
- Causes of PA
  - Aquired PA, e.g after head injury or stroke
  - Developmental PA, i.e. aquired during childhood (without apparent cause)
  - Congenital PA, i.e. present from birth
- How common is PA?
  - from 1947 to 2003 only a handfull of cases (mostly aquired PA) have been described
  - in 2003 Grüter, Kennerknecht et al. found a prevalence rate of 2.47% for congenital prosopagnosia

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Can you recognize this guy?

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Out of 16 Prosopagnosics (PAs) 5 did not recognize the instructor

Face Recognition is quite robust

against changes in age

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Angela Merkel

Face Recognition is quite robust

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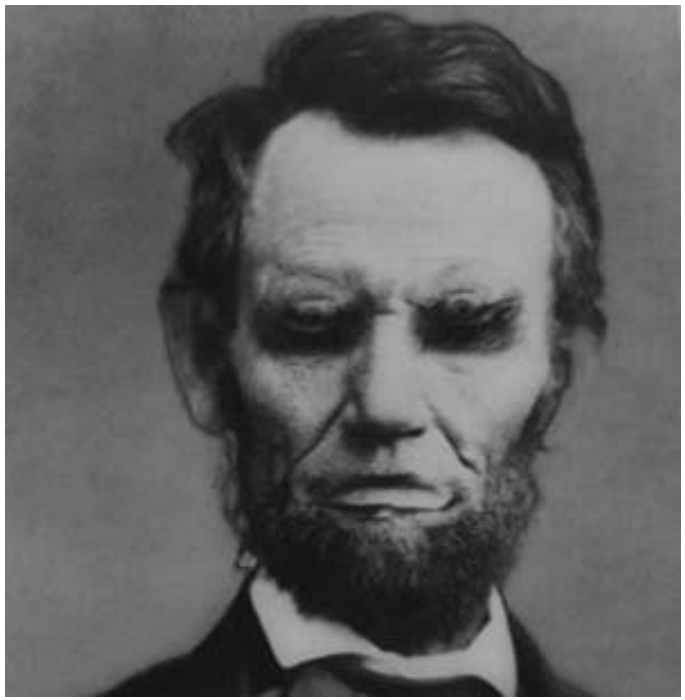
Abraham Lincoln



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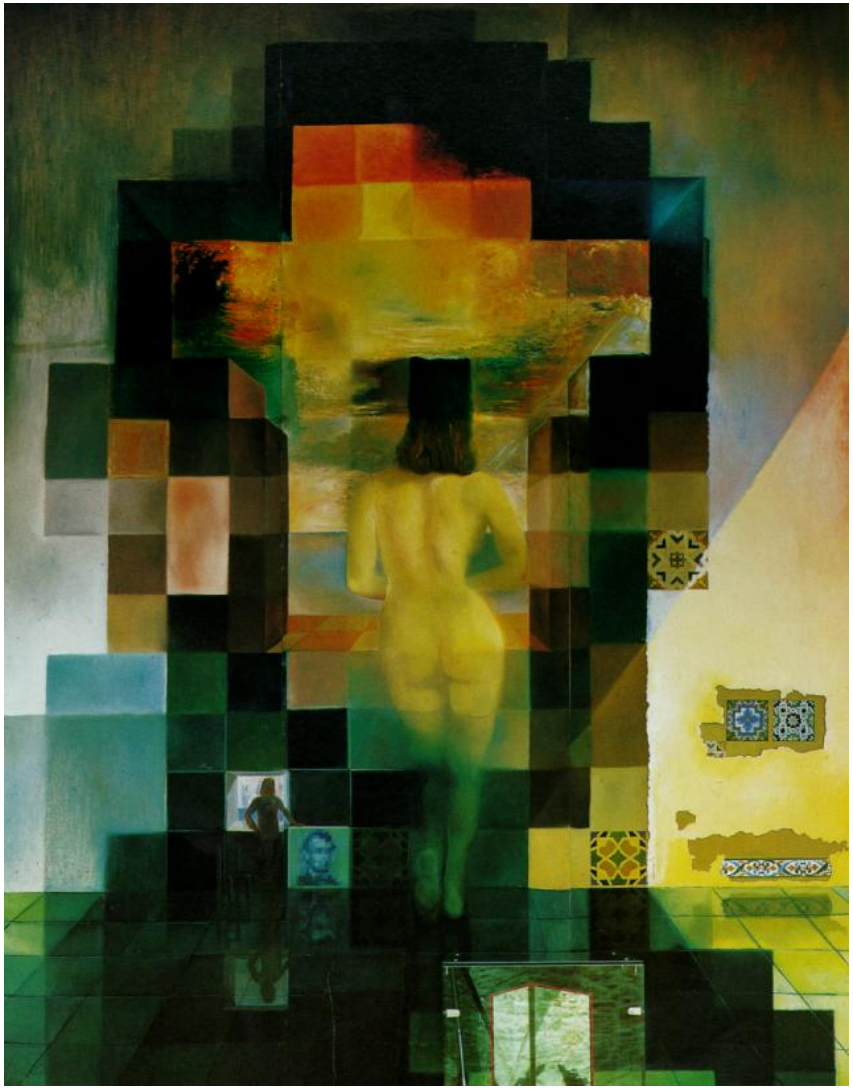

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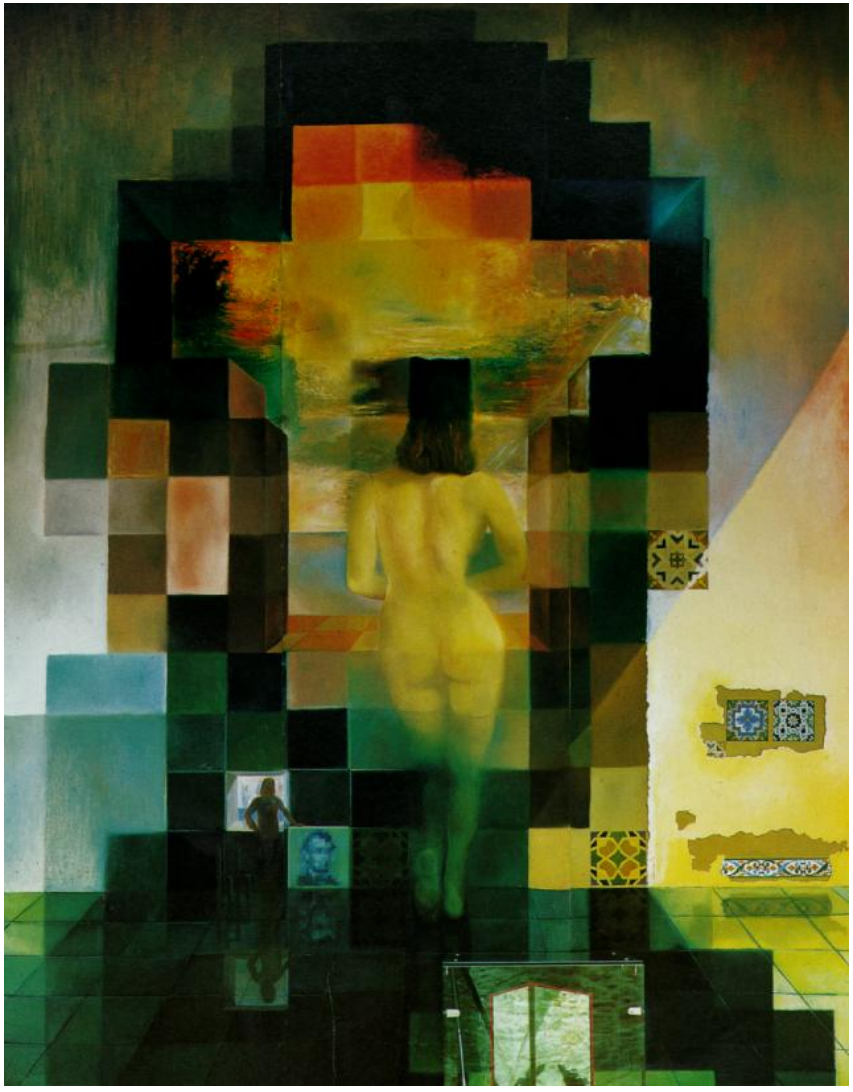

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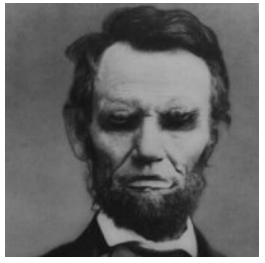

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Study with 16 PAs

conducted in November 2006 in Münster, Germany

daily life reports:

- problems recognizing familiar faces in unfamiliar environment
- heavy reliance on non-facial cues

famous faces test:

- some older PAs showed recognition performance 1-2 SDs below control mean
- some PAs showed surprisingly good performance (even upside-down)
- but unknown pre-experimental level of familiarity

experimental test:

- some PAs need long training and presentation times even for identical pictures
- "feature-based" recognition shows impaired robustness

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Experimental test

The pictures where provided by the Max-Planck Institute for Biological Cybernetics in Tuebingen, Germany

Presentation

Experimental test

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Presentation $\rightarrow$ Feedback Training

Known or Unknown?
$\rightarrow$ Feedback

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Presentation → Feedback Training → Test

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Presentation → Feedback Training → Test → Generalization

Known or Unknown?

Single case studied in more detail

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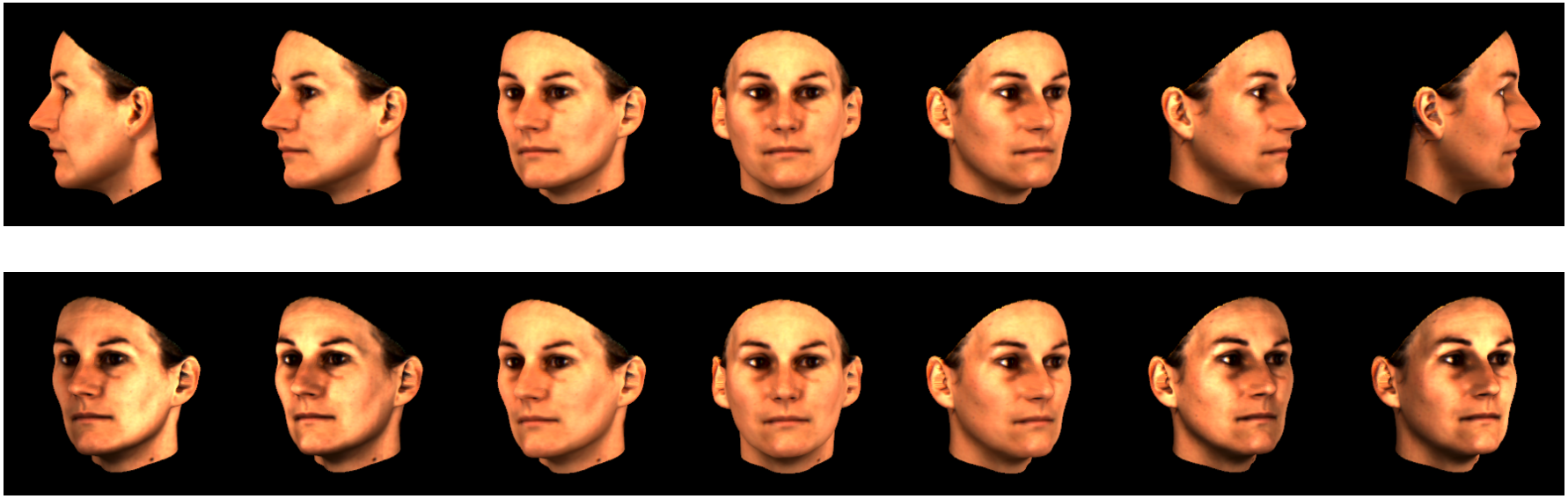

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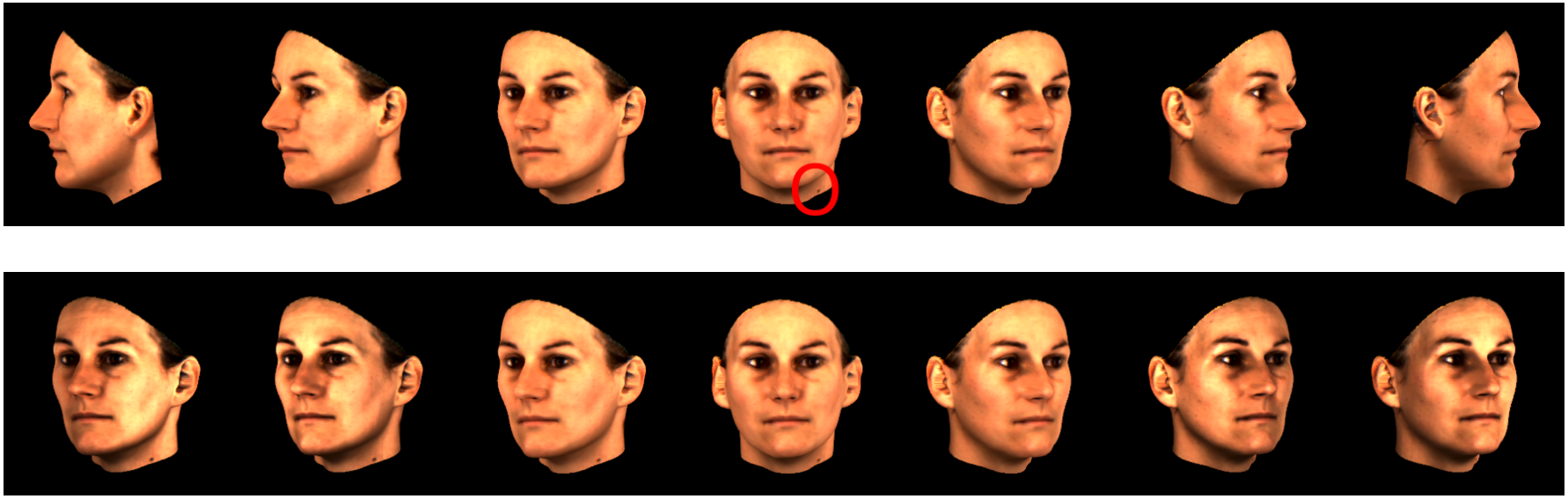

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What did we learn so far?

Prosopagnosics

- are impaired in identifying others by their face
- show heterogeneuous performance (no reliable diagnostic criteria so far)
- use individual, compensatory strategies not relying on facial cues in daily life
- rely on the use of unique "features" in experimental settings

What can still be learned?

about PA:

- Does congenital PA have a common cause?
  →heterogeneity
- Is the deficit really restricted to faces only?
  →specificity
- Could PA be overcome/alleviated by special training?
  →treatment

about face recognition:

- What makes "feature"-based strategies fail in daily life?
  →robustness
- What are necessary/sufficient steps in face recognition?
  →process
- Are faces special w.r.t. other objects?
  →domain

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Do you recognize him?