

Holistic processing is finely tuned for faces of one's own race

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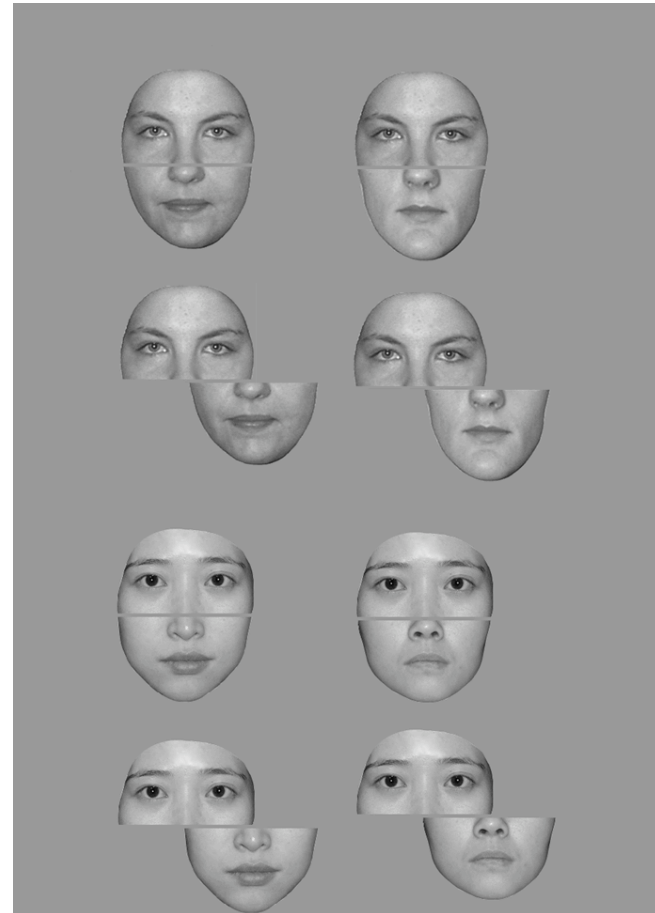
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Psychological Science, 2006, 17, 608-615.

See also: Michel, C., Caldara, R., & Rossion, B., 2006, *Visual Cognition*, 14, 55-73.

Main findings and conclusions

- **Same-race faces are processed more holistically than other-race faces:**

The composite-face effect is *larger for Caucasian* than for Asian faces in *Caucasian* participants, and conversely *larger for Asian* faces than for Caucasian faces in *Asian* participants.

- **This differential holistic processing for same- versus other-race faces, probably a by-product of visual experience, may be a critical factor in accounting for the ‘other-race effect’**

- **Outstanding questions:**

- ☐ What is the relationship between this differential holistic processing and the other-race effect?
- ☐ Is our perceptual system *unable* to process other-race faces as holistically as same-race faces or can we modulate this effect?
- ☐ Are there other perceptual mechanisms that differ between same- and other-race face processing?

The 'other-race effect'

Same-race faces are better recognized than other-race faces



Introduction

NOTE ON TERMINOLOGY

The concept of 'race'

= at the core of a major debate in the literature.

The opponents

A meaningless concept since only 15% of the human diversity arise between groups (e.g. Lewontin, 1972; Graves, 2004).

The differences between groups are merely cosmetic (skin color, facial features...) and they do not reflect any additional genetical distinctiveness

The proponents

The 'assault' against the notion of race is socio-politically – and not scientifically – motivated, because one is afraid that race promotes racism (e.g. Dawkins & Henig, 2004; Dr George Gill, <http://www.pbs.org/wgbh/nova/first/gill.html>).

TRUE THAT: the genetic clusters that can be defined in human population do not necessarily correspond to the clusters made on the basis of visible characteristics (e.g. Wilson, Weale, Smith, Gratrix, Fletcher, Thomas, Bradman, & Goldstein, 2001).

BUT WRONG THAT only 15% of the diversity arise between groups (e.g. Risch, Burchard, Ziv, & Tang, 2002).

The greatest genetic structure in the human population does occurs at the racial level, as long as suited analyses are conducted: analyses including correlations in gene-frequency data, whose importance has been underlined by Cavalli-Sforza & Piazza, 1975 (e.g. Edwards, 2003).

It is possible to assess the race of individuals from skeletal remains as well as from looking at living people (Dr George Gill; <http://www.pbs.org/wgbh/nova/first/gill.html>).

Terminology

Where we are concerned...

As in most papers dealing with the 'other-race effect' in the face processing literature, we use this term to refer to the large subdivisions that can be made within human species according to physical characteristics such as skin color, head shape and so on...

Whether these cosmetic differences are related or not to additional genetical differences between the subpopulations is not of main interest for research on the ORE, since the ORE precisely refers to the difficulty one has to recognize faces presenting such phenotypical differences as compared to those one is used to see in everyday life.

Of course, the term is used without any hierarchical connotation between these subpopulations.

The other-race effect (ORE) : a very robust phenomenon

Demonstrated empirically in numerous studies with

- different racial groups
- different paradigms

(See Meissner & Brigham, 2001 for a meta-analysis)

HOWEVER:

It does not benefit from a clear theoretical explanation

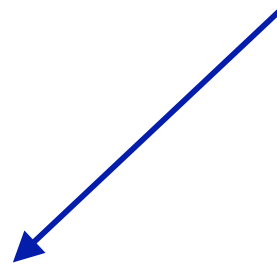
Why are we better at recognizing faces from our own race?

Consensus among researchers: the ORE is due to the differential visual experience we have with same versus other-race faces.

But what changes with visual experience, making us processing faces of our own-race more efficiently?

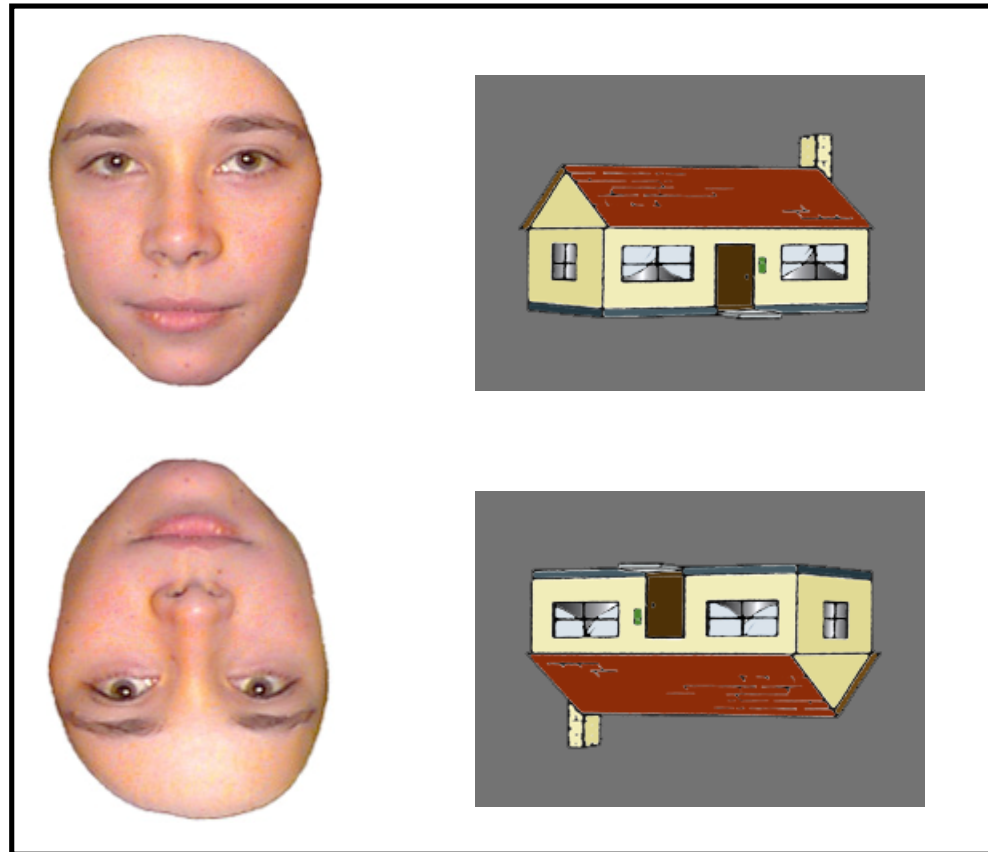
An interesting hypothesis: 'the holistic hypothesis'

Same-race faces would be processed more holistically than other-race faces.



face = processed and represented as a whole percept with the facial features being integrated, instead of a sum of independent parts

The holistic hypothesis has been **tested previously**, using the 'Face Inversion Effect' (FIE; Yin, 1969).



FIE = vertical inversion impairs recognition of faces more than recognition of other objects.

Introduction

Since the vertical inversion is supposed to disrupt mainly configural or holistic processing of the face, the FIE is often taken as an evidence that faces are processed holistically/configurally.

The idea was thus the following:

If same-race faces are processed more holistically than other-race faces, the FIE should be larger for the former than for the latter.

➤ Indirect evidence

➤ Conflicting results:

- Rhodes et al., 1989: larger FIE for same-race (SR) faces
- Valentine, 1991: larger FIE for other-race (OR) faces
- Buckhout & Regan, 1988: no difference between SR and OR

Introduction

Are same-race faces processed more holistically than other-race faces?

Here, we tested this hypothesis directly, with Asian and Caucasian participants having no particular experience with OR faces.

Measuring holistic processing of SR and OR faces

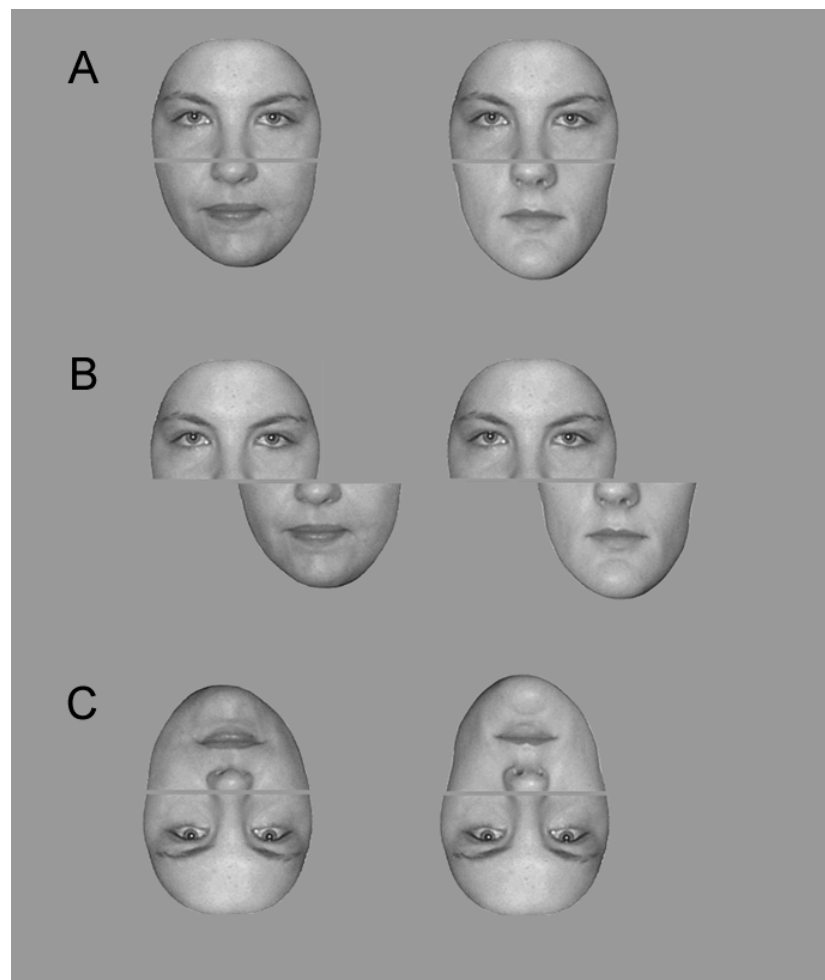
The composite-face effect (Young et al., 1987)

The 'composite illusion'

Identical top parts of faces appear as being different if they are aligned on different bottom parts (A).

This illusion disappears if the top and the bottom parts of the face are misaligned (B).

Or if the composite faces are presented upside-down (C).



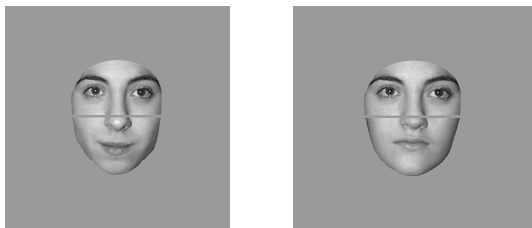
Paradigm

The composite-face effect (Young et al., 1987)

In a **task** requiring from participants to decide if the top parts of two composite faces are identical or not, **IGNORING** the bottom parts (which are different between the two faces),

→ the **composite-face effect** is the difference between the performance in the aligned and in the misaligned conditions for 'same' trials (i.e. trials with identical top parts in the 2 faces), in favour of the latter.

The **composite illusion** leads to the impression that the two top parts are different in the aligned condition (although they are identical)



NO composite illusion in the misaligned condition: the two top parts are thus correctly perceived as being the same.



Paradigm

The present experiment:

First of all: do our participants present an ORE in face recognition?

Measure of the ORE

Old/new recognition task for SR and OR faces separately

first stage: 20 faces presented sequentially (max. 3 s.)

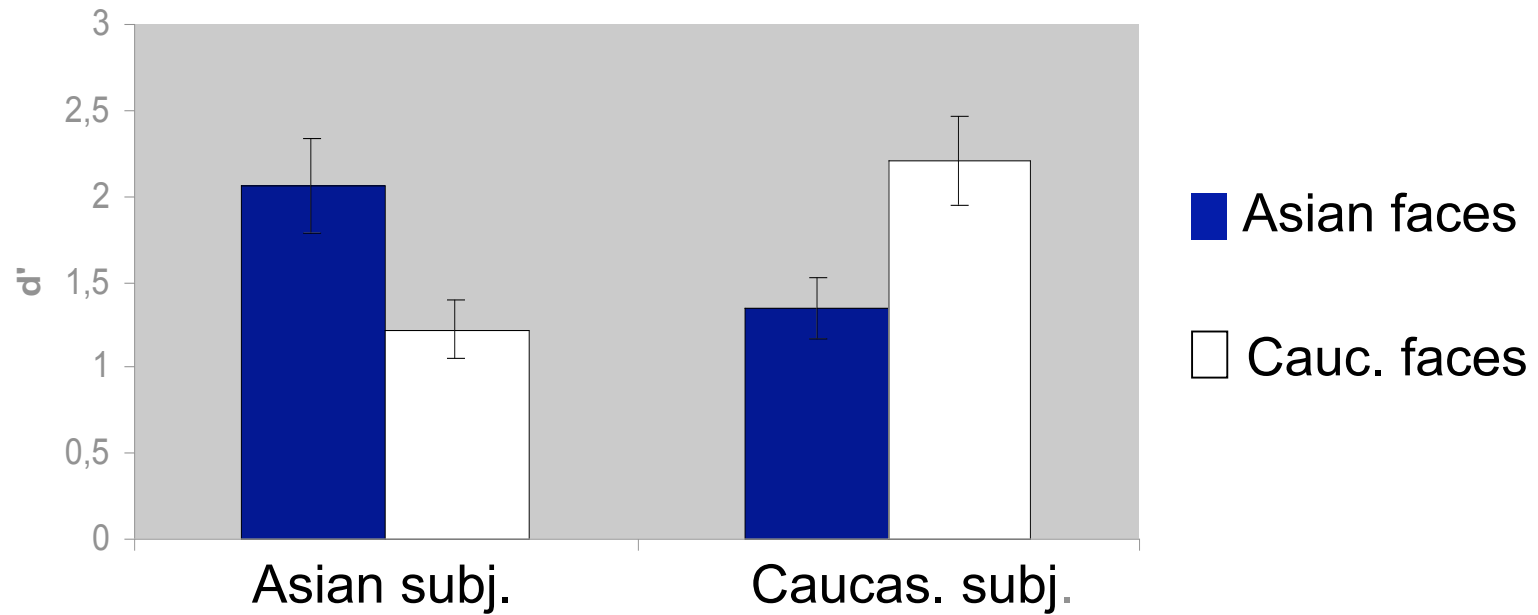
task: to memorize the faces

second stage: 40 faces sequentially (20 old + 20 new) (max. 2 s.)

task: old or new?

Experiment

d'



Interaction race subjects x race faces: $p < .001$

Participants present a strong ORE in face recognition

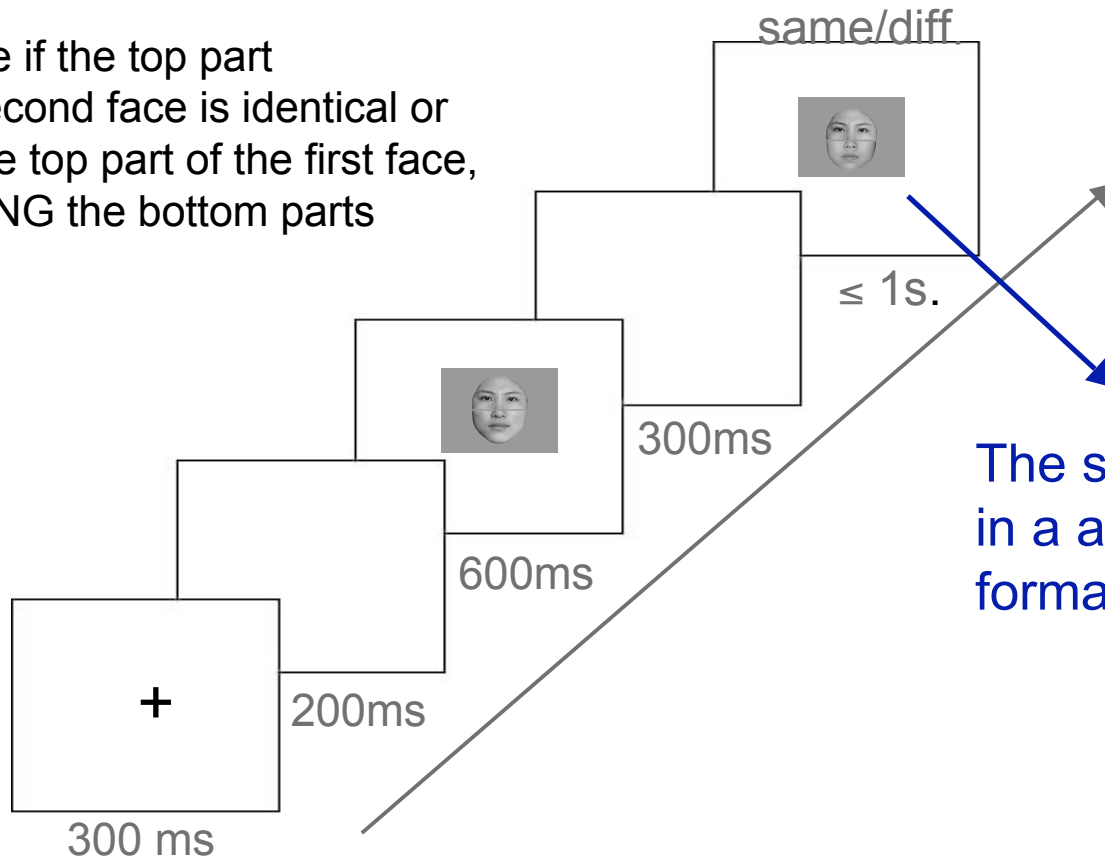
Experiment

Is the composite-face effect larger for SR than for OR faces?

A same/different delayed matching task

Task :

to decide if the top part of the second face is identical or not to the top part of the first face, IGNORING the bottom parts



The second face is presented in a aligned or in a misaligned format

Experiment

2 x 2 x 2 design

Asian participants
living in Korea (N=30)

Caucasian participants
living in Belgium (N=30)

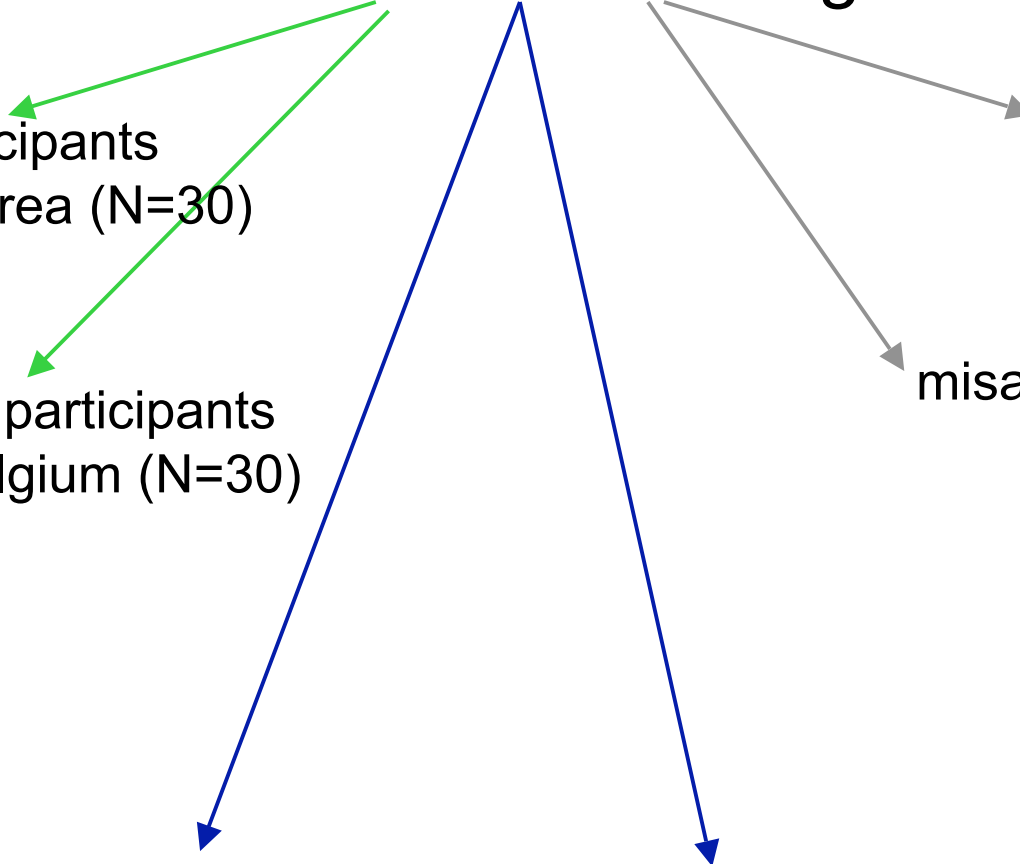
aligned condition

misaligned condition

Asian faces

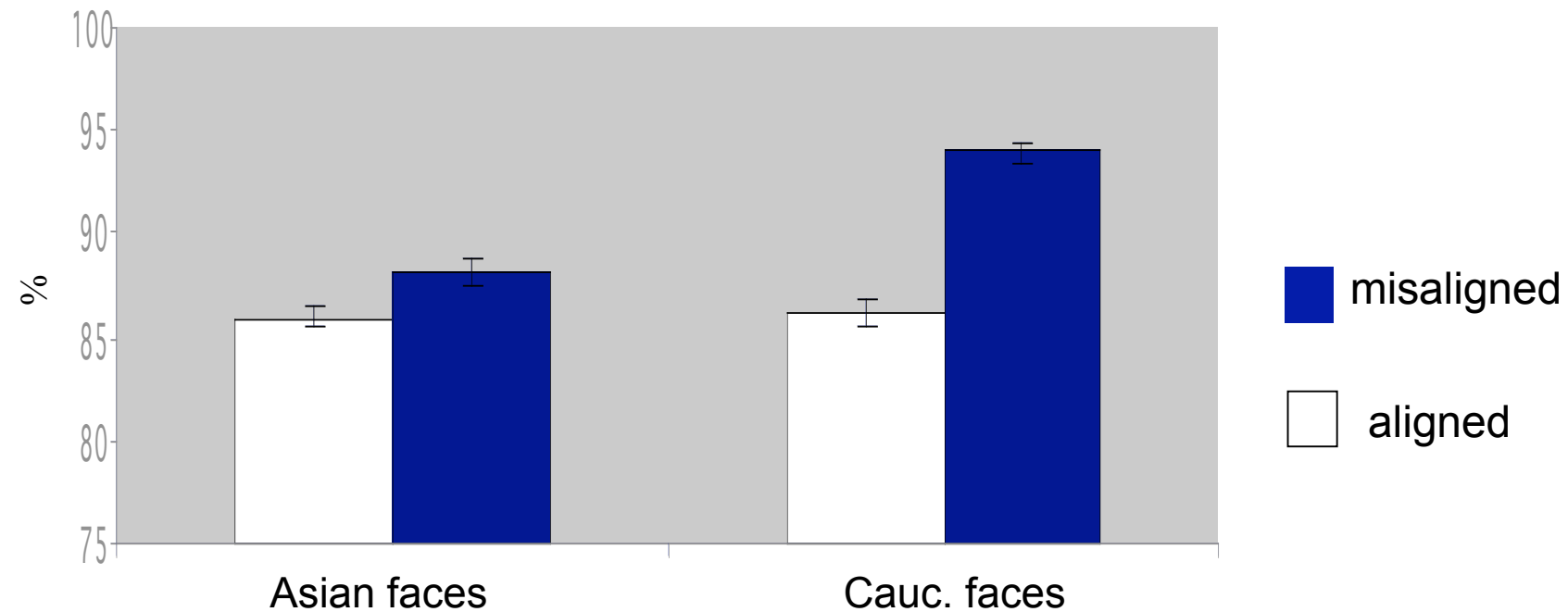
Caucasian faces

Experiment



ACCURACY

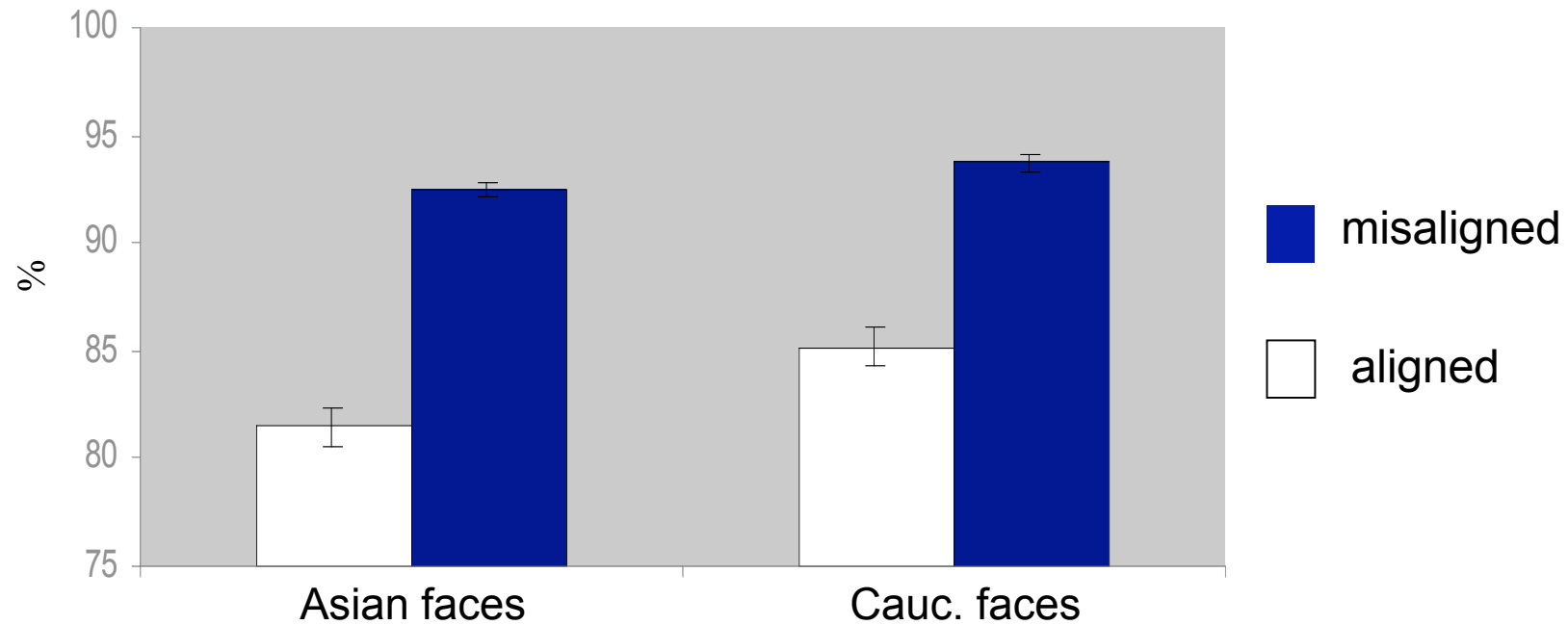
Caucasian participants



The composite effect is larger for Caucasian than for Asian faces

Experiment

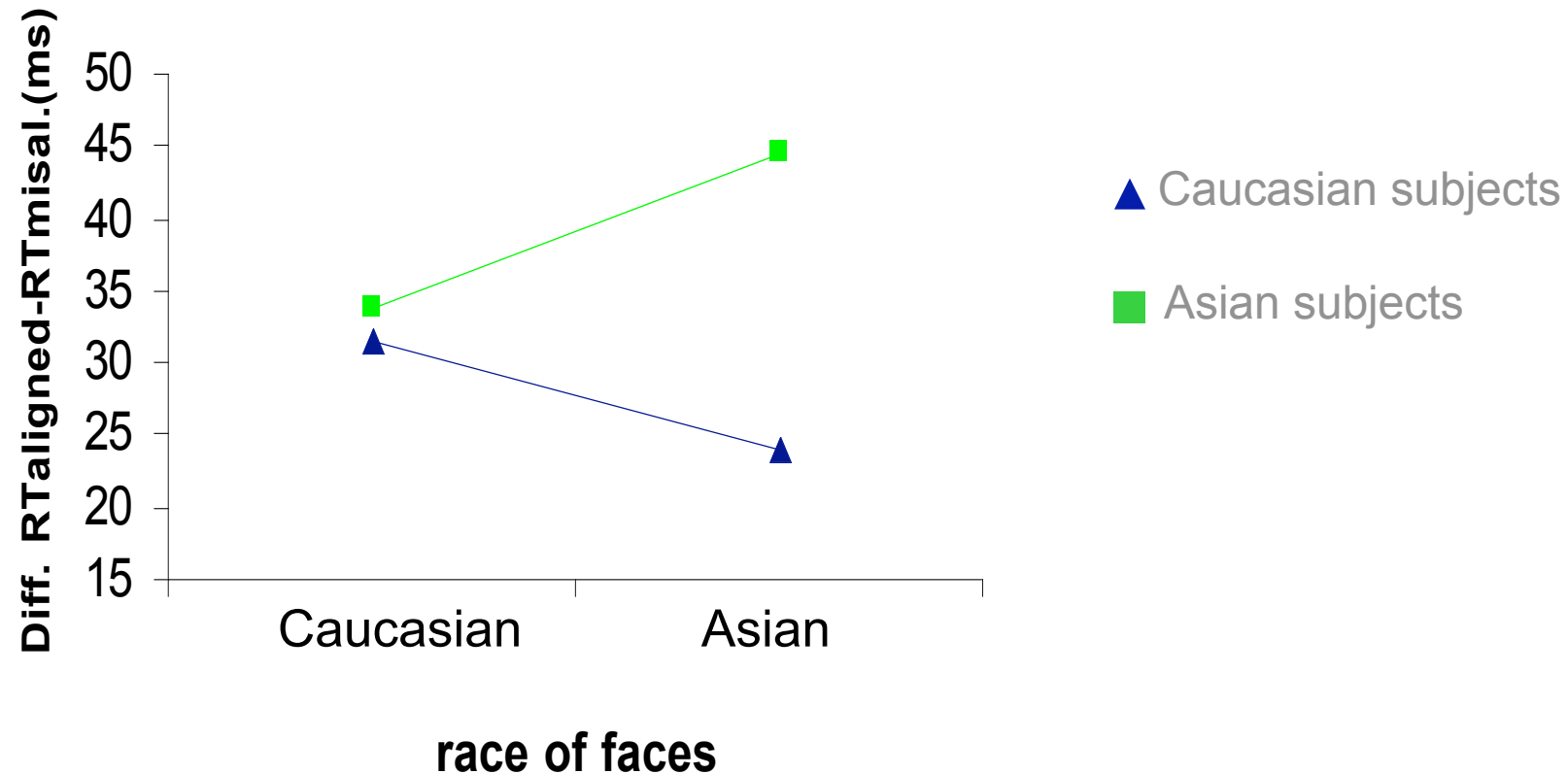
Asian participants



The composite effect is larger for Asian than for Caucasian faces

Experiment

Response times



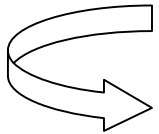
The composite effect in RTs is significantly larger for Asian than for Caucasian faces in Asian participants

Experiment



Evidence that same-race faces are processed more holistically than other-race faces

The holistic processing of face is thus ONE perceptual mechanism by which SR and OR face processing precisely differ.



Probably a by-product of visual experience

Conclusions