

Are mirror images really more difficult to discriminate than plane rotations?

A study based on the COR hypothesis

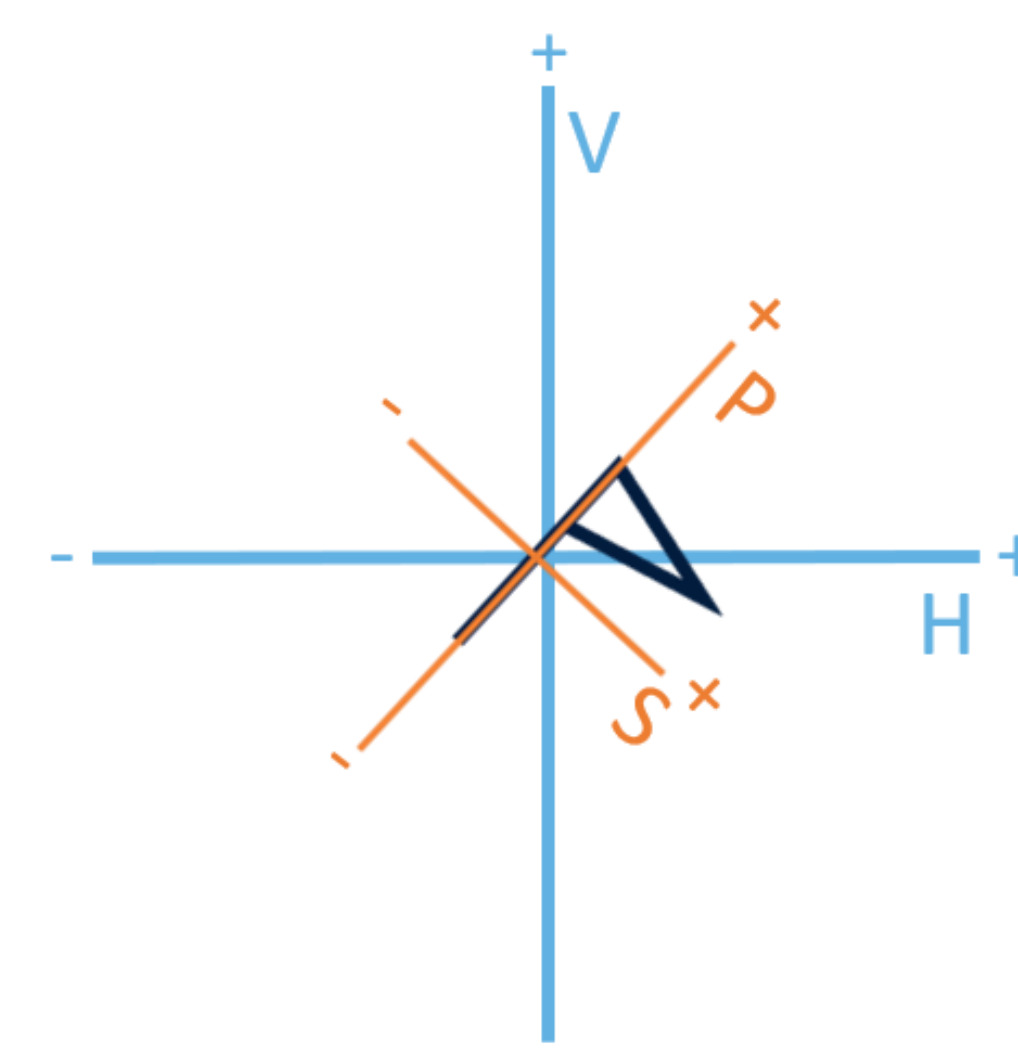
Marie Houbben & Gilles Vannuscorps

INTRODUCTION

- It is widely assumed that « mirror images » of an object are more difficult to discriminate than « plane rotations »^{1, 2}
- But what does it mean? Does it depend on the type of mirror reflection? Is it true for any plane rotation?
- We investigated this issues through the lens of the COR hypothesis^{3, 4}

Main tenets of the COR hypothesis:

- Orientation perception emerges from the computation of a relationship between an **object's defining axes** and some **axes extrinsic to the object**
- This requires computing four parameters:
 - Axis correspondence (AC)**
 - Polarity correspondence (PC)**
 - Tilt magnitude**
 - Tilt direction**

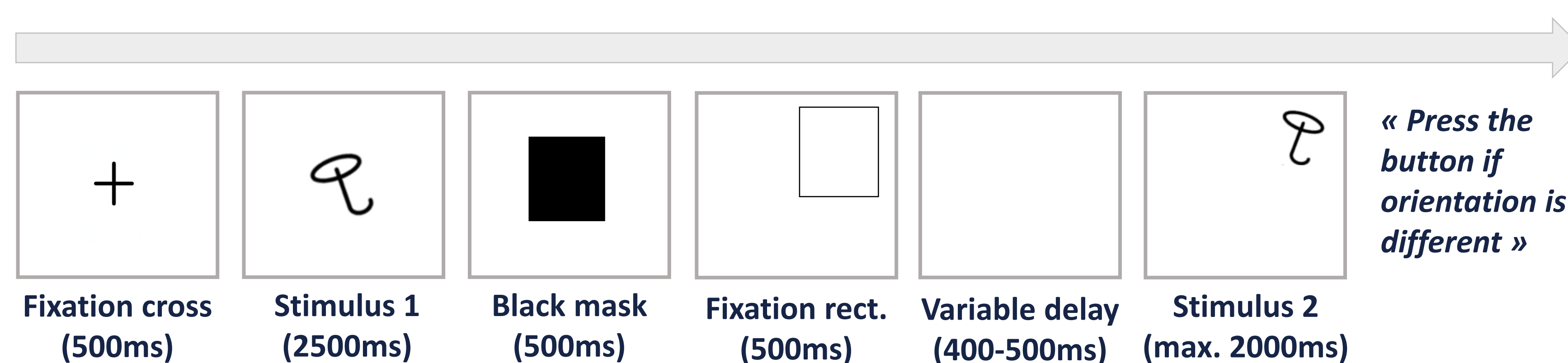


METHOD

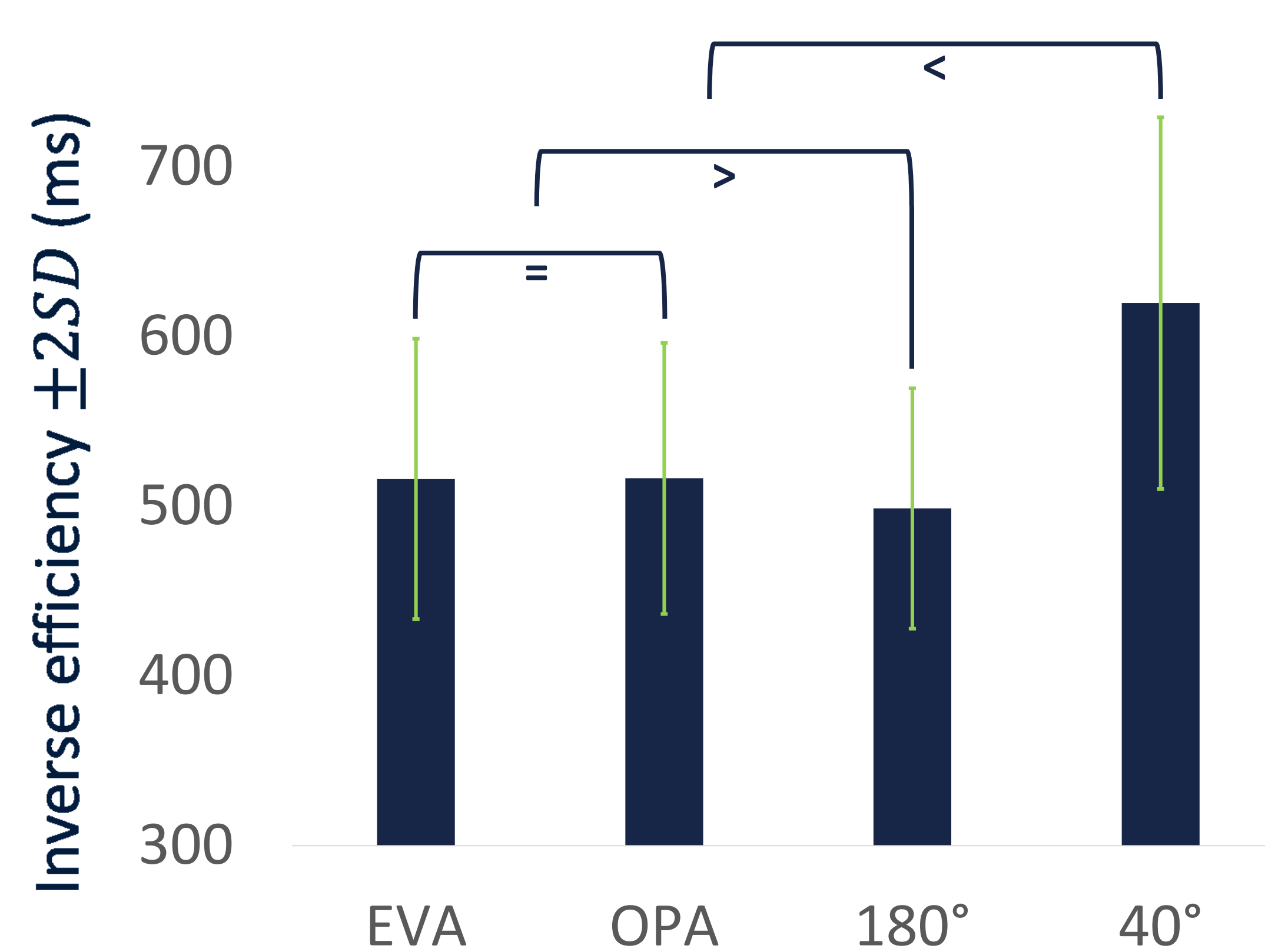
- 26 students** (21 ± 2 yo, 5 males) with normal reading abilities (Alouette test⁵) and normal or corrected vision.
- 3 ≠ symbols of the BACS⁶**, 4 initial orientations (340°, 20°, 160° or 200°) and 5 conditions :
 - **OPA** = a mirror reflection of the symbol across its principal axis;
 - **EVA** = a mirror reflection across a vertical axis;
 - **180°** = a plane rotation of 180°;
 - **40°** = a change in tilt direction.



- « Same/different » task on the orientation of the symbols:



RESULTS



EVA = OPA ($p = 1^*$) OPA ≠ 180° ($p = .008^*$)

EVA ≠ 180° ($p = .002^*$) OPA ≠ 40° ($p < .001^*$)

EVA ≠ 40° ($p < .001^*$) 180° ≠ 40° ($p < .001^*$)

* Wilcoxon-Mann Withney test

* Repeated measures ANOVA

DISCUSSION

- Mirror images of an object are not necessarily more difficult to discriminate than « plane rotations ».**
- We found no difference between mirror reflections through the primary axis of an object and mirror reflections through a vertical axis.

	AC	PC		Tilt	
		P. axis	S. axis	Direction	Magnitude
OPA			X		
EVA			X	X	
40°				X	
180°	X	X			

In light of the 4 parameters defined by the COR hypothesis, these results suggest that:

- There is no difference between objects differing only in terms of PC and objects differing in terms of PC and tilt direction;
- Objects differing only in tilt direction are more difficult to discriminate than objects differing in terms of PC;
- Objects differing in terms of PC for the two axes are the easiest to discriminate.

→ Evidence in favor of a sequential model of orientation computation?

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