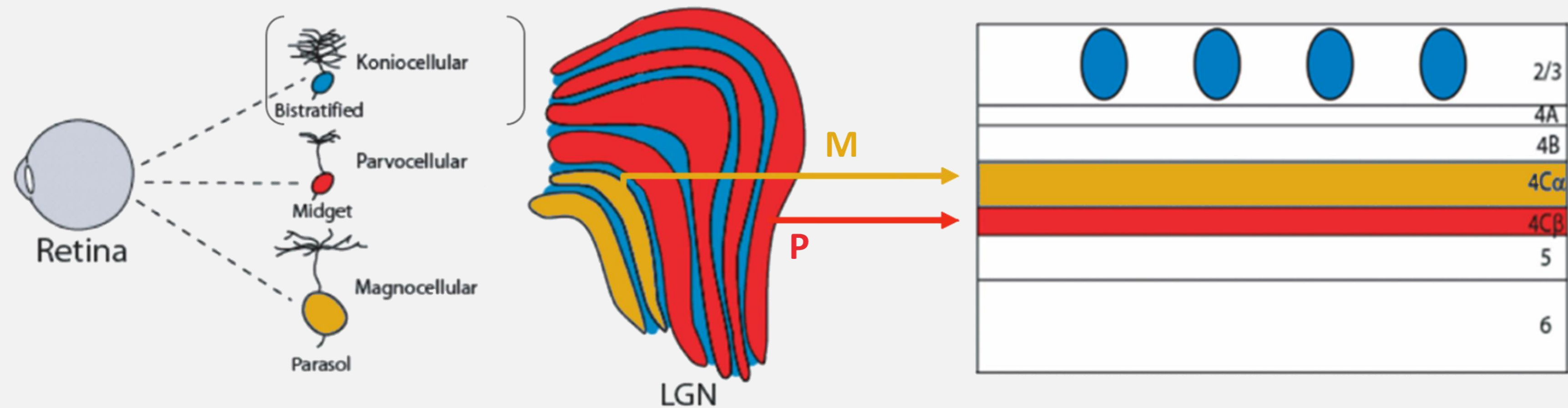


INTRODUCTION

- From the retina to the primary visual cortex, the human visual system processes visual information in two parallel and complementary streams¹:
 - The **parvocellular (P) stream**
 - sensitive to sharp-edged, fine, stationary, and high-contrast stimuli;
 - The **magnocellular (M) stream**
 - sensitive to coarse, large, moving, brief, and low-contrast stimuli.
- The **M stream** may play a critical role in the ability to discriminate mirror images^{2,3,4}
 - ➔ the goal of this study is to test this hypothesis and clarify the contribution of the M stream to orientation computation.



METHOD

- 40 students** (21 ± 1.85 yo, 29 females, 11 males, 9 with dyslexia) with normal or corrected vision
- Tasks assessing** the **M stream** efficiency, the **P stream** efficiency and **orientation perception** :

(1) Speed discrimination

Fixation cross (1000ms) Stimulus 1 (450-490ms) Variable delay (510-550ms) Stimulus 2 (450-490ms)

« which one was the fastest? »

(2) Coherent motion perception

(250ms)

« What was the majority direction of the points? »

(3) Contrast sensitivity on blinking gratings

Blinking grating (1000ms) Response ∞

« Were the lines oriented to the left or to the right? »

(4) Contrast sensitivity on steady gratings

Steady grating (1000ms) Response ∞

« Were the lines oriented to the left or to the right? »

(5) Same/different judgment task on the orientation of 3 ≠ BACS⁵ symbols

Stimulus 2

Stimulus 1 340°

Mirror reflections: OPA, EVA, 180°, 40°, SAME

Plane rotation: OPA, EVA, 180°, 40°, SAME

Fixation cross (500ms) Stimulus 1 (2500ms) Black mask (500ms) Fixation rect. (500ms) Variable delay (400-500ms) Stimulus 2 (max. 2000ms)

« Press the button if orientation is different »

RESULTS

Pearson's correlations (one-tailed) between the efficiency of the M & P streams and the ability to discriminate plane rotations (40°) and mirror images (180°, OPA, EVA) of the BACS⁵ symbols (task 5):

		COMPOSITE 1+2+3 (M)	TASK 4 (P)	3 - 4 (M - P)
40°	Pearson's R	0.128	-0.209	0.142
	P-value	.223	.103	.200
180°	Pearson's R	0.362	-0.406	0.383
	P-value	.014	.006	.010
OPA	Pearson's R	0.272	-0.378	0.397
	P-value	.054	.010	.007
EVA	Pearson's R	0.331	-0.340	0.239
	P-value	.024	.018	.077

Is this relation specific to mirror images?

		COMPOSITE 1+2+3 (M)	TASK 4 (P)	3 - 4 (M - P)
40°- 180°	Pearson's R	-0.227	0.316	-0.366
	P-value	.082	.028	.015
40°- OPA°	Pearson's R	-0.228	0.420	-0.431
	P-value	.084	.004	.004
40°- EVA°	Pearson's R	-0.119	0.293	-0.078
	P-value	.239	.037	.328

DISCUSSION

- In line with our hypothesis, we found significant positive correlations between individuals' **M stream** efficiency and their ability to discriminate mirror images (but not stimuli differing by a plane rotation).
- We also found an inverse correlation between the ability to discriminate mirror images and individuals' **P stream** efficiency.
- These results suggest that an unbalance between the efficiency of the M and P streams in the detriment of the M stream could predict the ability to discriminate mirror images.
- This finding may have implications for understanding the origin of mirror letter confusions in dyslexia.

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