

Electronic Supplementary Material

Left-right asymmetry of the Maxwell spot centroids in adults without and with dyslexia

Albert Le Floch^{1,2,3} and Guy Ropars^{1,3}

¹Laboratoire de Physique des Lasers, UFR SPM, Université de Rennes 1, 35042 Rennes, France.

²Laboratoire d'Electronique Quantique et Chiralités, 20 square Marcel Bouget, 35700 Rennes.

³Université Bretagne Loire, 35044 Rennes, France.

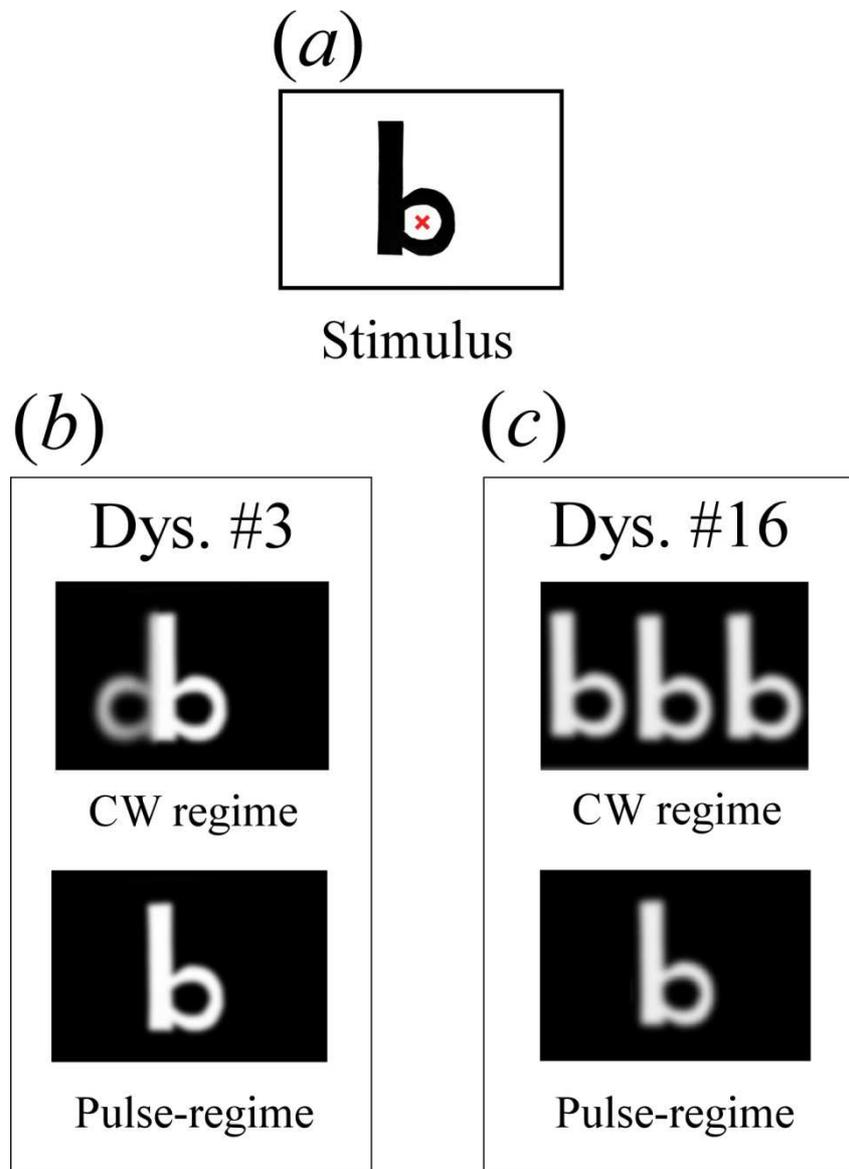


Figure S1. Afterimages with images and mirror images for an asymmetric letter “b” seen by the observers # 3 and 16 with dyslexia.

(a) Scheme of the asymmetric letter “b” used as stimulus, with its fixation point (red cross).

(b) Reconstructed afterimages observed by dyslexic observer #3. In the CW regime, the dyslexic student sees a superposition of the initial letter “b” and also its mirror image “d” (top). Amazingly, using a pulse-width modulation light-emitting diode (modulation frequency equal 70 Hz, duty cycle of 20%, no visible flickering), the extra mirror-image “d” is suppressed (bottom) and the reading skills are restored.

(c) Reconstructed triple “b” afterimage observed in usual CW lighting regime by dyslexic observer #16 (top). Here the fixation binocular instability induces a more complex triple “b” afterimage. Using the pulse-width modulation light-emitting diode, a single “b” afterimage is also recovered (bottom), restoring the reading skills for this observer.

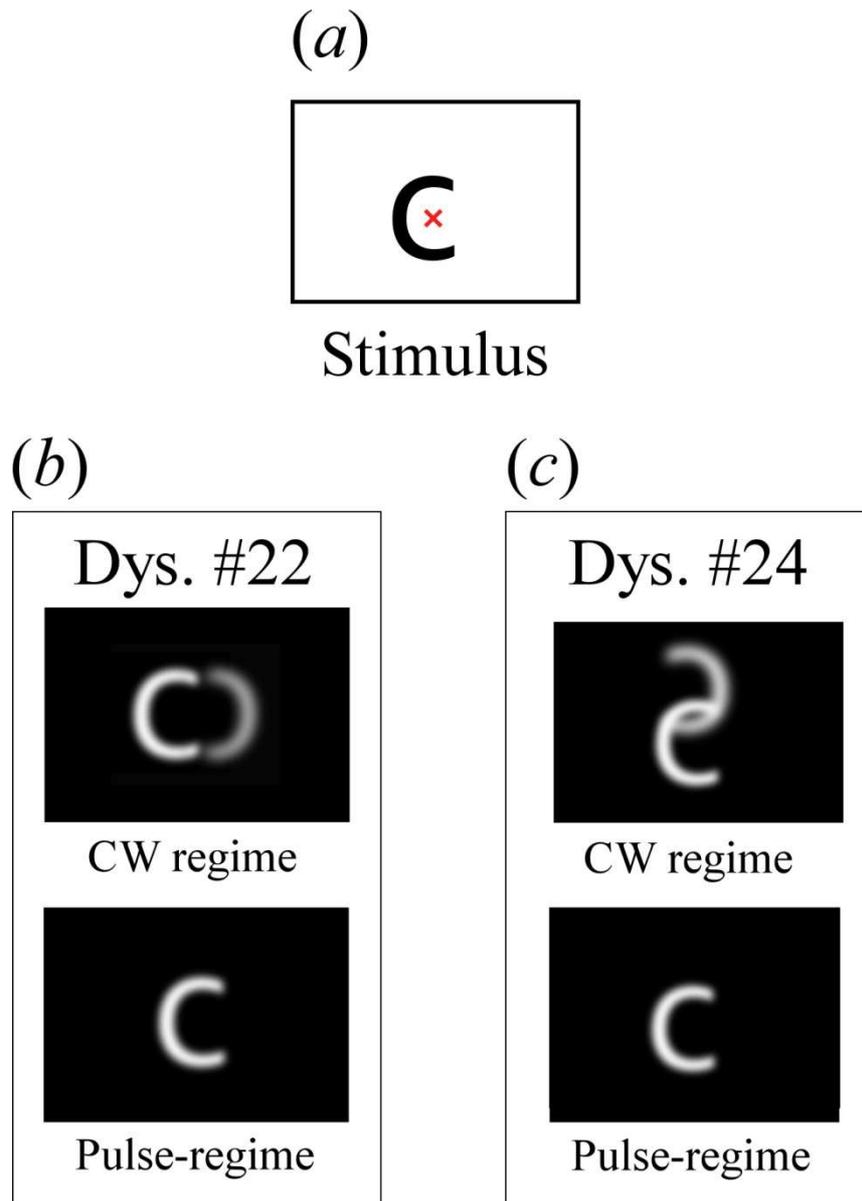


Figure S2. Afterimages with images and mirror images for an asymmetric letter “C” seen by the observers # 22 and 24 with dyslexia.

(a) Scheme of the asymmetric letter “C” used as stimulus.

(b) Reconstructed afterimage seen by observer #22 using a continuous lamp (top), and the afterimage seen by the same observer, using a pulse-width modulation light-emitting diode at 84 Hz and a 20 % duty cycle (bottom).

(c) Reconstructed afterimage seen by observer #24 using a continuous lamp (top). The inter-hemispheric projection is here vertically deviated. Bottom: the afterimage seen by the same observer, using a pulse-width modulation light-emitting diode. The correct afterimage is also restored.

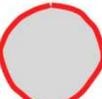
	Maxwell's centroid		$\Delta\varepsilon$	Afterimage dominance
	Left eye ε_L	Right eye ε_R		
Observer #29	 $\simeq 1$	 $\simeq 1$	0	NO
Mother	 $\simeq 1$	 $\simeq 1$	0	NO
Father	 $\simeq 1$	 $\simeq 1$	0	NO
Brother	 $\simeq 1$	 $\simeq 1$	0	NO
Sister	 $\simeq 1$	 $\simeq 1$	0	NO

Figure S3. Blue cone-free area outlines and afterimage dominances for the five members with dyslexia of the family of observer #29.

The circular outlines of the blue cone-free areas for each member show a complete lack of asymmetry. The symmetry of the Maxwell's centroids corresponds to an undetermined afterimage dominance separately observed for all members.