

Asymmetries of the saccadic system: A tool to quantify eye dominance strength

Jérôme Tagu

& K. Doré-Mazars, C. Lemoine-Lardennois, J.Vergne, D.Vergilino-Perez

Laboratoire Vision Action Cognition
Université Paris Descartes

SIGHTING EYE DOMINANCE

- Eye dominance (ED):
« **Hole-in-card test** » (Miles, 1930)



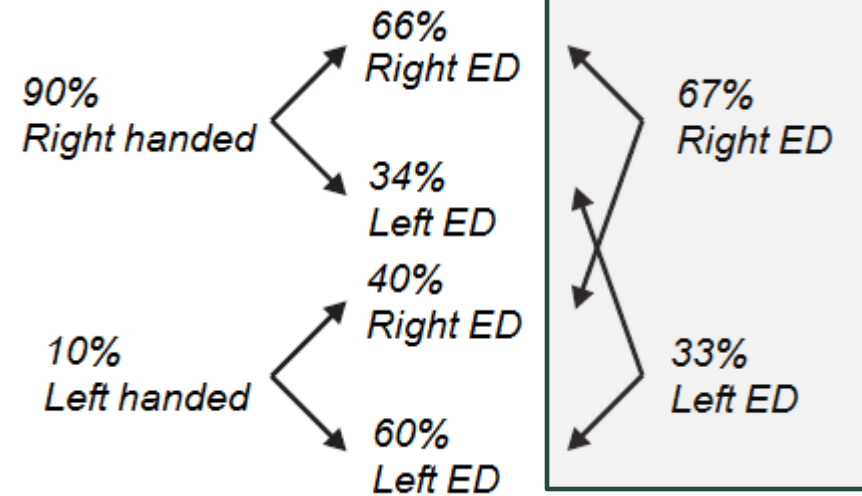
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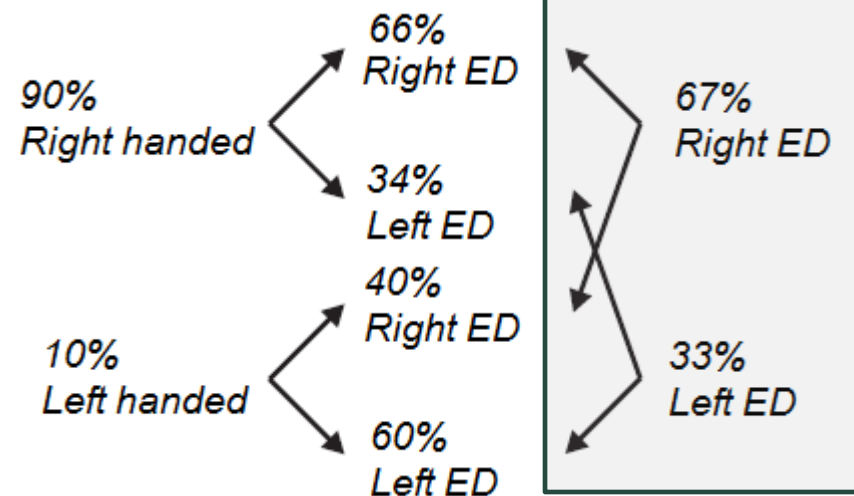
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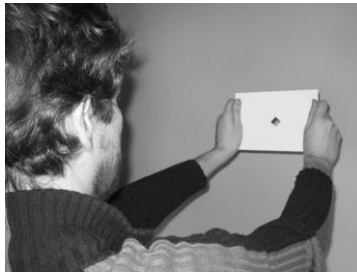
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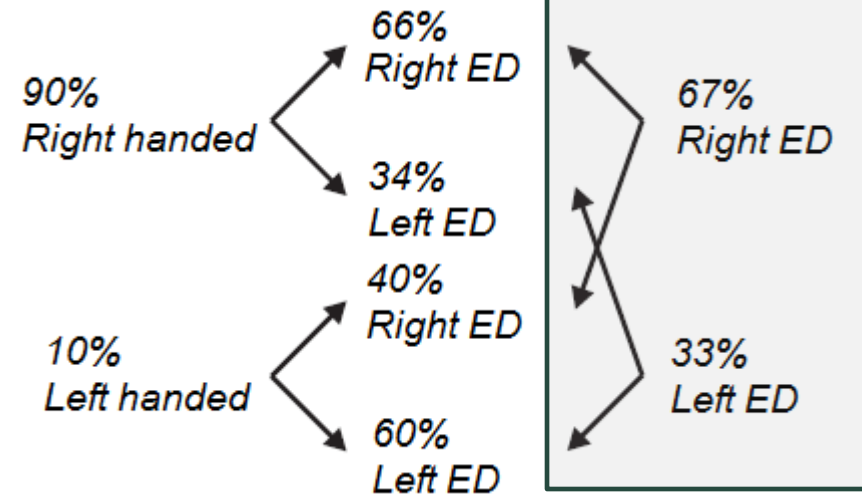
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Aim = Quantify eye dominance strength

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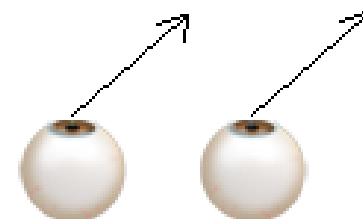
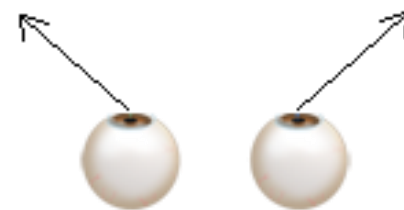
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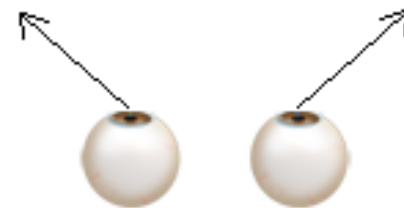
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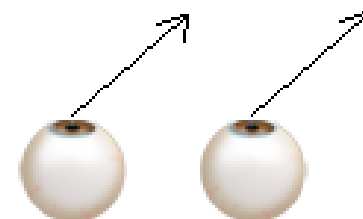
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Weak ED



Strong ED



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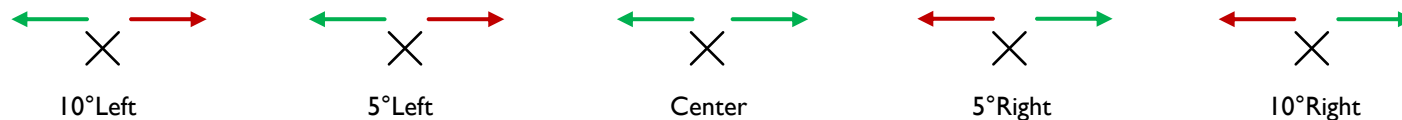


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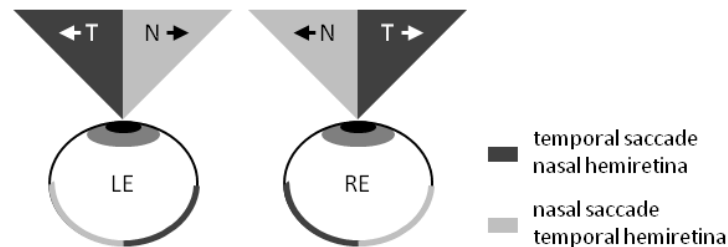
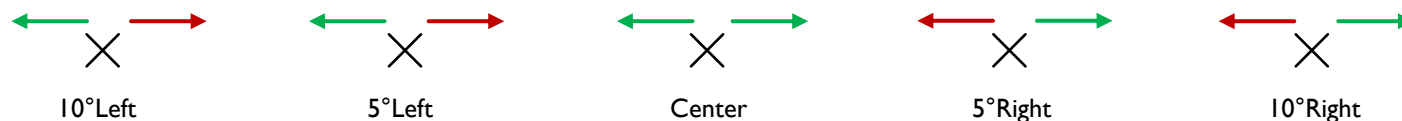


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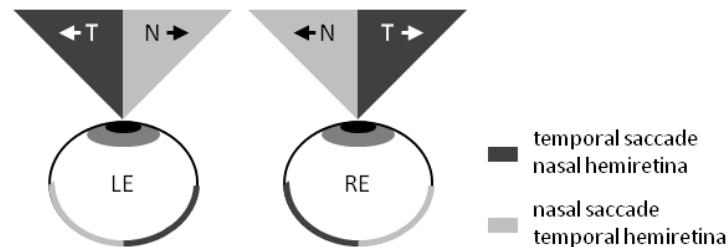
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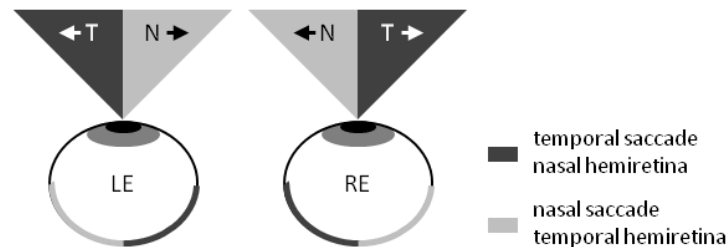
×
10°Left

×
5°Left

×
Center

← × →
5°Right

×
10°Right



- Binocular recordings

METHODS

■ 63 participants:

- 21 right-handed with right ED
- 23 right-handed with left ED
- 9 left-handed with right ED
- 10 left-handed with left ED



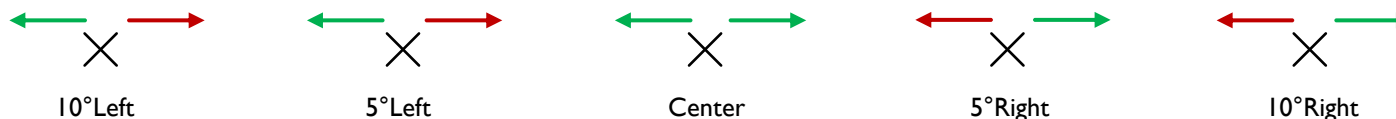
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■ 5° leftward and rightward saccades from the 5 possible departure locations

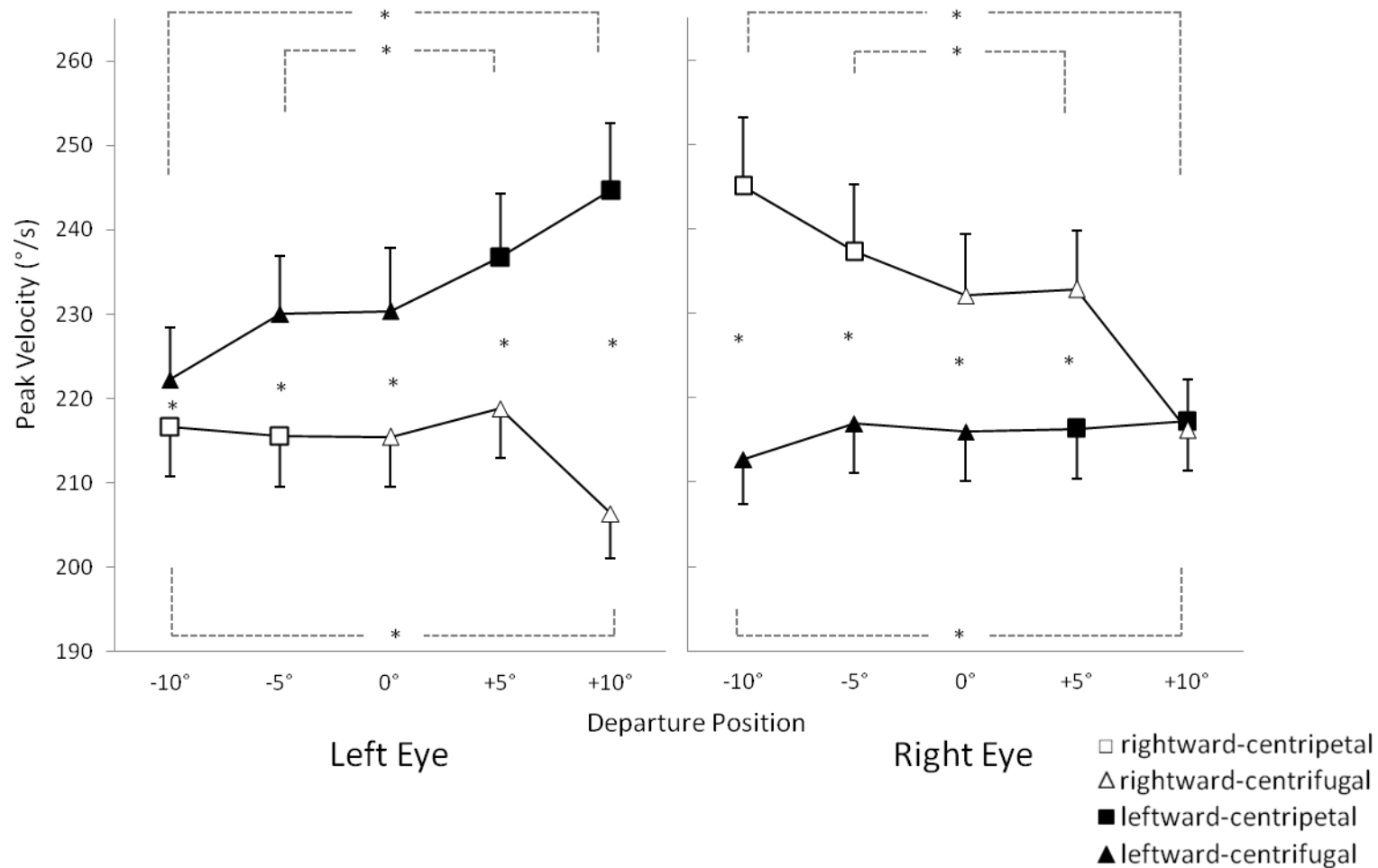
■ Step and Overlap-600 conditions

■ 40 trials / condition (total = 800 trials)

■ EyeLink 1000[®] SR Research (Binocular recordings)

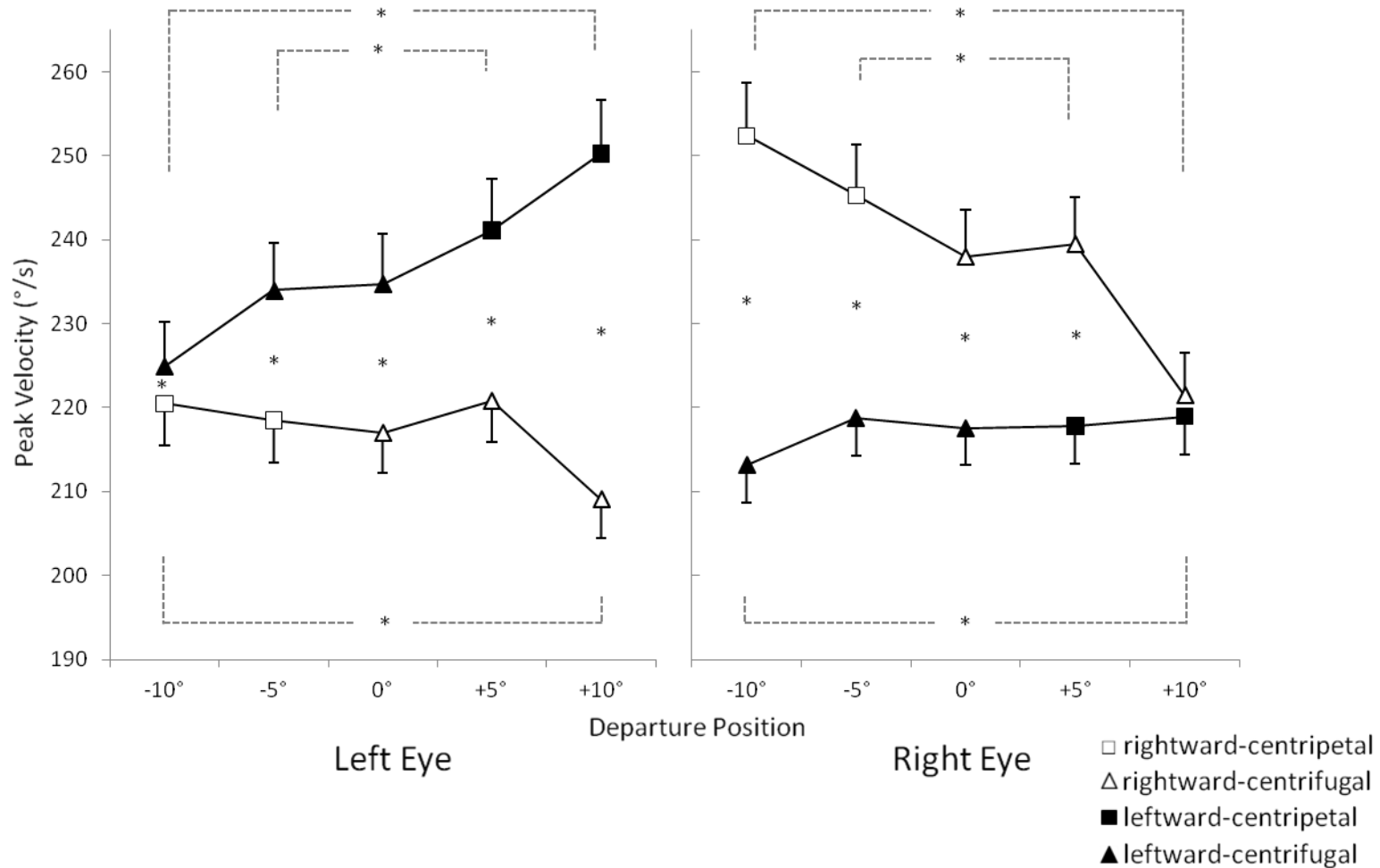
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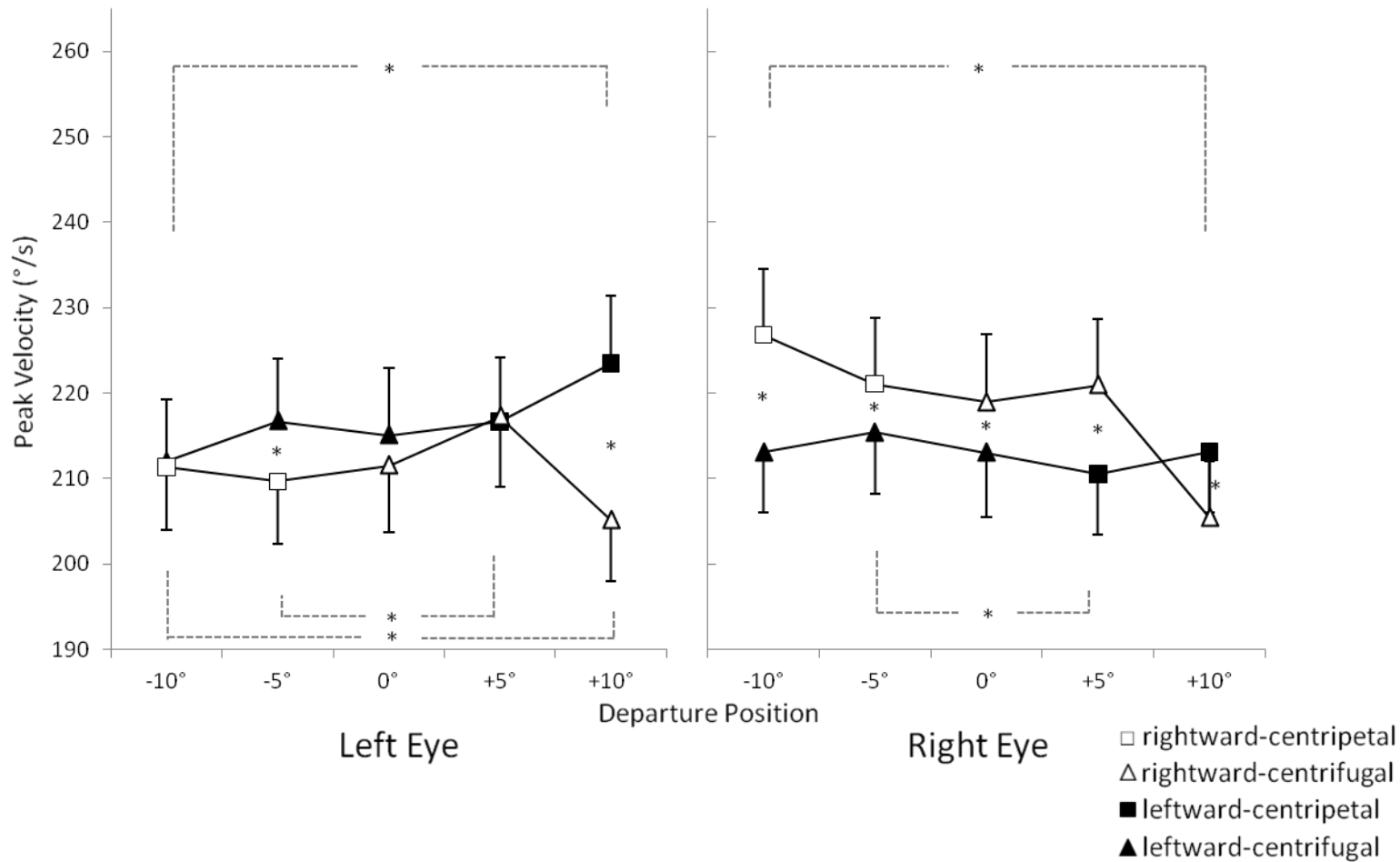
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■ For weak eye dominance (n=34)



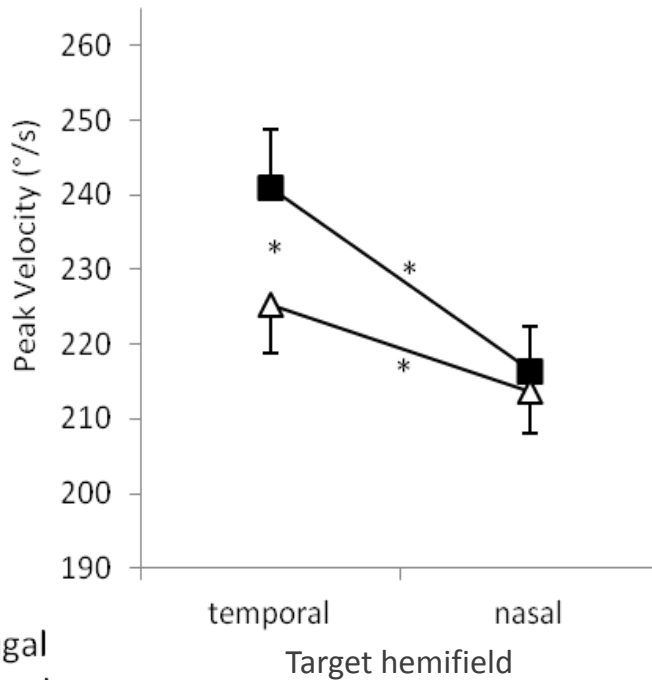
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■ For strong eye dominance (n=29)

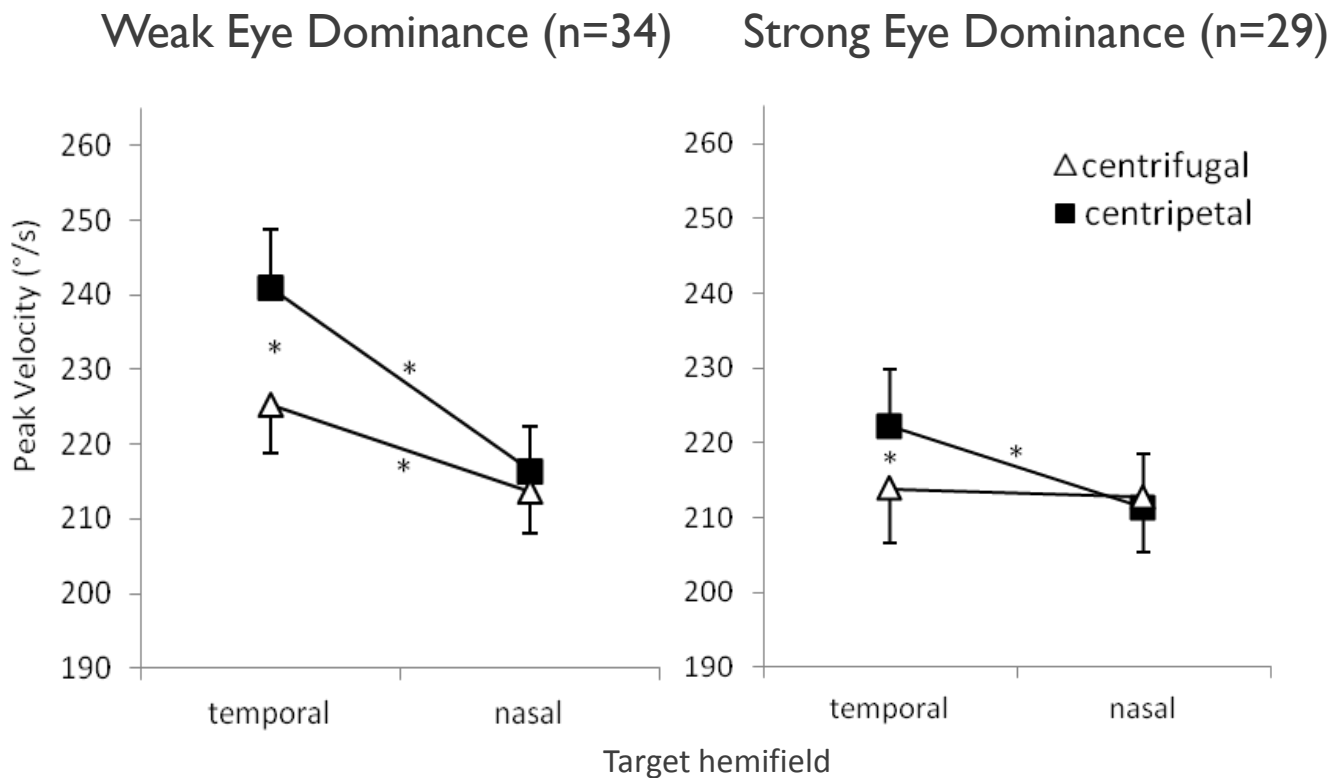


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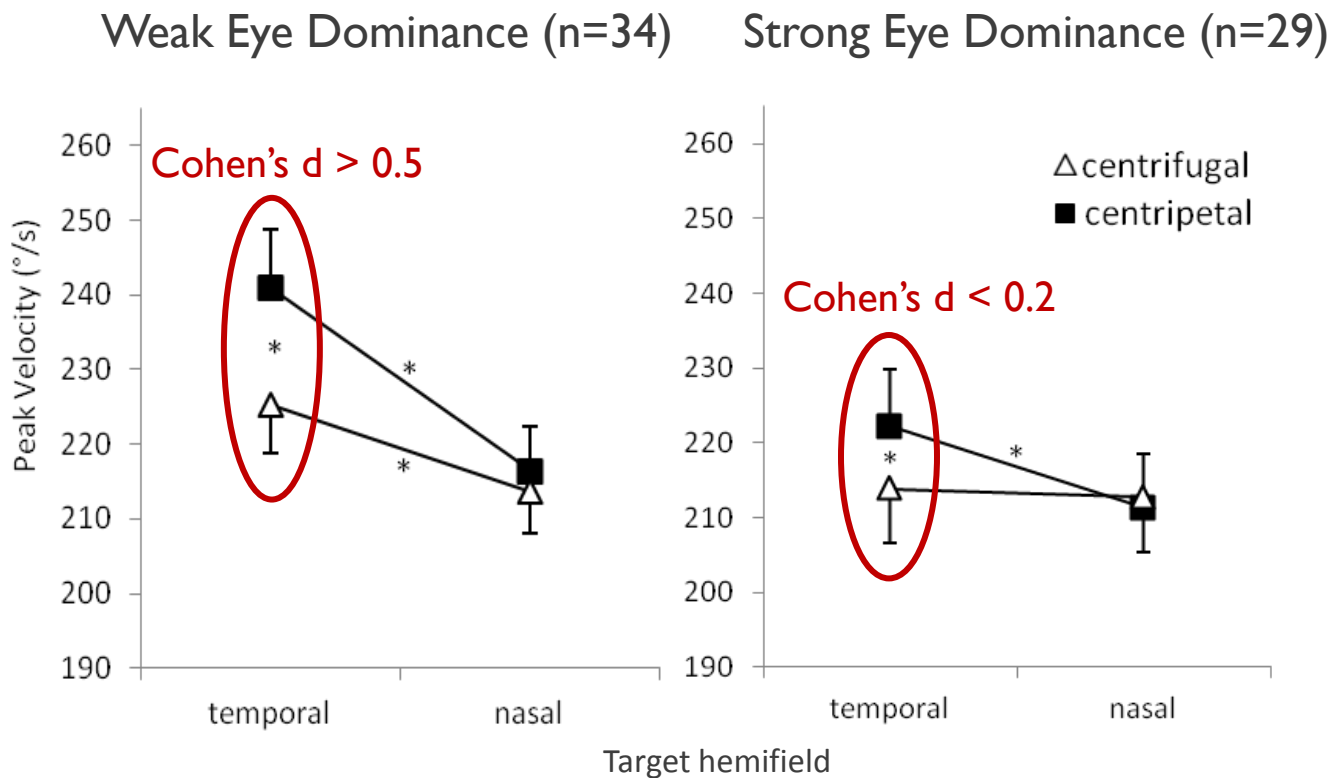
Weak Eye Dominance (n=34)



AVERAGED RESULTS



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RESULTS: *INDIVIDUAL DIFFERENCES IN PEAK VELOCITIES*

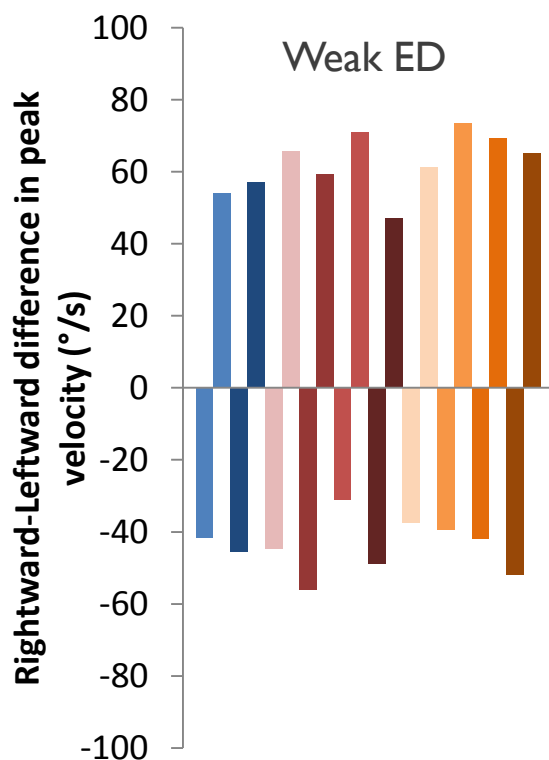
- **Participants show three profiles of naso-temporal asymmetry:**

RESULTS: *INDIVIDUAL DIFFERENCES IN PEAK VELOCITIES*

■ Participants show three profiles of naso-temporal asymmetry:

I. Robust NTAs: Weak Eye Dominance (n=25)

higher peak velocities for rightward saccades of the RE and leftward saccades of the LE (i.e., weak ED, Vergilino-Perez et al., 2012)



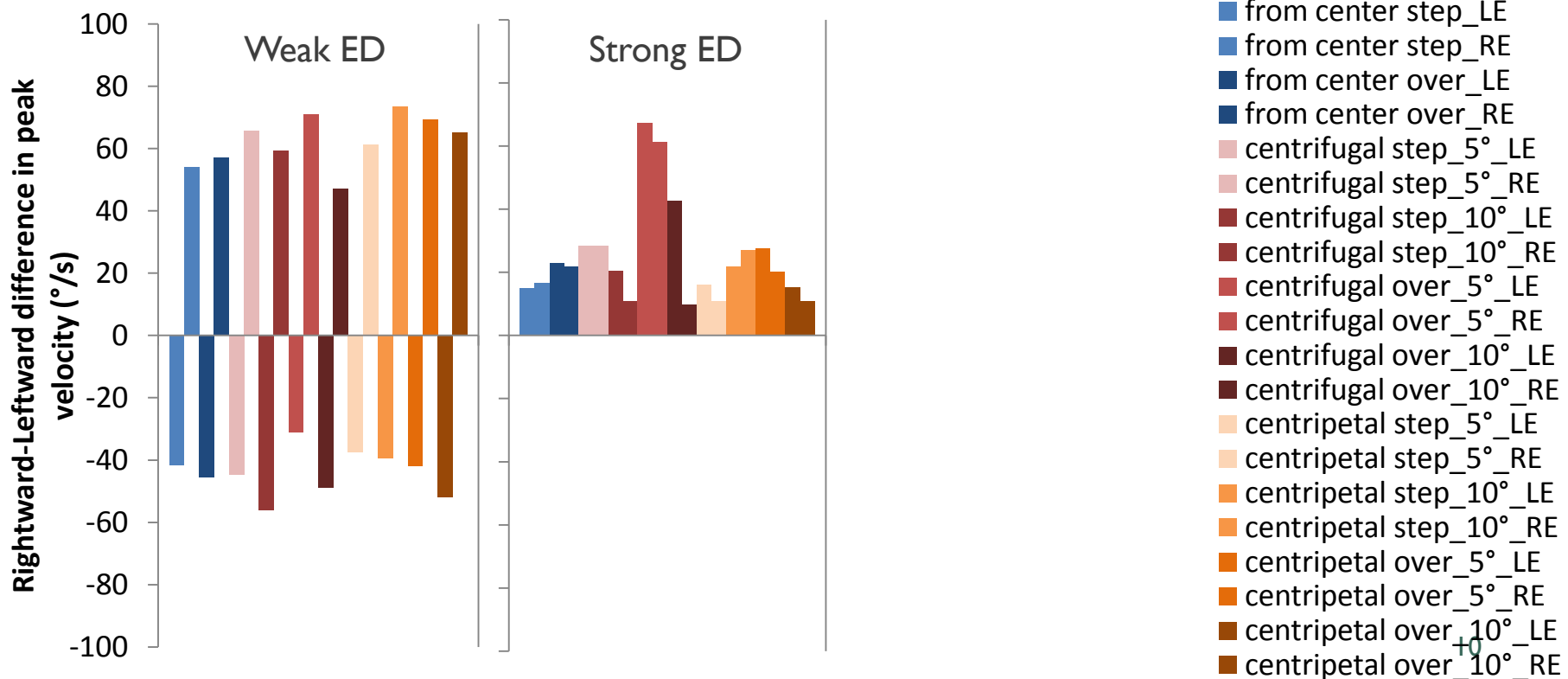
- from center step_LE
- from center step_RE
- from center over_LE
- from center over_RE
- centrifugal step_5°_LE
- centrifugal step_5°_RE
- centrifugal step_10°_LE
- centrifugal step_10°_RE
- centrifugal over_5°_LE
- centrifugal over_5°_RE
- centrifugal over_10°_LE
- centrifugal over_10°_RE
- centripetal step_5°_LE
- centripetal step_5°_RE
- centripetal step_10°_LE
- centripetal step_10°_RE
- centripetal over_5°_LE
- centripetal over_5°_RE
- centripetal over_10°_LE
- centripetal over_10°_RE

RESULTS: INDIVIDUAL DIFFERENCES IN PEAK VELOCITIES

■ Participants show three profiles of naso-temporal asymmetry:

2. No NTA: Strong Eye Dominance (n=17)

higher peak toward one hemifield whichever the recorded eye
(i.e., strong ED, Vergilino-Perez et al., 2012)

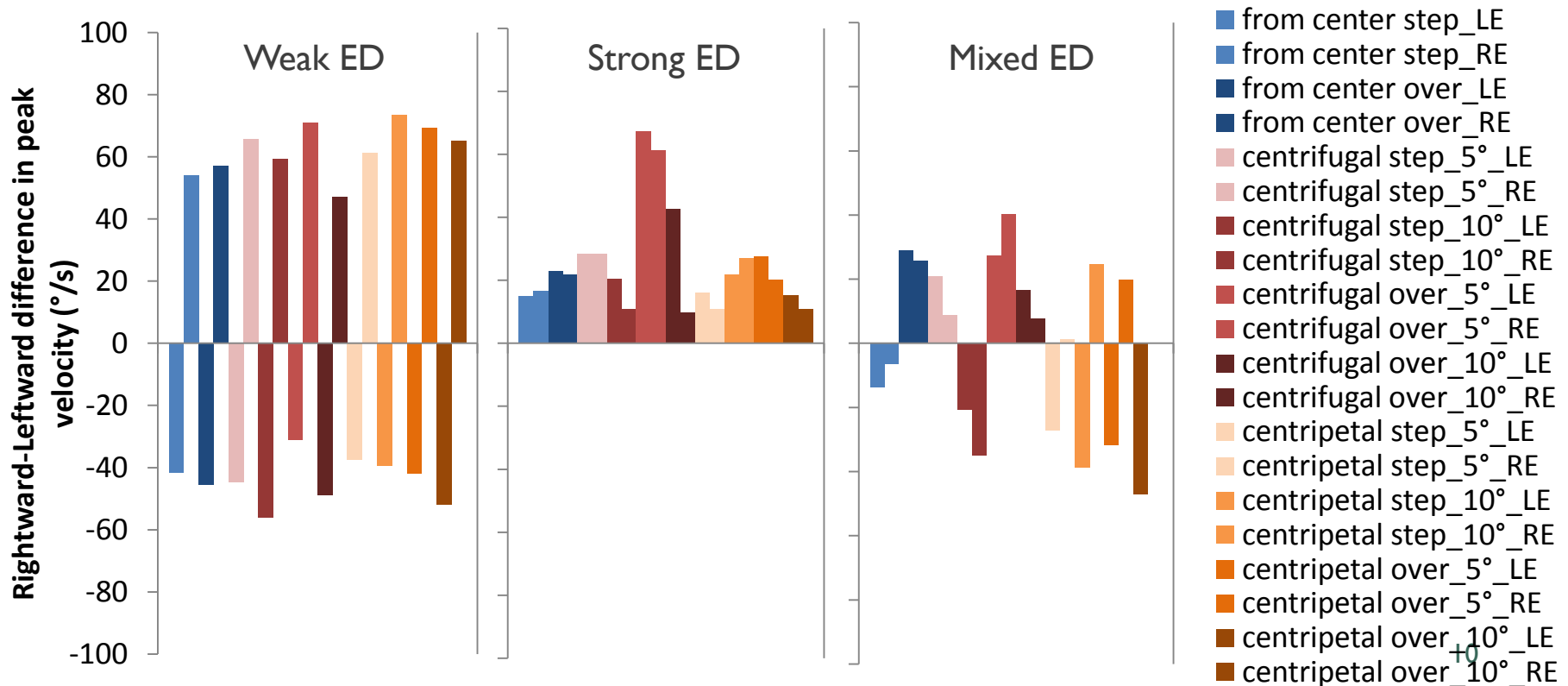


RESULTS: INDIVIDUAL DIFFERENCES IN PEAK VELOCITIES

■ Participants show three profiles of naso-temporal asymmetry:

3. NTAs only in some of the condition: New intensity of Eye Dominance (n=21)

Strong eye dominance on centrifugal saccades, and Weak eye dominance on centripetal saccades (mixed ED ?)



RESULTS: *TOWARD A PERCENTAGE OF EYE DOMINANCE*

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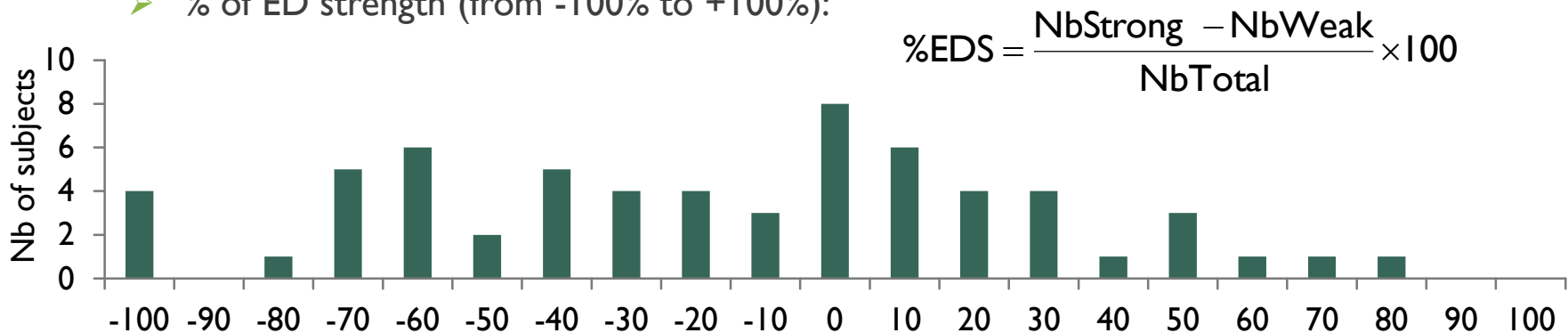
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$$\%EDS = \frac{NbStrong - NbWeak}{NbTotal} \times 100$$

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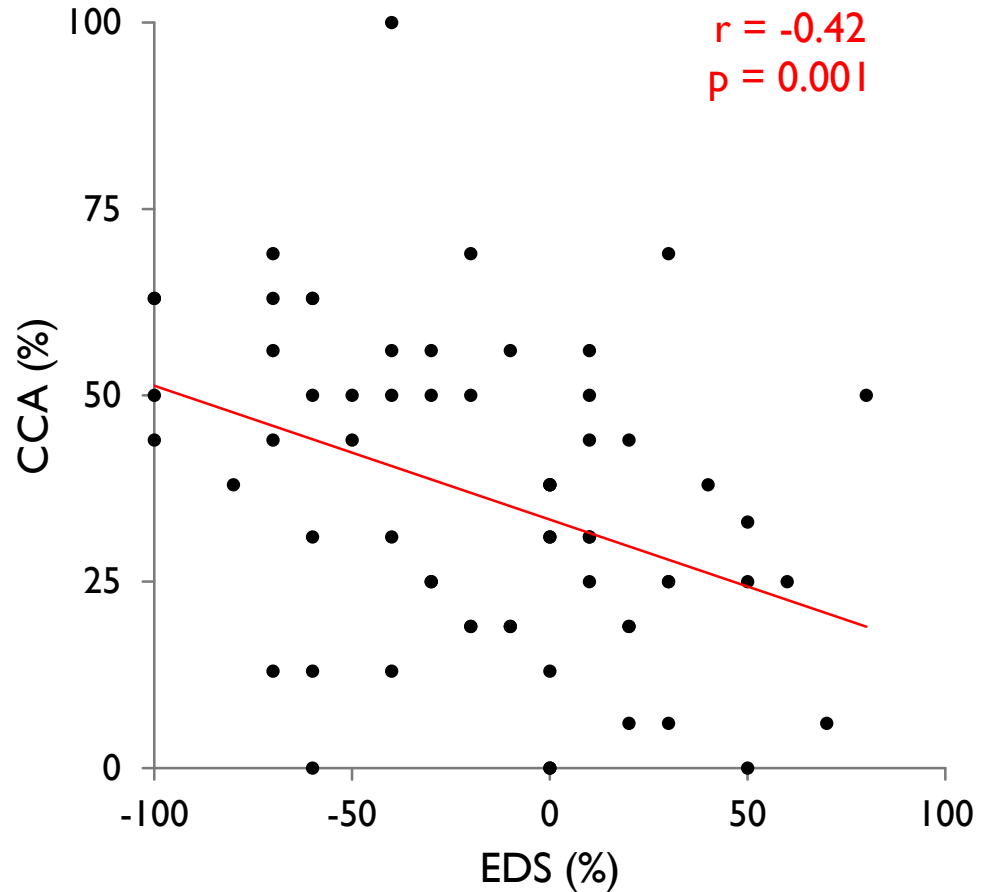
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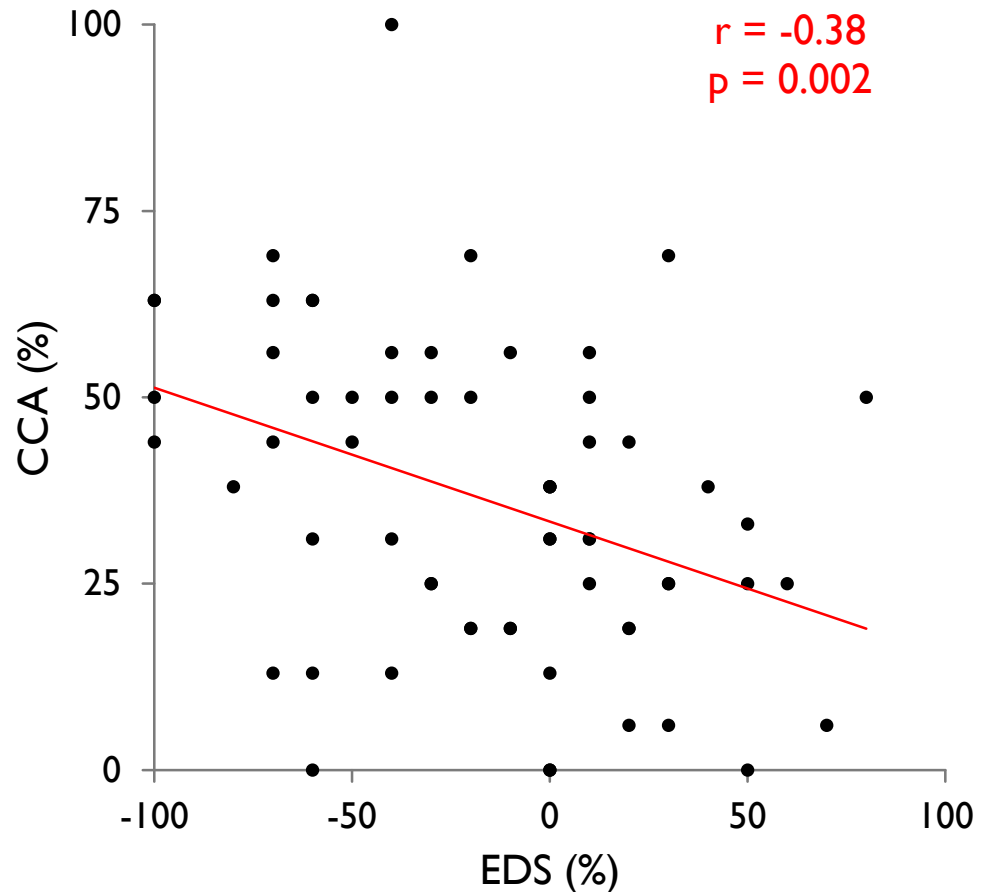
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- The higher the eye dominance strength, the lower the CCA.
- Like the NTA, the CCA is signing a weak eye dominance.

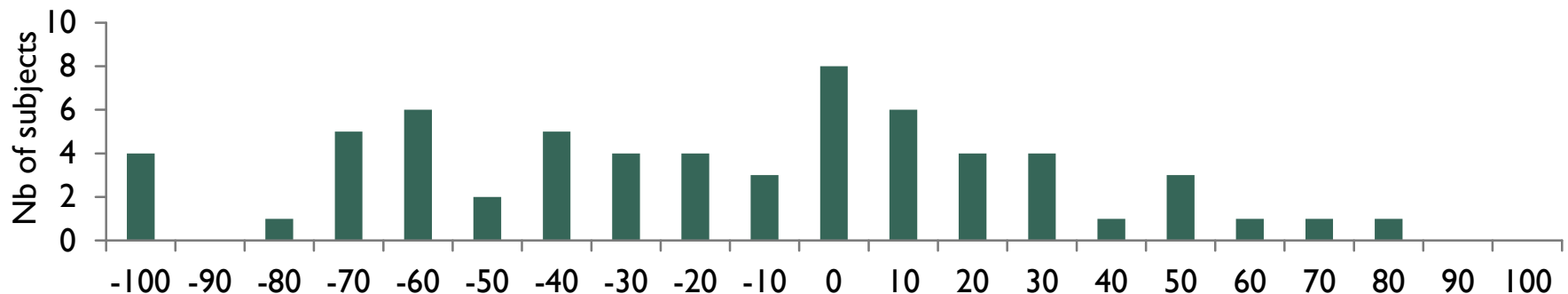


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- Studying together the NTA and the CCA allows to sharpen the quantification of eye dominance strength, by assigning a **percentage of eye dominance** to each participant.



THANK YOU !

- To the doctoral school 261 “Cognition Comportements Conduites Humaines”



- To the contributors of this work:



K. Doré-Mazars



C. Lemoine-Lardennois



J. Vergne



D. Vergilino-Perez

- To all the members of the Vision Action Cognition Lab
- To all the participants
- ...And to all of you for your attention