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STIMULUS SPEED INFLUENCE IN EVALUATING PURSUIT MOVEMENTS MEASURED WITH A NEW VISUAL ANALYZER

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INTRODUCTION

- Smooth pursuit movements allow us to follow objects in movement combining soft movements and small saccadic intrusions. Its main function is to stabilize the image of the object on the fovea to keep a good visual acuity.
- The principal characteristics of smooth pursuit movements are latency (around 100 ms [1]), speed (up to 100 degrees/second [2,3]), accuracy and stability.
- Smooth pursuit movements are usually evaluated in clinics using a subjective test that allows at the examiner to estimate the accuracy and the softness of the movement.

- **Purpose:** To determine the influence of stimulus speed in the objective assessment of pursuit movements using a prototype of a new fully autonomous and automated vision analyzer (Eye and Vision Analyzer, EVA, DAVALOR, Spain), that records eye movements while the patient watches a true-3D (matching accommodation and convergence demands) video game.

METHODS

- **Sample:** 18 healthy young subjects were enrolled in this study. The mean age ± standard deviation (SD) was 22.6 ± 2,00 years (range from 20 to 30).
- **Inclusion criteria:** Near Visual Acuity greater or equal to 0.00 logMAR; Spherical Ametropia ≤ ±6.00D ; Astigmatism ≤ -3.00D; Phoria values in near vision between 8x'-2e'. No previous history of amblyopia or strabismus, ocular pathology or history of eye surgery.

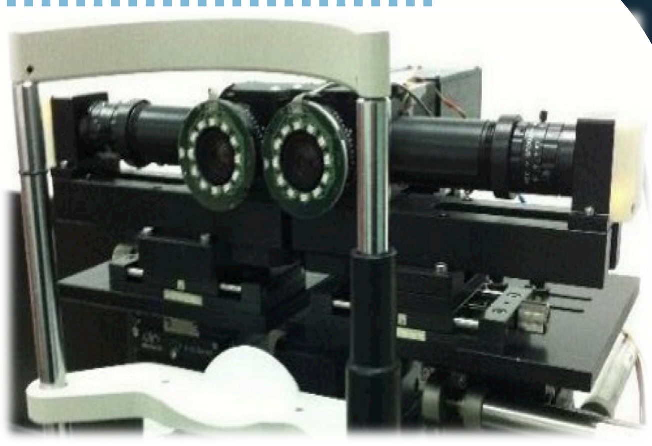
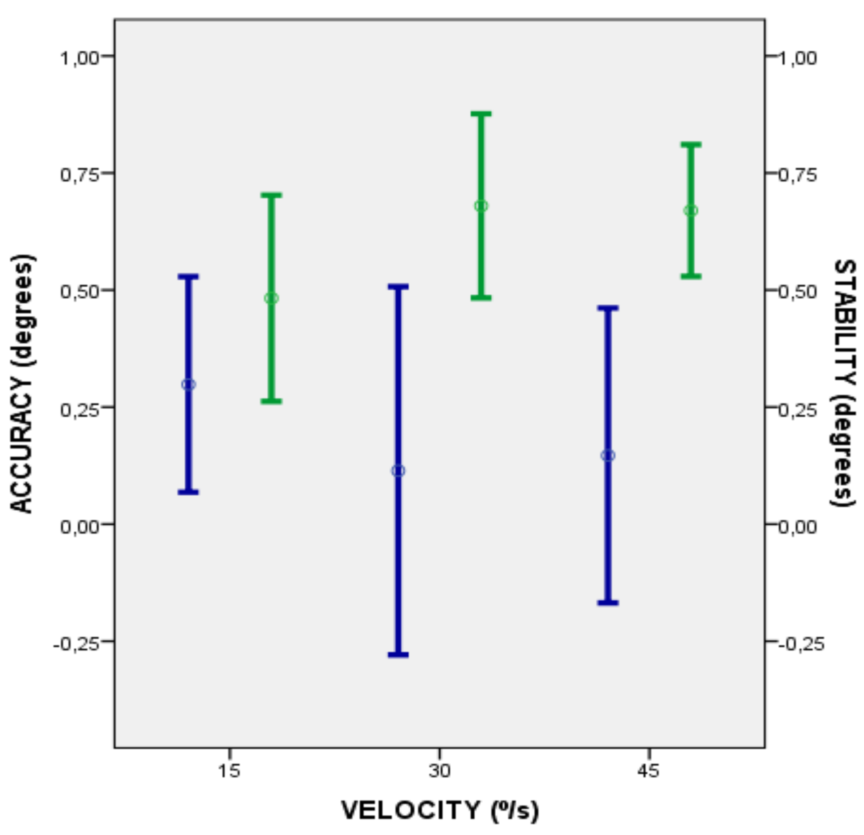


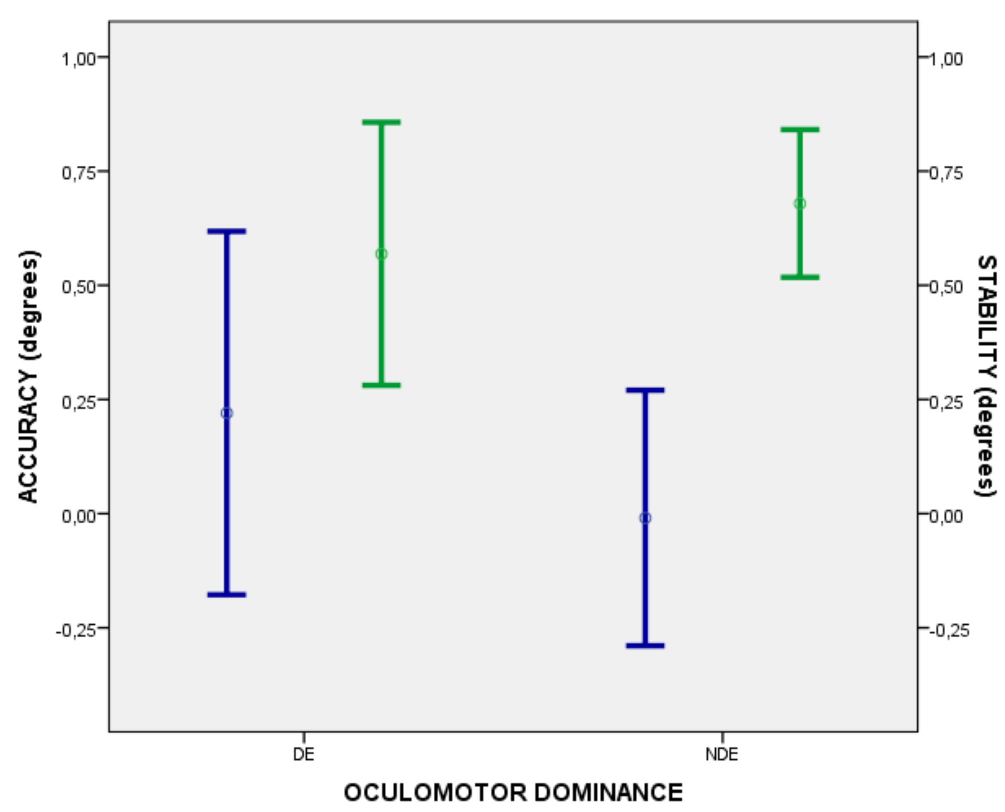
Figure 1: Prototype of EVA device

- **Ocular movements** were registered using a prototype of EVA device (Fig. 1) at a frequency of 30 Hz, showing an optotype at 40 cm with circular displacement. Its size corresponds to a visual acuity of 0.8 logMAR.
- **Accuracy** was assessed as the mean difference between the gaze and the stimulus positions.
- **Stability** was assessed as the root mean square (RMS) of the difference between the gaze and the stimulus positions.
- **Stimulus speed:** 15, 30 and 45 degrees/second.

RESULTS



Graphic1: Mean and 95%CI smooth pursuit accuracy (Blue line) and stability (Green line) vs stimulus speed values.



Graphic 2: Mean and 95%CI smooth pursuit accuracy (Blue line) and stability (Green line) for dominant (DE) and non dominant (NDE) (Stimulus speed 30 deg/sec)

	ACCURACY p = 0.611		STABILITY p = 0.180	
	Mean (deg)	Sd (deg)	Mean (deg)	Sd (deg)
15º/s	0.30	0.30	0.48	0.29
30º/s	0.11	0.51	0.68	0.26
45º/s	0.15	0.41	0.67	0.18

Table 1: Smooth pursuit accuracy and stability (mean and standard deviation) for different stimulus speeds (p corresponds to ANOVA significance)

	ACCURACY p = 0.292		STABILITY p = 0.453	
	Mean (deg)	Sd (deg)	Mean (deg)	Sd (deg)
DE	0.22	0.52	0.57	0.38
NDE	-0.10	0.36	0.70	0.21

Table 2: Smooth pursuit accuracy and stability (mean and standard deviation) for dominant (DE) and non dominant (NDE) eye (p corresponds to T-Student significance)

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Supported by:
GOBIERNO DE ESPAÑA MINISTERIO DE CIENCIA E INNOVACIÓN
davalor
Grant: DPI2014-56850-R

CONCLUSIONS

- The best accuracy is for 30º/s and the best stability is for 15º/s, but differences are not statistically significant.
- The non-dominant eyes show better results than dominant eyes in accuracy and worse in stability, but differences are not statistically significant.
- In a future work the sample will be increased.

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