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SUBMISSION ROLE: Abstract Submission

## AUTHORS

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### **INSTITUTIONS (ALL):**

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**Commercial Relationships Disclosure (Abstract):** Clara Mestre: Commercial Relationship(s);DAVALOR SALUD S.L.:Code F (Financial Support) | Carles Otero: Commercial Relationship(s);DAVALOR SALUD S.L.:Code F (Financial Support) | Josselin Gautier: Commercial Relationship(s);DAVALOR SALUD S.L.:Code F (Financial Support) ;DAVALOR SALUD S.L.:Code E (Employment) | Jaume Pujol: Commercial Relationship(s);DAVALOR SALUD S.L.:Code F (Financial Support)

**Study Group:** (none)

## ABSTRACT

**TITLE:** Does cover test overestimate systematically the phoria values?

### **ABSTRACT BODY:**

**Purpose:** To analyze the differences between deviations of both eyes and the displacement of one single eye during the measurement of horizontal phoria in the cover test.

**Methods:** Both right and left eye movements were recorded synchronously with the eye-tracker embedded in the stereoscopic virtual reality system EVA (Eye and Vision Analyzer, Davalor Salud, Spain) during the performance of the cover test at near vision (40 cm). Participants were asked to fixate a stimulus during 2 cycles, each cycle comprised the following states: binocular vision, right eye occlusion, binocular vision, left eye occlusion. Each state lasted 4 s (seconds) but only the last 0.5 s was considered to compute the median eye's position of each state. Two different computational methods were used to measure the phoria. First, it was computed as the displacement of the occluded eye from the previous binocular state. Second, phoria was calculated as the difference between the displacements of the occluded and fixating eyes from their respective binocular positions. In all cases the final phoria value was computed as the average of the 4 trials.

**Results:** 19 subjects were included in the study, with a mean age  $\pm$  standard deviation (SD) of  $22.3 \pm 3.5$  years, normal or corrected-to-normal visual acuity and a horizontal phoria greater than 1 PD (prism diopter) (8 exophoric and 11 esophoric). The average accuracy  $\pm$  SD of the eye-tracker recordings was  $0.37^\circ \pm 0.18^\circ$ . The dependent t-test showed statistically significant differences between the phoria values computed as one eye's displacement and between eyes deviations ( $t(18)=6.2$ ,  $p<0.001$ ). The mean difference  $\pm$  SD was  $0.67 \pm 0.47$  PD (range from 0.17 PD to 1.68 PD). In 21.1% of the subjects the differences were greater than 1 PD.

**Conclusions:** Major advantages of using an eye-tracker during the cover test are the possibility of registering both eyes' movements synchronously and the increased resolution of the measure with respect to the clinician's observations. Our results suggest that the phoria measurement considering one eye's deviation is greater than when the deviation of the visual axes of both eyes is taken into account. It is hypothesized that under dissociated conditions the fixating eye moves according to Hering's law of equal innervation, which leads to an overestimation of the phoria value when deviations of one single eye are measured.

(No Image Selected)

**Layman Abstract (optional):** Provide a 50-200 word description of your work that non-scientists can understand.

**Describe the big picture and the implications of your findings, not the study itself and the associated details.:** The assessment of ocular alignment is essential to evaluate the binocular function, which at the end contributes to the quality and efficacy of vision. Typically, manifest or latent deviations are measured by optometrists and ophthalmologists with subjective tests which depend on the patients' answers or the expertise of clinicians. An eye tracking system is used in this study to measure the eye movements during the performance of the cover test, one of the most used by clinicians. This method allows to assess objectively and more accurately the ocular alignment, which lead to more precise diagnostics and, if needed, the recommendation of more effective treatments.

## DETAILS

**PRESENTATION TYPE:** #1 Paper, #2 Poster

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**CURRENT SECTION:** Eye Movements/Strabismus/Amblyopia/Neuro-Ophthalmology

**Clinical Trial Registration (Abstract):** No

**Other Registry Site (Abstract):** (none)

**Registration Number (Abstract):** (none)

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## TRAVEL GRANTS and AWARDS APPLICATIONS

**AWARDS:**

## AFFIRMATIONS

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