



Letter to the Editor



ARTICLE INFO

Number of reviewers = 2

Dear Editor,

We read with interest the recent study by Leube, Kostial, Alex Ochakovski, Ohlendorf, and Wahl (2017) that shows the effect of real defocus blur (where a clear target was presented with blur induced optically with lenses of different power) and simulated defocus blur (where a blurred target was presented without optical blur) on the visual acuity (VA) under monochromatic light conditions. The key difference between the two conditions is that, with optical blur, the light rays reach the retina with some optical vergence (converging if the lens is negative; diverging if the lens is positive), whereas, with target blur, optical vergence is always zero and the computationally blurred target is presented focused at the retina.

The results obtained in this experiment showed that the reduction in VA was symmetric with respect to defocus blur under monochromatic light conditions. However, since an asymmetric reduction in VA was found in previous studies with polychromatic light, authors concluded that “the visual system uses the chromaticity of light and the chromatic aberration of the eye’s optics to identify the sign of defocus, **but not the presence of light vergence** [emphasis added].” The first part of their conclusion that chromatic aberration is used to detect the sign of defocus is in agreement with the seminal works by Fincham (1951) and by Kruger, Mathews, Aggarwala, and Sanchez (1993). However, the second part of their conclusion, ruling out from their data that light vergence is a mechanism to identify the sign of defocus, is speculative. The authors made this point in the Discussion subtly: “since the visual acuity seems to be unaffected by the absence of the light vergence it is suggested that the high spatial frequency channels have no input from

light vergence for the detection of the sign of defocus, **or in any case, its input does not affect VA** [emphasis added].” Results from recent studies support the hypothesis that the visual system does use optical vergence to infer the sign of defocus and accommodate accordingly (Del Águila-Carrasco et al., 2017; Marín-Franch et al., 2017).

References

- Del Águila-Carrasco, A. J., Marín-Franch, I., Bernal-Molina, P., Esteve-Taboada, J. J., Kruger, P. B., Montés-Micó, R., & López-Gil, N. (2017). Accommodation responds to optical vergence and not defocus blur alone. *Investigative Ophthalmology & Visual Science*, 58(3), 1758–1763.
- Fincham, E. F. (1951). The accommodation reflex and its stimulus. *The British Journal of Ophthalmology*, 35(7), 381–393.
- Kruger, P. B., Mathews, S., Aggarwala, K. R., & Sanchez, N. (1993). Chromatic aberration and ocular focus: Fincham revisited. *Vision Research*, 33(10), 1397–1411.
- Leube, A., Kostial, S., Alex Ochakovski, G., Ohlendorf, A., & Wahl, S. (2017). Symmetric visual response to positive and negative induced spherical defocus under monochromatic light conditions. *Vision Research*, 143, 52–57.
- Marín-Franch, I., Del Águila-Carrasco, A. J., Bernal-Molina, P., Esteve-Taboada, J. J., López-Gil, N., Montés-Micó, R., & Kruger, P. B. (2017). There is more to accommodation of the eye than simply minimizing retinal blur. *Biomedical Optics Express*, 8(10), 4717–4728.

Antonio J. Del Águila-Carrasco
Independent Researcher, Jerez de la Frontera, Spain
E-mail address: dacantonioj@gmail.com

Iván Marín-Franch
Department of Ophthalmology and Visual Sciences, University of Alabama
at Birmingham School of Medicine, Birmingham, AL, USA