Author's response to reviews

Title: Variability of wavefront aberration measurements in small pupil sizes using a clinical Shack-Hartmann aberrometer

Authors:

Dr Harilaos S Ginis (ginis@med.uoc.gr)
Sotiris Plainis (plainis@med.uoc.gr)
Aristophanis Pallikaris (apallik@med.uoc.gr)

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PDF covering letter
**Response to Referees**

**General comments**

Overall, we are pleased that the referees find the work well done and worth publishing. Many of the referee remarks are well taken and when the m/s is modified it will be much improved.

The suggestion made by both referees regarding the issue of word **repeatability** is absolute right and was adopted. In all situations, the text was adjusted accordingly: the word "repeatability" was replaced by "variability".

**Reviewer: Nigel Davies**

1. **Methods**: we have indicated in the text that none of the subjects had undergone refractive surgery.
2. **Procedure**: COAS also provides a real time display of the pupil image, which is used to objectively measure pupil size to the nearest 0.1mm. A sentence was added in "Methods".
3. **Chromatic aberration**: A whole Appendix session was added, describing the procedure used for correcting zernike coefficients for chromatic aberration.
4. The referee indicates that he would like figures 3a and 3b (and not 2 and 3 as stated) to be polished in some way. Although, his comment about re-ploting the data in a different way is credible, we believe that is valid to keep figures as it is, because our aim is not only to show any dispersion in the data, but also to indicate any drift.

**Reviewer: Antonio Guirao**

**General**

1. see above
2. The referee has prompted us to present results for a second pupil size. We have tested analysing the data for a second pupil size (4.5 mm) and observed that the COAS software truncation still introduces noise that affects the variability of higher order aberrations. Specifically, S/N of the spherical aberration improves by a factor of 2 for subject AP (comparing to 3.5 improvement when a 3mm pupil is used). However, we believe that presenting the whole set of data for a second pupil will "overload" the paper.

**Specific**

1. **lenslet spacing, a, b.**: We have added these specifications in "Methods"

   c. As mentioned in "methods" large pupil analysis was based on the full pupil which varied between subjects tested (between 4.5 and 7.1 mm)
2. We believe that figure 2 adds credibility in the paper as it shows how standard aberration increases near the edge of the pupil.

3. a. We thank the referee for this valid comment. We added the argument in the discussion.
   b. We do agree that there are many limitations. The references cited have been purposely selected, as they present scepticism. We have adjusted the text accordingly.

4. a. We have improved the text both in results and in figure caption.
   b. We added units (\(\mu m\)) in Zernike coefficients labels in figures.