# Toric vs. Spherical Correction: Looking further than traditional acuity

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## BACKGROUND

- Toric contact lens (CL) correction has been shown to provide improvements in traditional visual acuity when compared to spherical correction.[1,2]
- Dynamic visual acuity has been used in sports vision assessment, but little is published on the topic in the field of CLs. It is more robust than traditional visual acuity measures in being a detection rather than recognition task, and may be a more accurate assessment of "real-world" tasks.
- **Purpose**: To quantify digital visual performance, subjective visual acceptance and its association with ocular comfort during toric contact lens wear as compared to spherical lens wear.

## METHODS

- Double masked, randomized order, cross-over study
- N=23 (age 24.5±4.5 years)
- Participants wore Alcon Precision1 Sphere and Toric daily disposable CLs
- Digital reading performance and dynamic visual acuity assessed using custom-made iPad apps
  - ➢ Dynamic visual acuity
    - to measure acuity via a tumbling Landolt C surrounded by crowding bars presented for a limited duration. (Figure 1)
  - ➢ Modified Radner reading sentences test (Figure 2)
    - to calculate critical print size (CPS) and optimal reading speed
  - ➢ Reading speed test
    - to measure zoom/contrast modifications, blink rate, and distance iPad held
- Near high luminance high and low contrast logMAR visual acuity (HLHC/HLLC VA) were measured using the electronic M&S system.
- Subjective outcomes were assessed with the Near Acuity Visual Questionnaire (NAVQ)[2]
- Preferred contact lens correction ascertained at the end of the study
- *Statistical Analysis: linear mixed model, Fisher's Exact test, and one-sample binomial test*

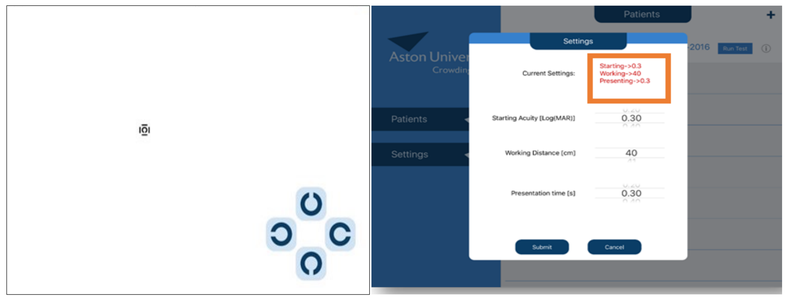



**Figure 1. Example screen shots from the iPad application for dynamic visual acuity, designed by Aston University.** A. The interactive page with Landolt C surrounded by crowding bars and subject options for orientation. B. Settings page for controlling the starting acuity, working distance, and presentation time, which was standardized for all subjects.

## RESULTS

- Subjects were moderate myopes with low to moderate astigmatism
- Overall, 70% of the participants preferred toric correction over spherical equivalent correction (P=0.007). (Figure 3; 59% with low (-0.75) and 100% with moderate cyl (-1.25) powers)
- Dynamic VA improved by 3.5 letter with toric correction (P=0.014) (Figure 4A)
- Subjects could read smaller text at a faster rate (smaller CPS) when using toric CLs compared to spherical CLs (P=0.02) (Figure 4B)
- Near HLHC VA was 3.5 letters (P=0.001) and HLLC was 4 letters (P=0.002) better with toric compared to spherical equivalent CLs, allowing subjects to read up to 1 line smaller on a digital device (Figure 4C,D)
- Subjects were comfortable reading with less contrast while wearing toric correction (44 vs. 52%, P=0.01). There was no statistical difference in reading speed, blink rate, reading distance, or zoom.
- Based on the overall NAVQ score, subjects reported better near visual quality with toric lenses, including less difficulty with maintaining focus at near, reading small print, labels/instructions, and computer display/keyboard (all P<0.05).

**Figure 3: Subjective Lens Preference**

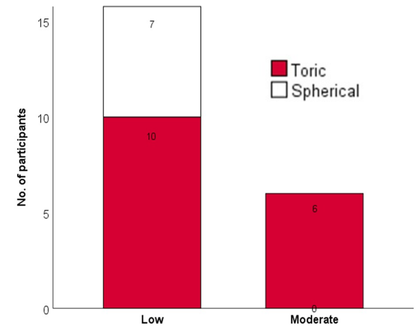



**Figure 2. Example screen shots from the iPad application for testing reading speed.**

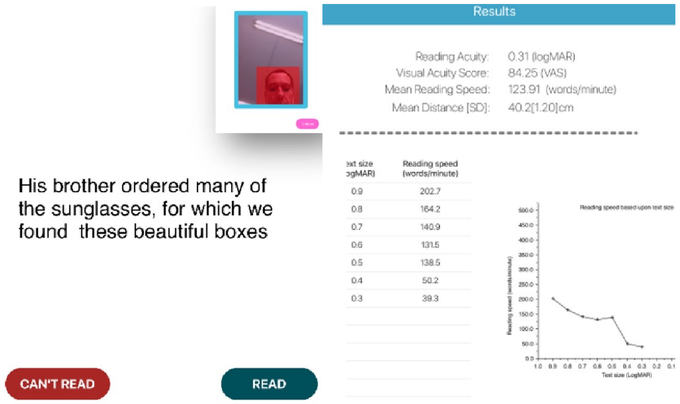
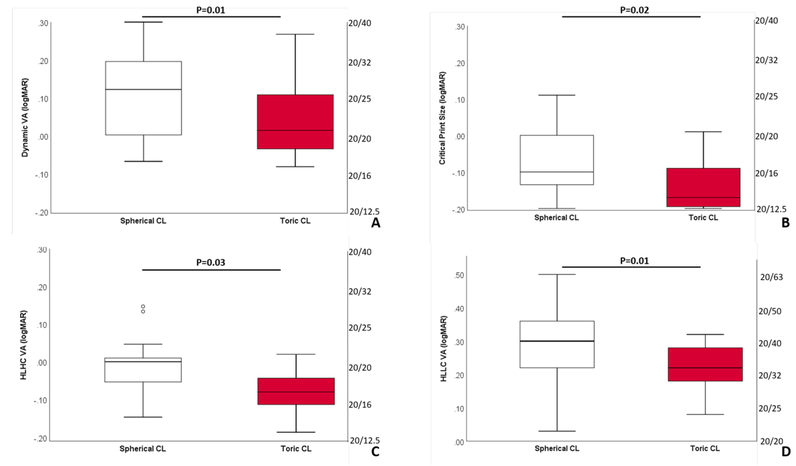



**Figure 4. Reading performance data**




## DISCUSSION

- Novel iPad apps were used to explore the benefits of toric correction in low and moderate astigmats.
- Toric lenses allowed better traditional visual acuity, but they also provided improved dynamic visual acuity and participants were able to read with lower contrast on a digital device.
- Overall, the majority of participants preferred toric CL correction, especially the moderate (up to -1.25 cyl) astigmats).

## CONCLUSION

Toric contact lens correction demonstrated superior visual performance versus spherical equivalent. The use of digital technology with real-world tasks offers a broader understanding of visual performance rather than the traditional measure of visual acuity alone.

## REFERENCES

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## DISCLOSURES

KS: Euclid (R), Novartis (R), Alcon (R). ET: Euclid (R), Novartis (R). CC: Alcon(R). JSW: Alcon (R), Allergan (R), Atia Vision (C), Contamac (C), CooperVision (C), Essilor (C), Johnson & Johnson (R), Novartis (C), Rayner (C), Théa pharmaceuticals (C). KR: Alcon (R), Vyluma (R), Euclid (R, C), Novartis (R), Paragon (R, C), CooperVision (C)

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