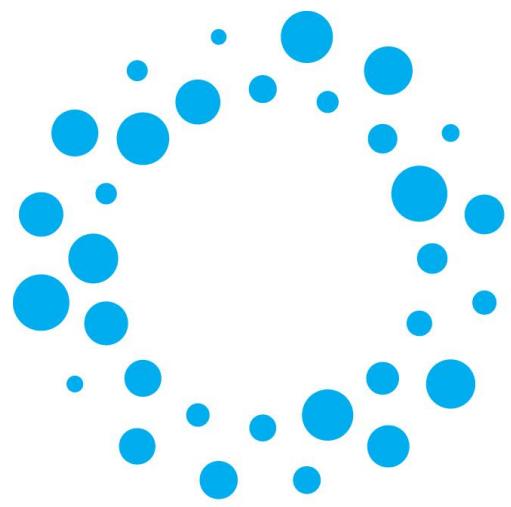




Home-Based Self-Assessment of the Contrast Sensitivity Function in Age-Related Macular Degeneration

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Introduction:

Early detection of visual function change is critical for eye care outcomes, but requires frequent assessment with sensitive tests.

The Contrast Sensitivity Function (CSF) is a sensitive endpoint for Age-related Macular Degeneration (AMD)¹; however there is currently no home-based self-assessment of the CSF.

Methods:

The binocular CSFs of 21 AMD patients were measured over at least 2 weeks using the quick CSF on a tablet computer².

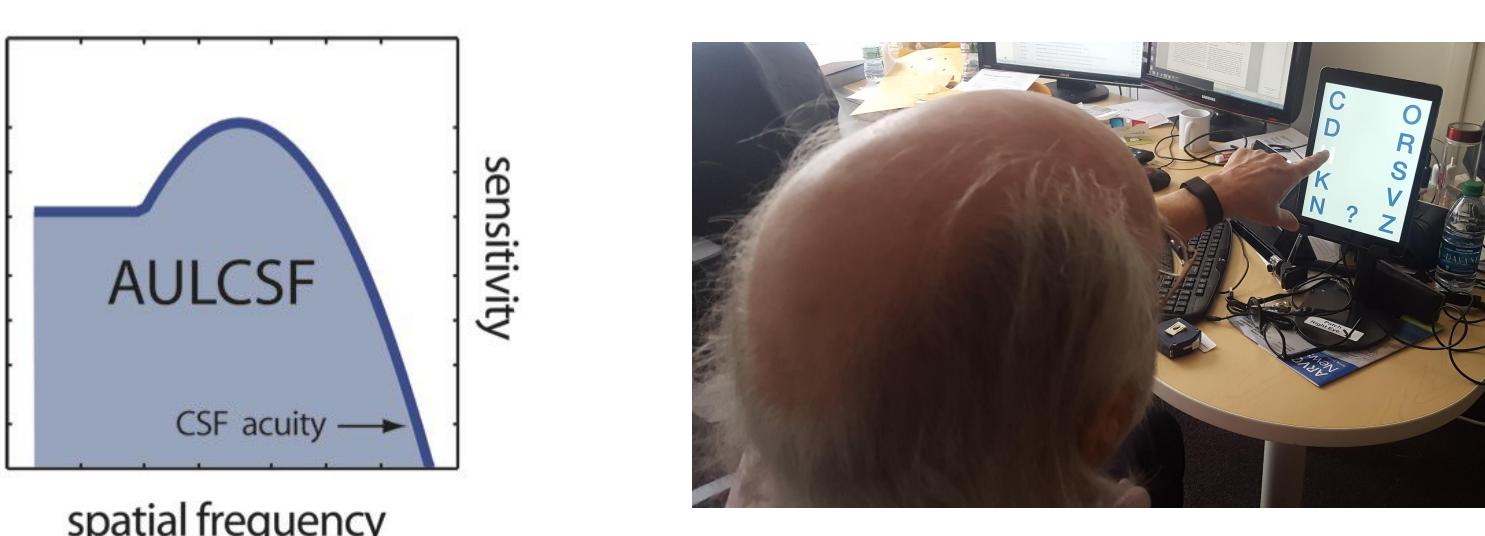
Encrypted data were automatically uploaded to a server after each test, which allowed remote monitoring and compliance intervention.

The quick CSF algorithm³ changed the spatial frequency and contrast of band-pass filtered Sloan letters in a 10 AFC task.

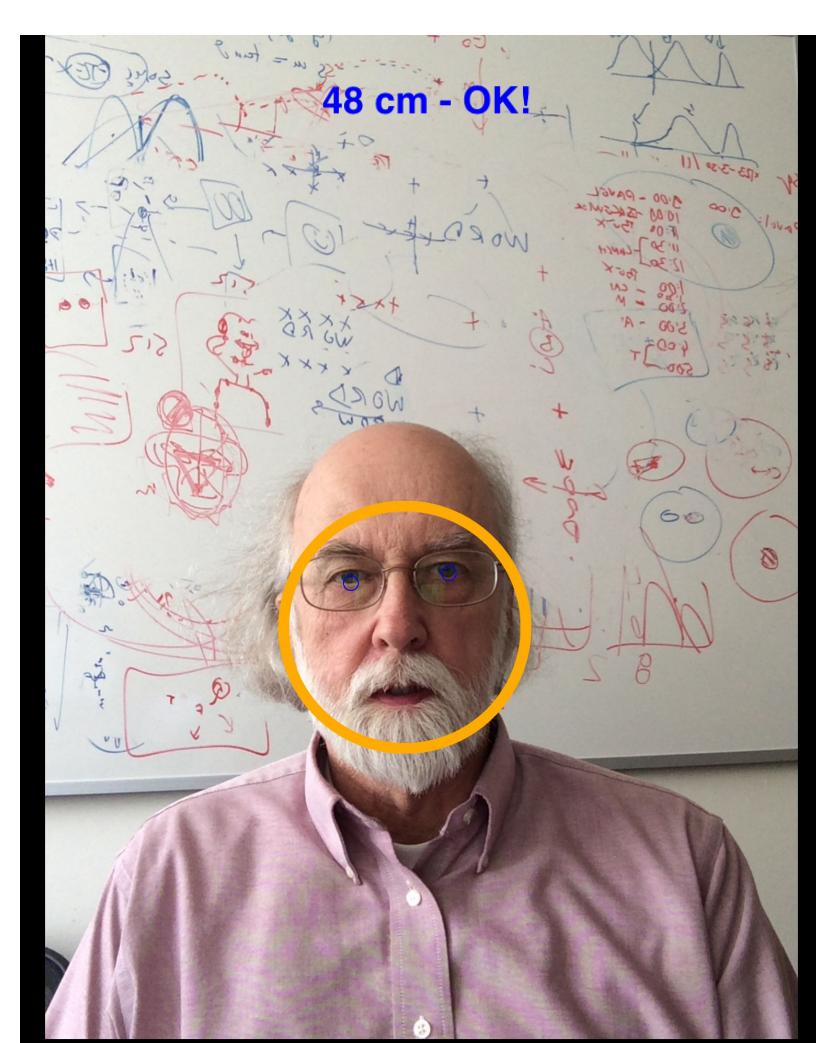
Viewing distance compliance was monitored using a face-tracking algorithm that employed the tablet's front-facing camera.

Supervised CSFs were measured in clinic at the start and end of the study, and daily self-administered CSFs were measured at home over a period of 14 days.

Figure 1: Quick CSF measured on a tablet computer.



Two summary statistics in addition to the full CSF:
AULCSF - the area under the log CSF
CSF acuity - the highest SF target identified at 100% contrast



Results: Clinic vs Home CSFs

Figure 2: CSFs recorded in supervised (red) and unsupervised (blue) conditions for each subject.

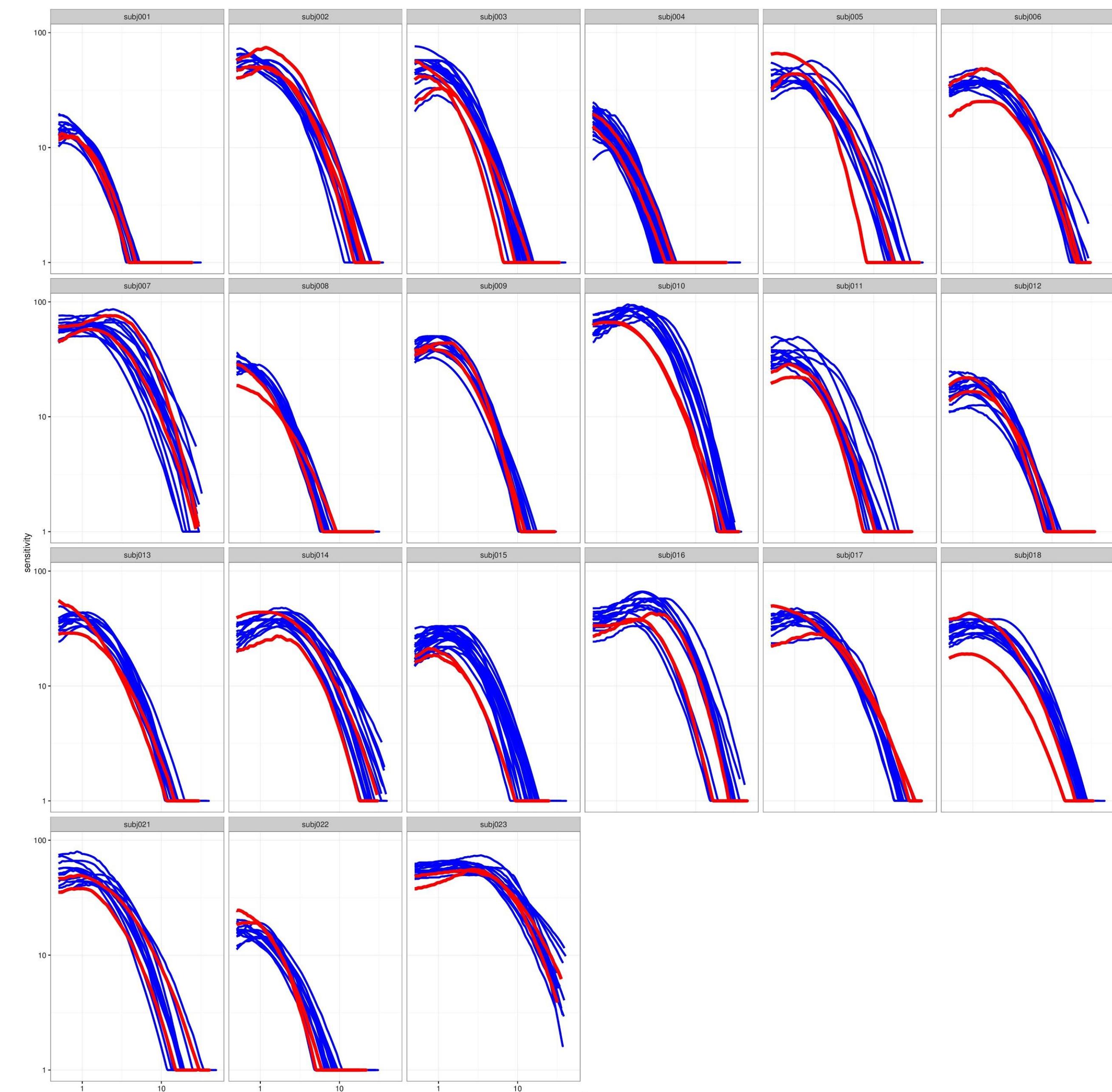
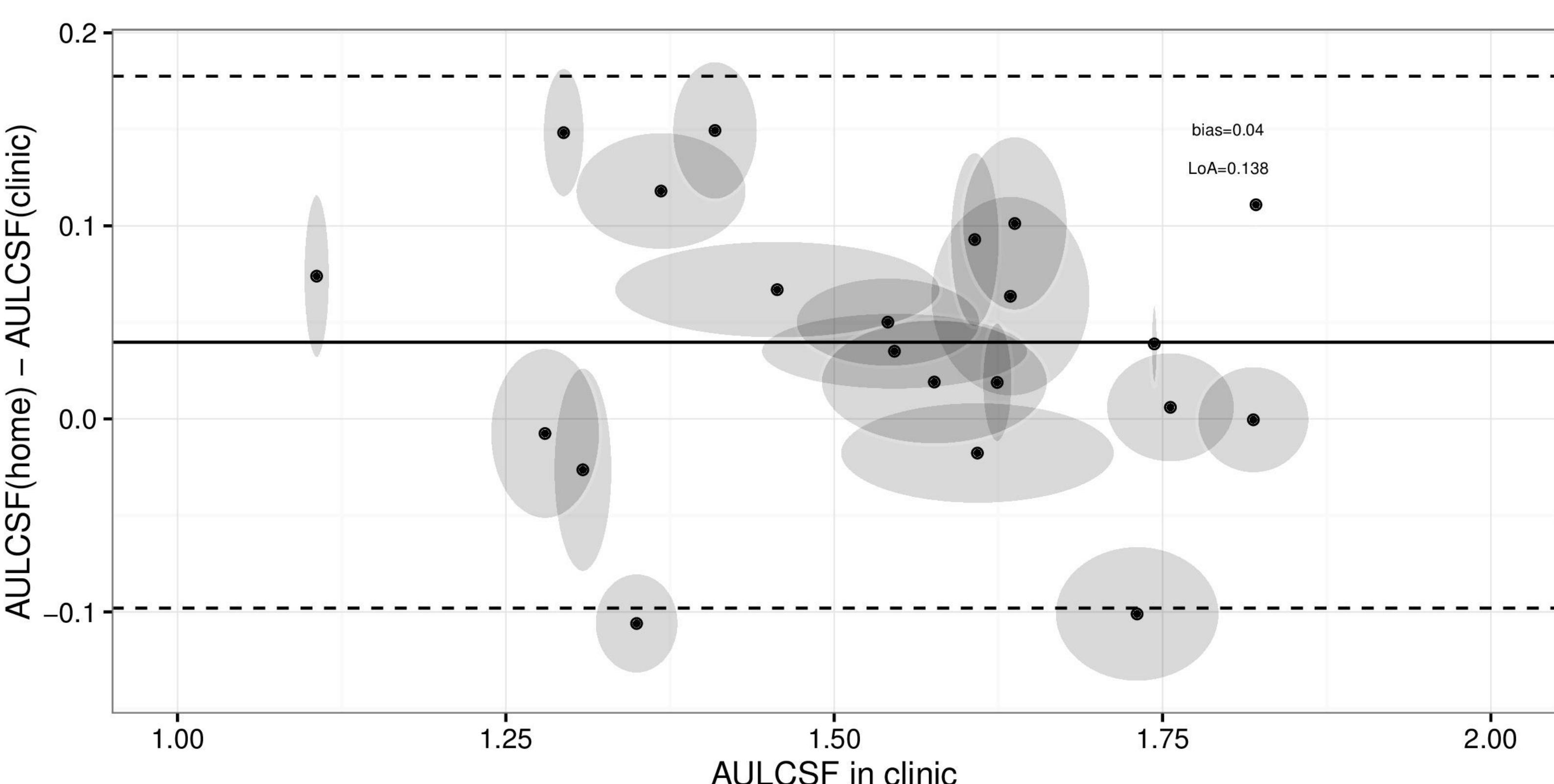
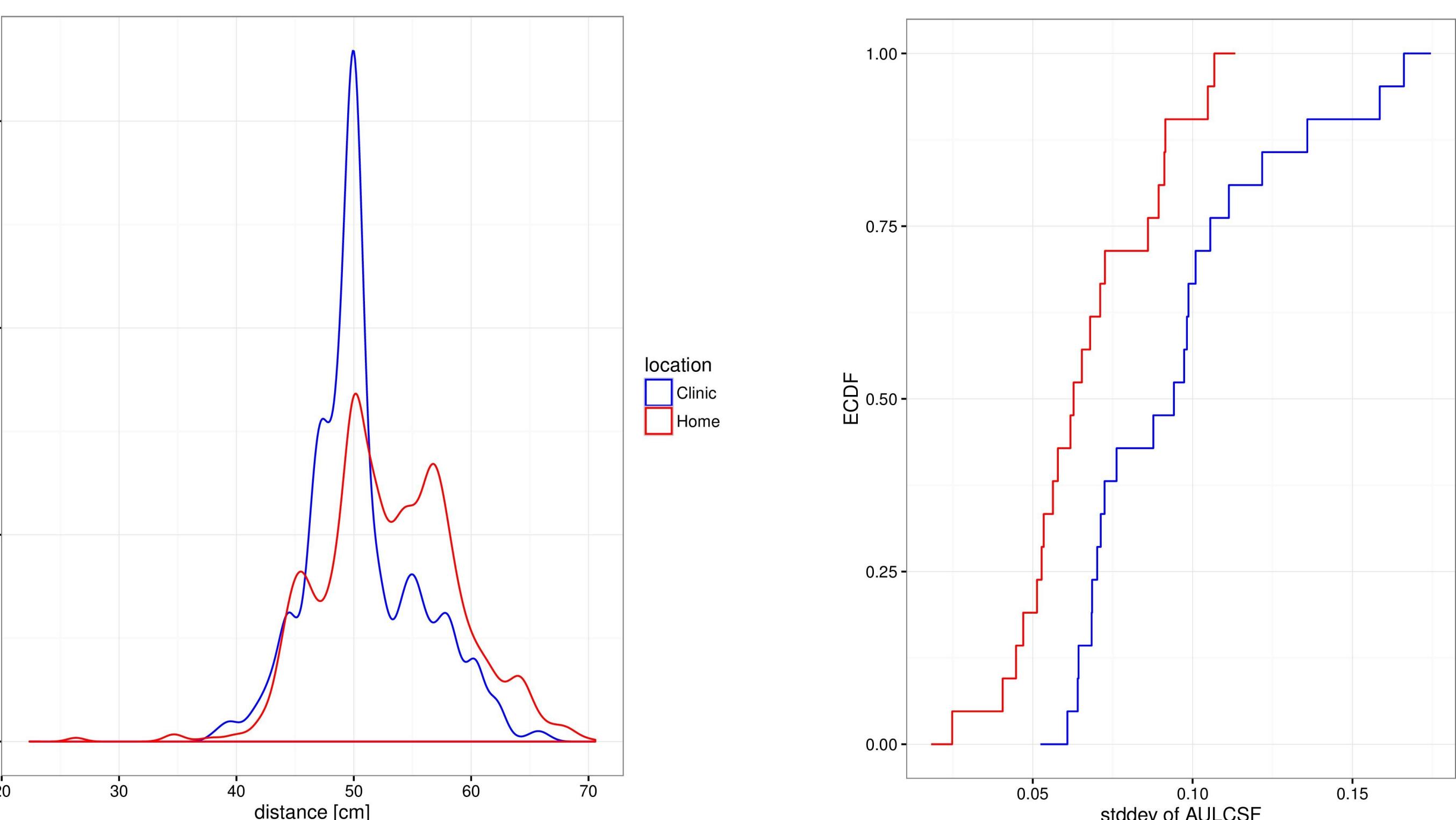


Figure 3: Bland-Altman plot showing the AULCSF distributions for supervised and unsupervised testing.



Results: Viewing Distance (Figure 4)

- a) Viewing distance variability was higher under unsupervised (blue) than supervised (red) testing.
- b) The test-retest variability (standard deviation of AULCSF estimates) was lower when data were corrected for viewing distance and rescored with an informative prior.



Conclusions:

The quickCSF can be reliably self-administered in the home in 3-5 minutes.

Unsupervised and supervised quickCSF test results are not substantially different, indicating that the quickCSF measured in the home can be used to supplement clinical data for health management and clinical trials.

Even though patients were instructed about the importance of viewing distance, variability in head position was greater in the home and increased the variability of uncorrected test results.

Viewing distance control is critical for home based vision testing.

Home-based visual function tests have the potential to increase the frequency of assessment at reduced patient burden.

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