

What did come out from our lab in 2013?

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<http://www.journalofvision.org/content/13/6/19>

Adaptation to interocular differences in blur

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Lucie Sawides

Susana Marcos

Michael A. Webster

Adaptation to a blurred image causes focused image to appear too sharp, of subjective focus toward the adapter, whether in blur this adapts, differences in blur between routinely arise from different Observers adapted to images fix defocus or different axes of astigmatism.

University of Nevada,
Reno, NV, USA

Optica Espana



Full OCT anterior segment biometry: an application in cataract surgery

Sergio Ortiz,^{1*} Pablo Pérez-Merino,¹ Sonia Durán,² Miriam Velasco-Ocana,¹ Judith Birkenfeld,¹ Alberto de Castro,¹ Ignacio Jiménez-Alfaro,² and Susana Marcos¹

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Abstract: *In vivo* three-dimensional (3-D) anterior segment biometry before and after cataract surgery was analyzed by using custom high-resolution high-speed anterior segment spectral domain Optical Coherence Tomography (OCT). The system was provided with custom algorithms for denoising, segmentation, full distortion correction (fan and optical) and merging of the anterior segment volumes (cornea, iris, and crystalline lens or IOL), to provide fully quantitative data of the anterior segment of the eye. The method was tested on an *in vitro* artificial eye with known surfaces geometry at different orientations and demonstrated on an aging cataract patient *in vivo*. Biometric parameters CCT, ACD/ILP, CLT/ILT Tilt and

Visual Psychophysics and Physiological Optics

Experimental Simulation of Simultaneous Vision

Pablo de Gracia, Carlos Dorronsoro, Álvaro Sánchez-González, Lucie Sawides, and Susana Marcos

Purpose: To present and validate a prototype of an optical instrument that allows experimental simulation of pure bifocal vision on image contrast and visual acuity.

Methods: The instrument presents the eye with two superimposed images, aligned with different defocus with adjustable defocus with adjustable instrument is addition of both on instrument letter

Cornea

Finite-Element Modeling of Intrastromal Ring Segment Implantation into a Hyperelastic Cornea

Sabine Kling and Susana Marcos

patient. Current techniques for the correction of presbyopia are based on one of four principles: alternating vision, monovision, simultaneous vision, and (in a very early stage) accommodating IOLs. Some of the optical corrections available relying on alternating vision are progressive lenses (where changes in gaze or head position allow selection of the zone of the spectacle or head position near or far objects)¹ or translating contact lenses (where the lens, typically gas permeable, moves upwards on the eye during downgaze for distance and the other eye is corrected for near vision. Monovision solutions are commonly applied in the form of corneal, intraocular lens, or contact lens treatments.³ An increasingly popular approach to the correction of presbyopia is on simultaneous vision simultaneously.^{4,5} Bifocal solutions come in the form of refractive contact lenses, and refractive intraocular lenses.

implantation represents a new visual experience in superimposed to a blurred replica of the overall contrast. The correction (driven by its design) of the overall contrast is the same optical axes. In current

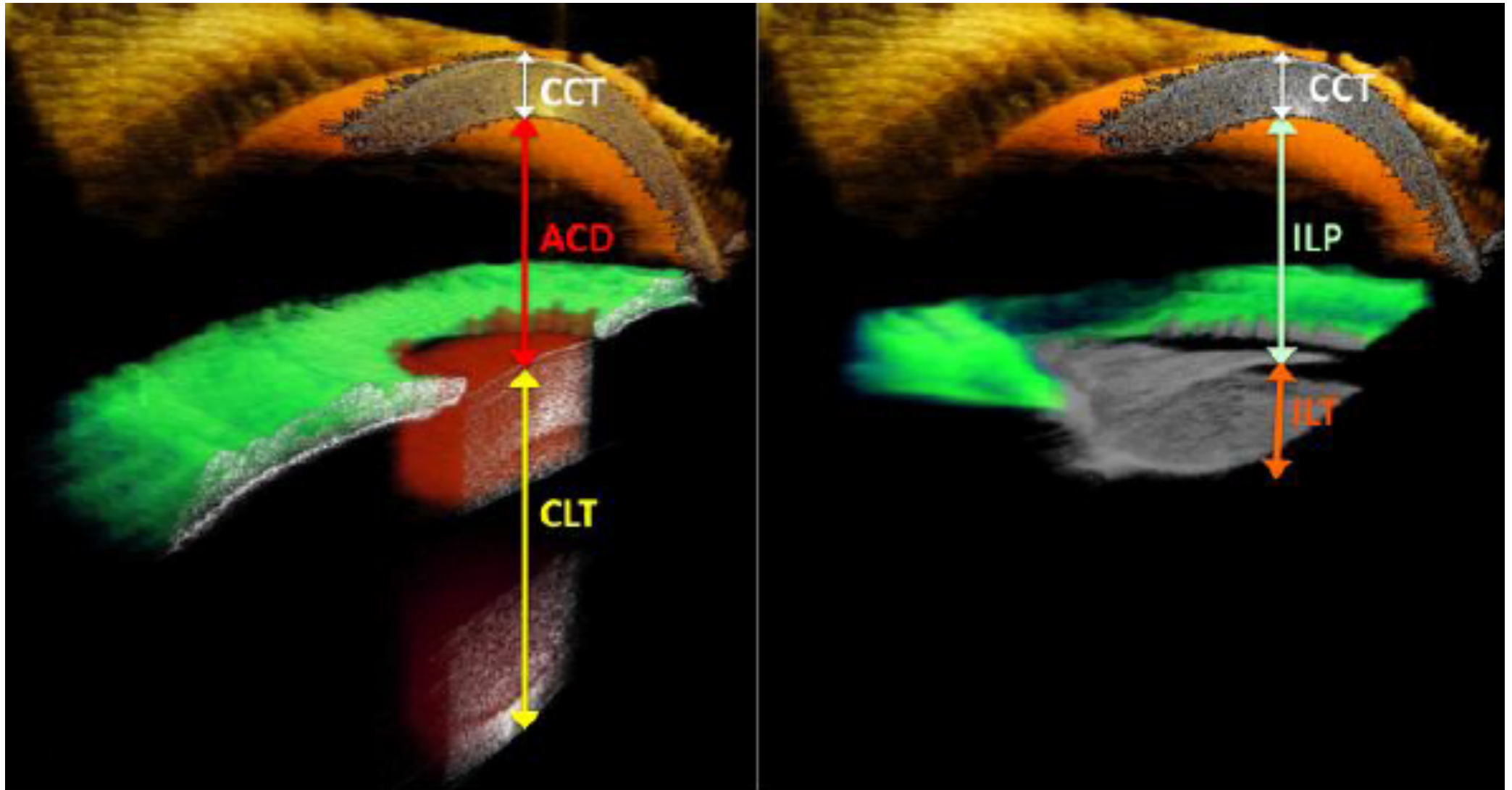
Biomedical Optics EXPRESS

(ICRSs) are keratoconic, IS geometry diagrams. We the corneal and keratoconic; later advances included ICRS geometry (different arc lengths and heights rings^{5,6}) and materials (synthetic gels^{6,7} or rigid poly(methyl methacrylate) (PMMA), have a triangular technology; Des Plaines, IL) shape and are available in created at 70%–80% corneal depth,⁹ in which the ICRS were reported in 1966.⁴ Later advances included ICRS geometry (different arc lengths and heights rings^{5,6}) and materials (synthetic gels^{6,7} or rigid poly(methyl methacrylate) (PMMA), have a triangular technology; Des Plaines, IL) shape and are available in created at 70%–80% corneal depth,⁹ in which the ICRS were reported in 1966.⁴ Later advances included ICRS geometry (different arc lengths and heights rings^{5,6}) and materials (synthetic gels^{6,7} or rigid poly(methyl methacrylate) (PMMA), have a triangular technology; Des Plaines, IL) shape and are available in created at 70%–80% corneal depth,⁹ in which the ICRS

proprietary astigmatic and rigidity and angular ICRS and corneal CRS heights re simulated. angled, where

(one) had a from 4.08 to (keratoconic) predicted to keratoconic). antation. The (Pinsky PM, et al. IOVS 1995;36:ARVO Abstract S308) have been proposed to model the response of the cornea to the change and ICRS height (the higher the ICRS, the more effective) and optical zone (ICRS inner distance to the smaller the more effective). This relationship is characterized by mechanical mechanisms and

Full 3-D OCT biometry in cataract surgery

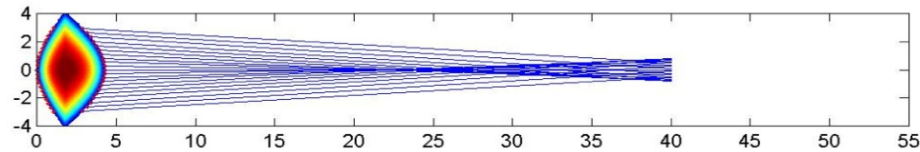


Ortiz et al. BOE 2013

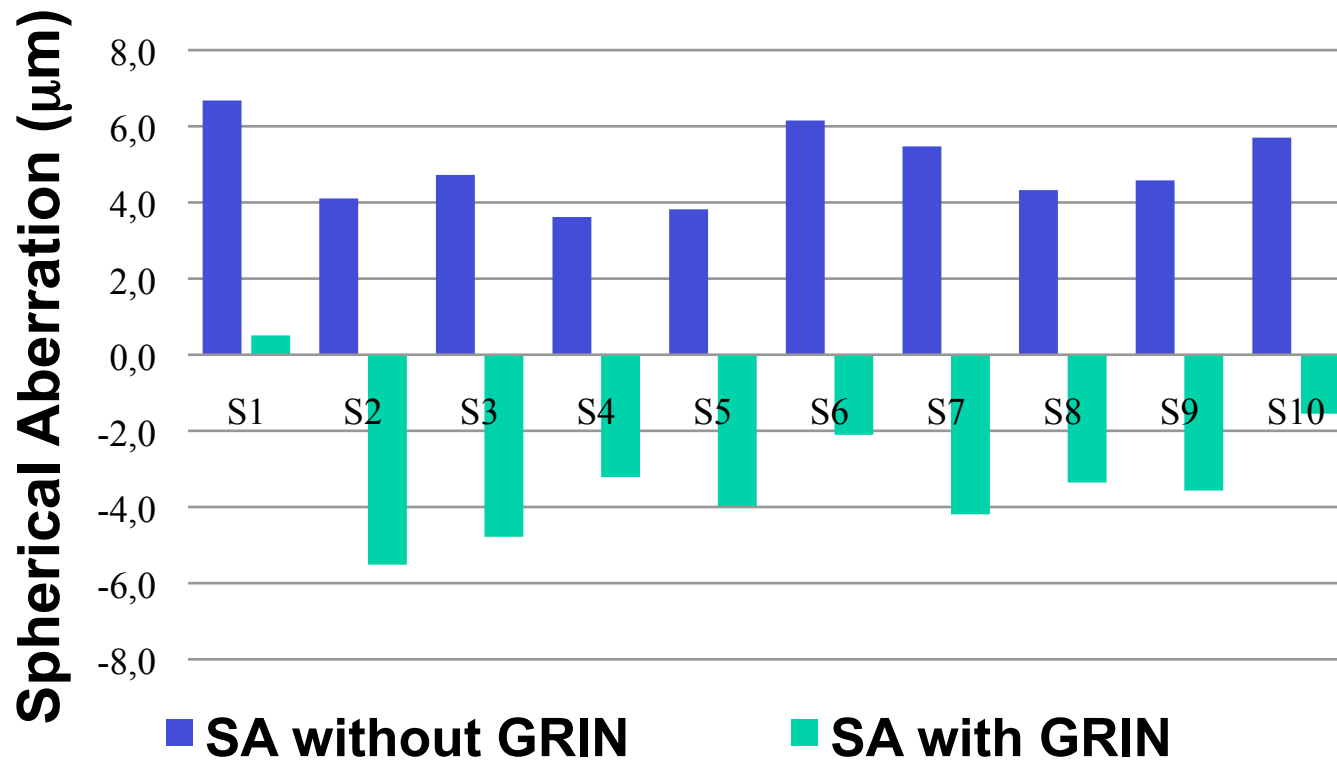
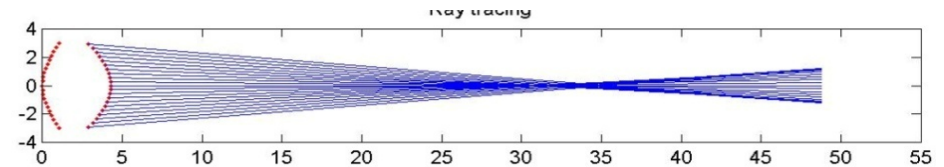
Best of Optics 2013. Optics and Photonics News

Shape & GRIN contribution to spherical aberration

GRIN

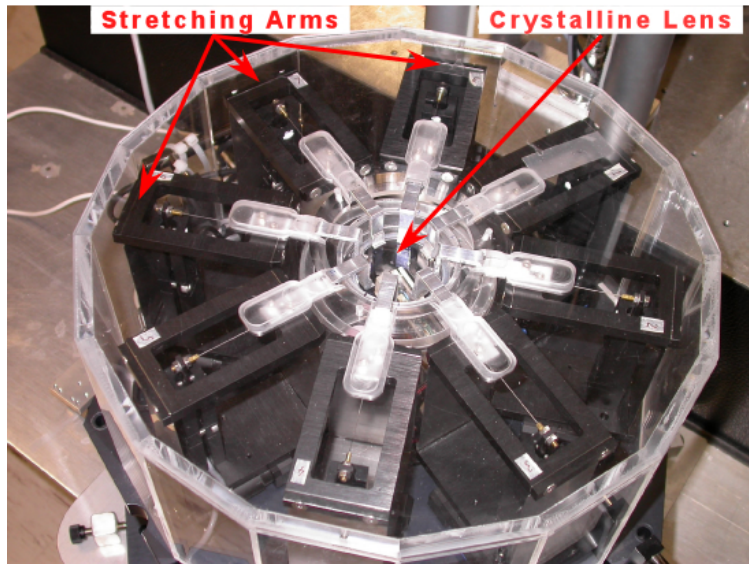


Homogeneous Equivalent

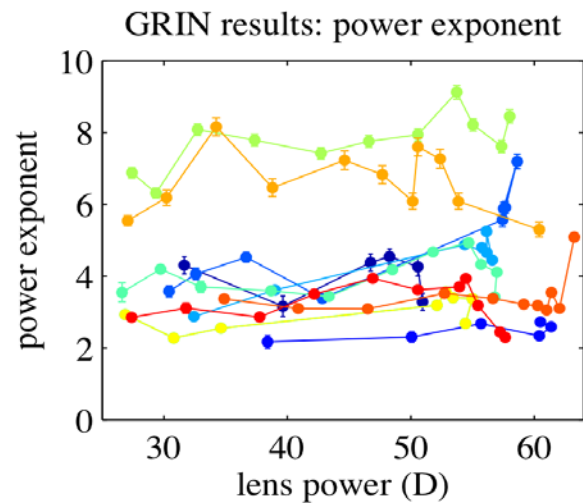
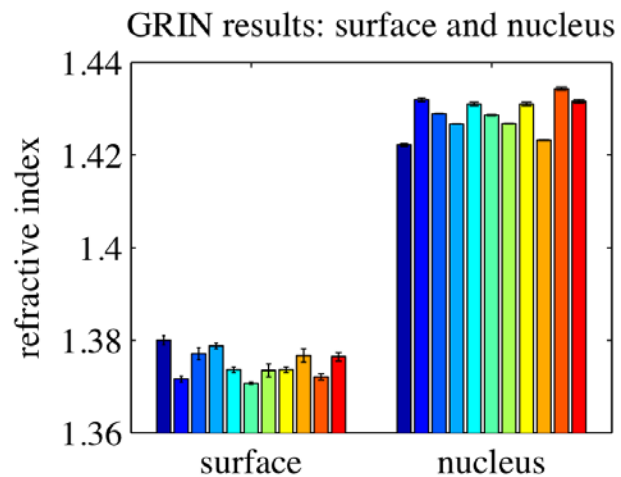
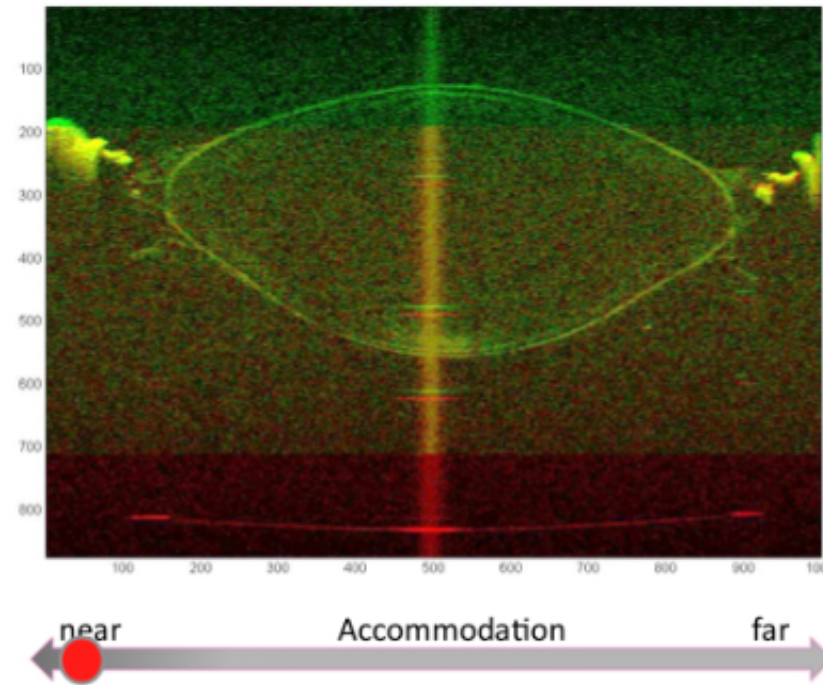


Birkenfeld al. Vision Research 2013

GRIN in vitro simulated accommodation

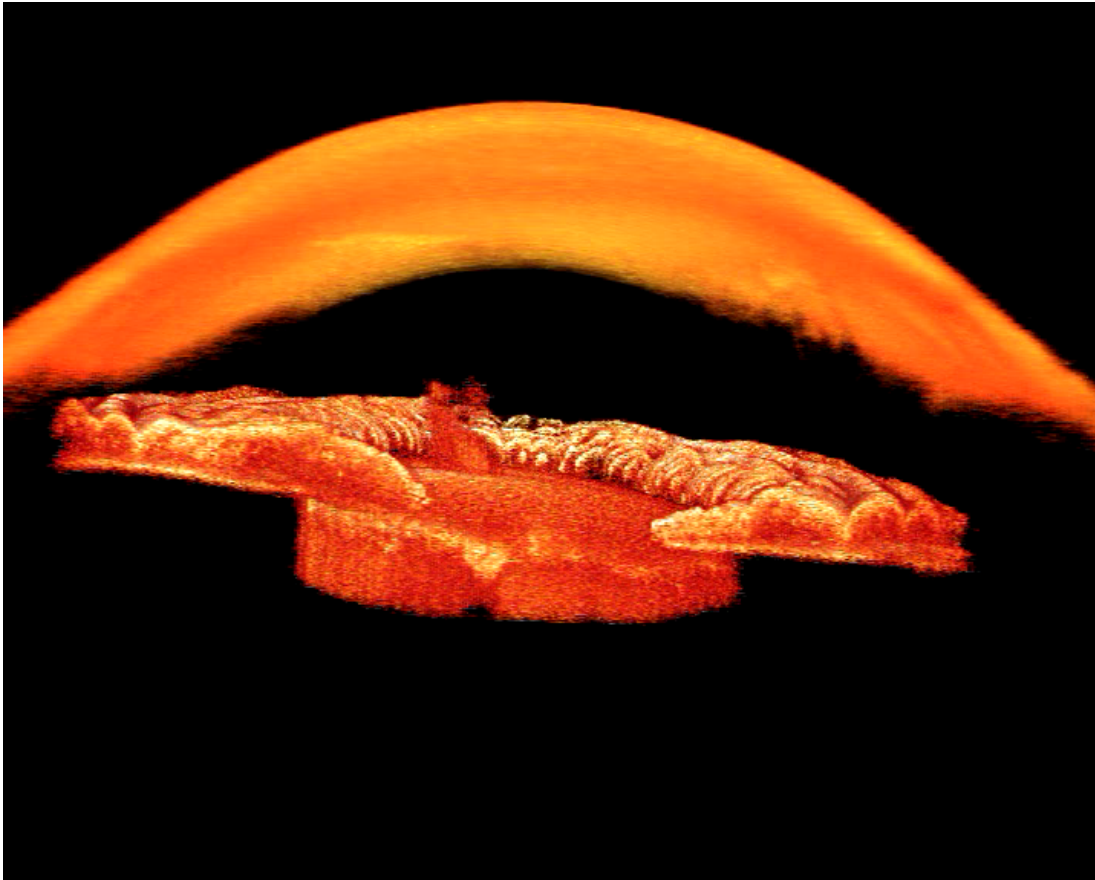


Bascom Palmer Ex vivo
Accommodation simulator

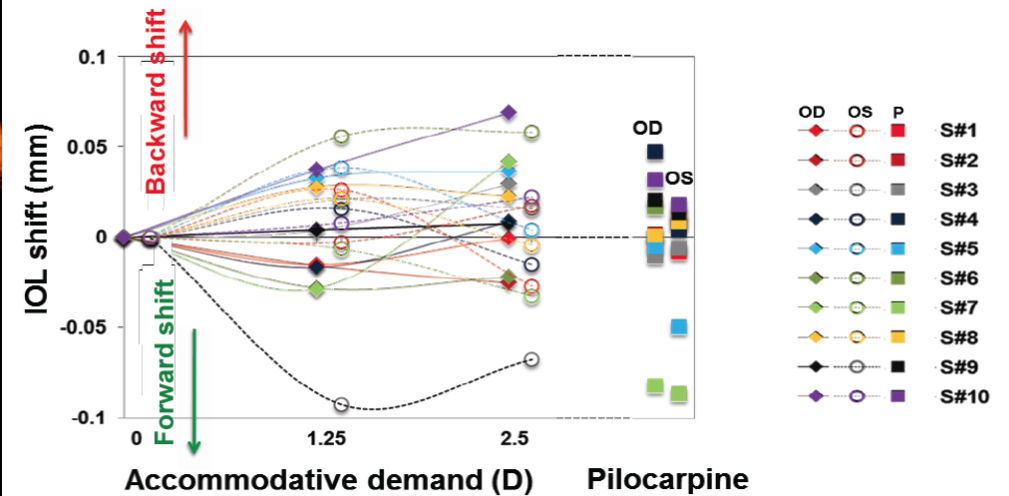


de Castro et al.
IOVS 2013

OCT-based A-IOL performance

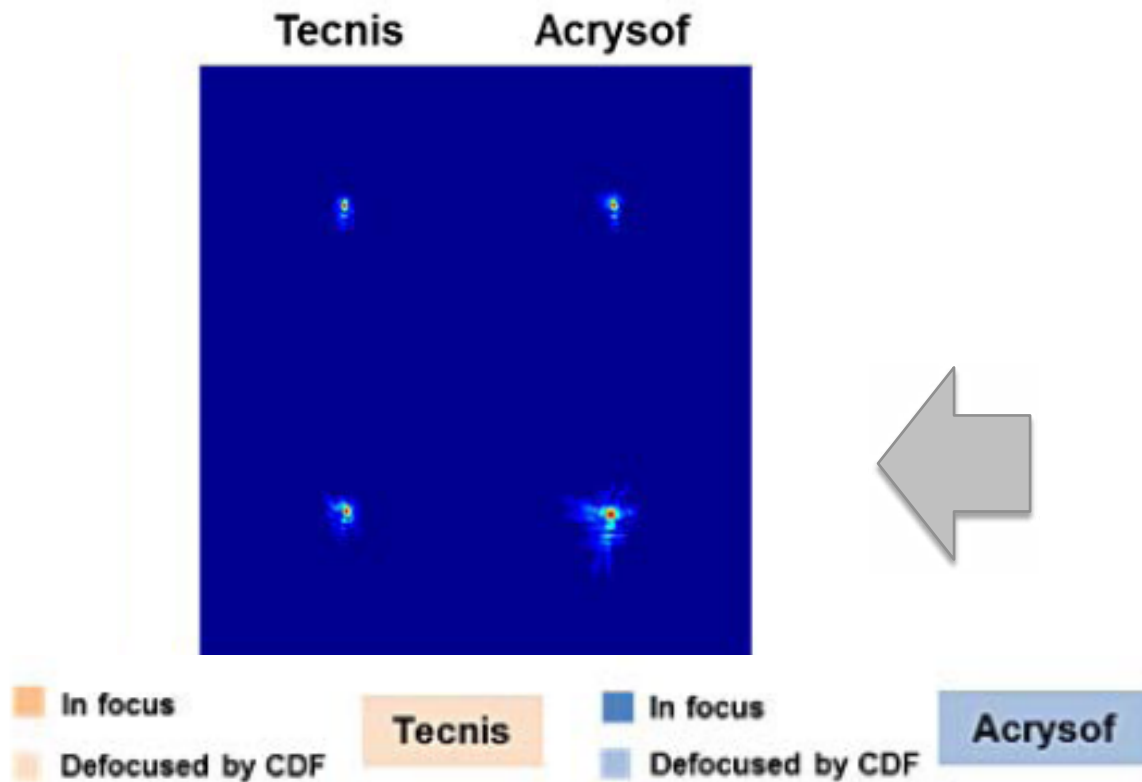


A-IOL shift with accommodative demand

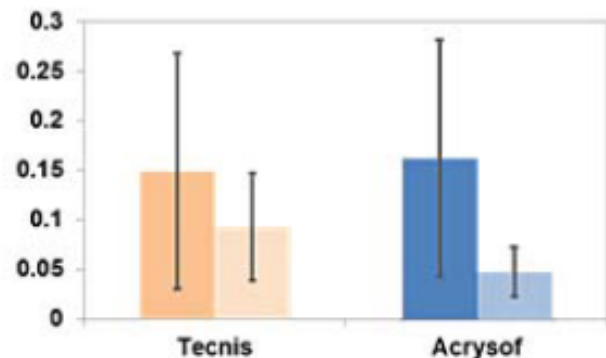
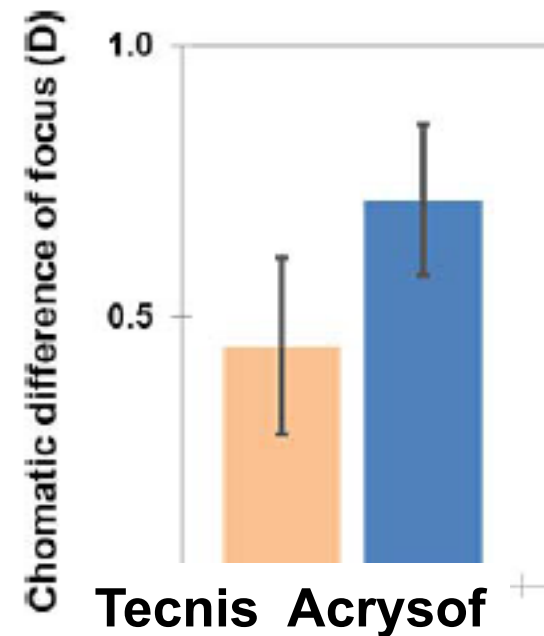


Marcos et al. Ophthalmology 2013

Chromatic aberrations of IOLs



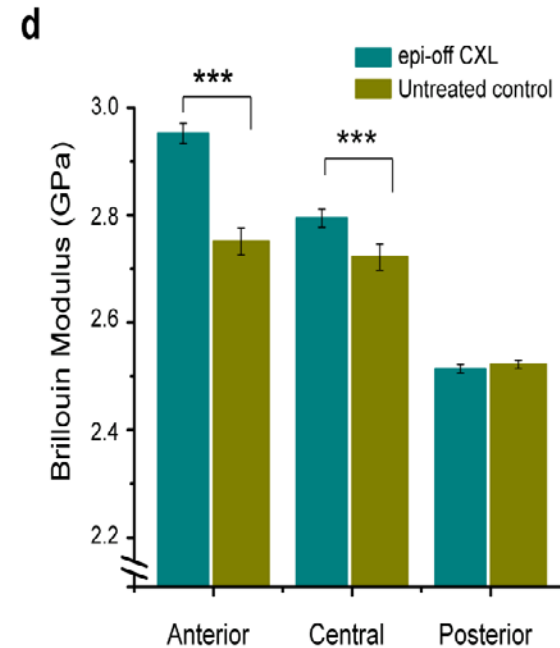
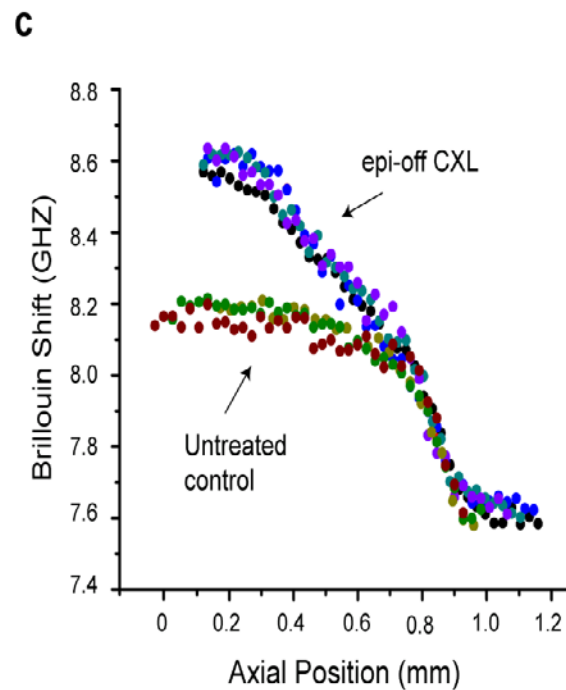
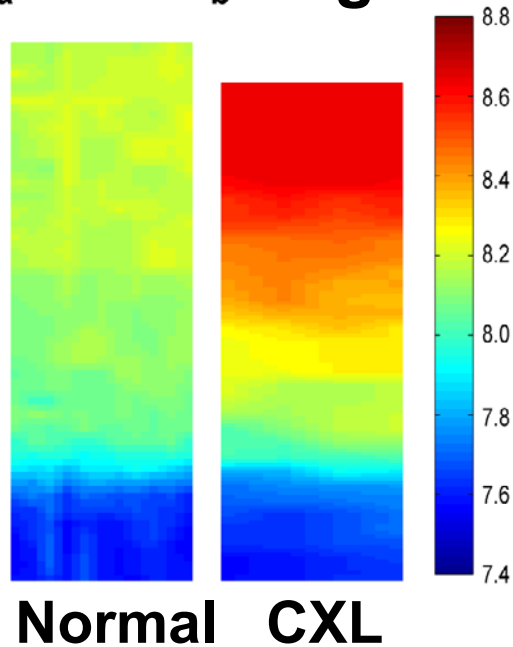
In vivo Chromatic Difference of Focus (G-IR)



Pérez-Merino et al. IOVS 2013

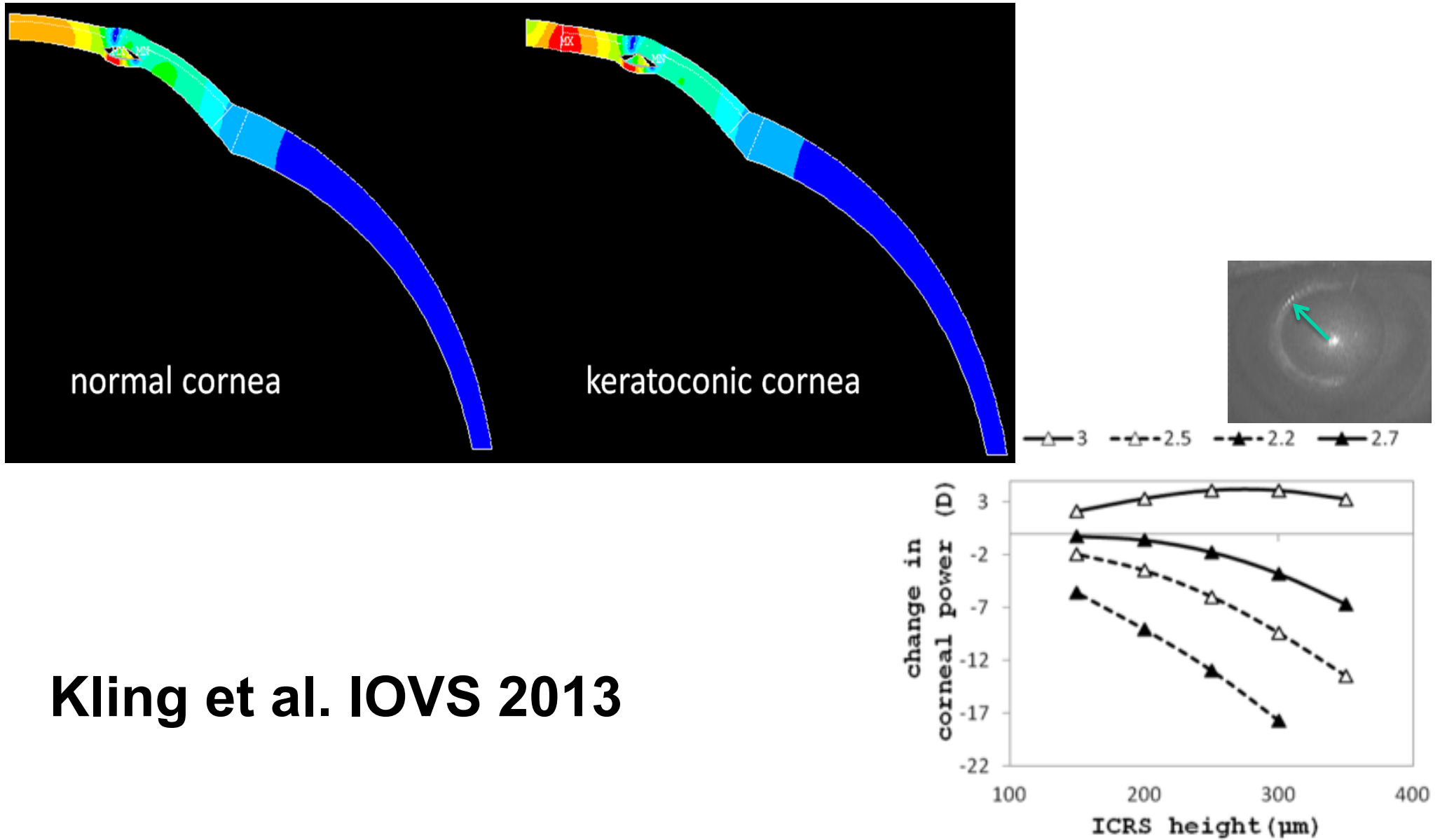
Corneal biomechanical properties after cross-linking from Brillouin Microscopy

Corneal cross-sectional Brillouin images



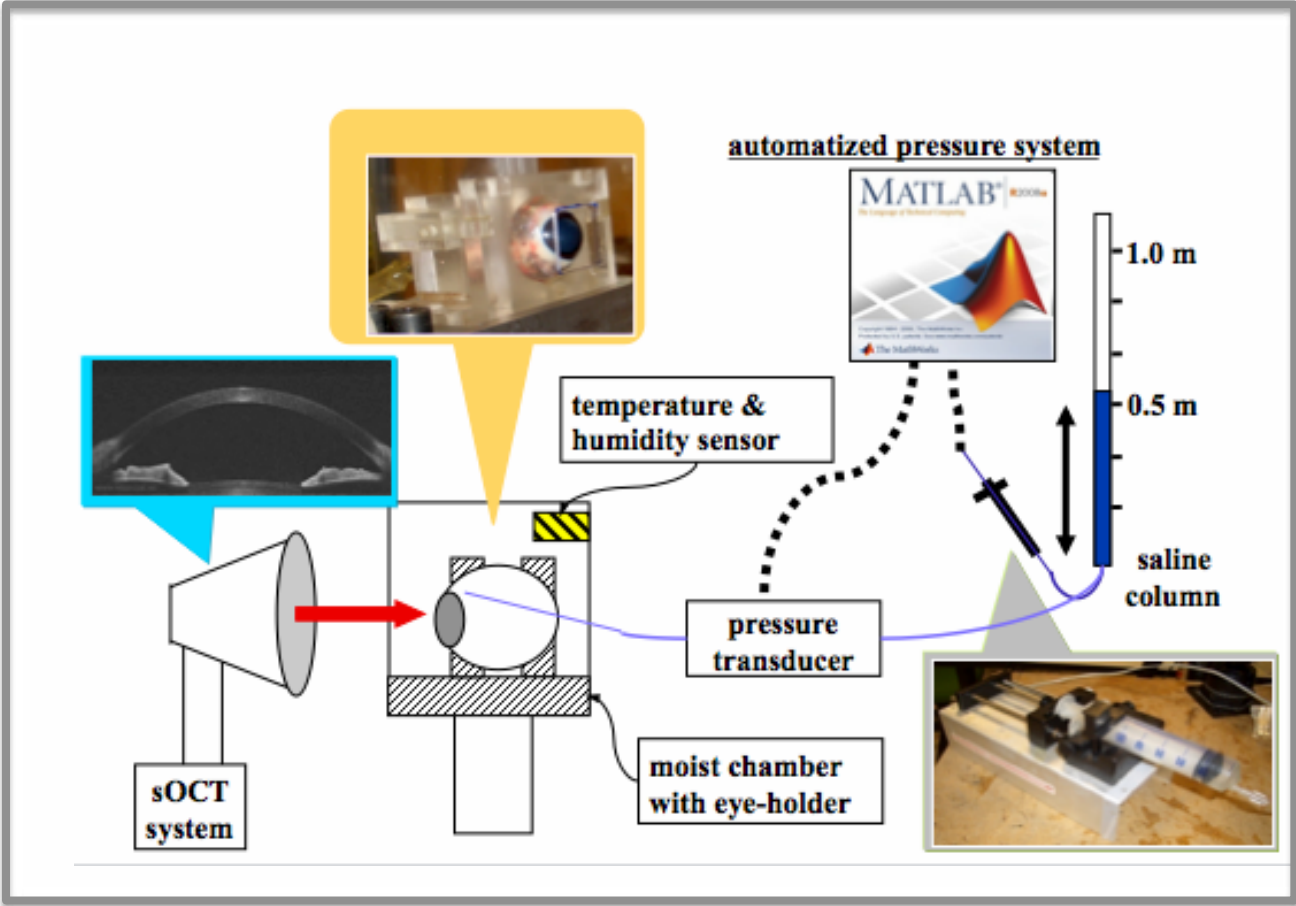
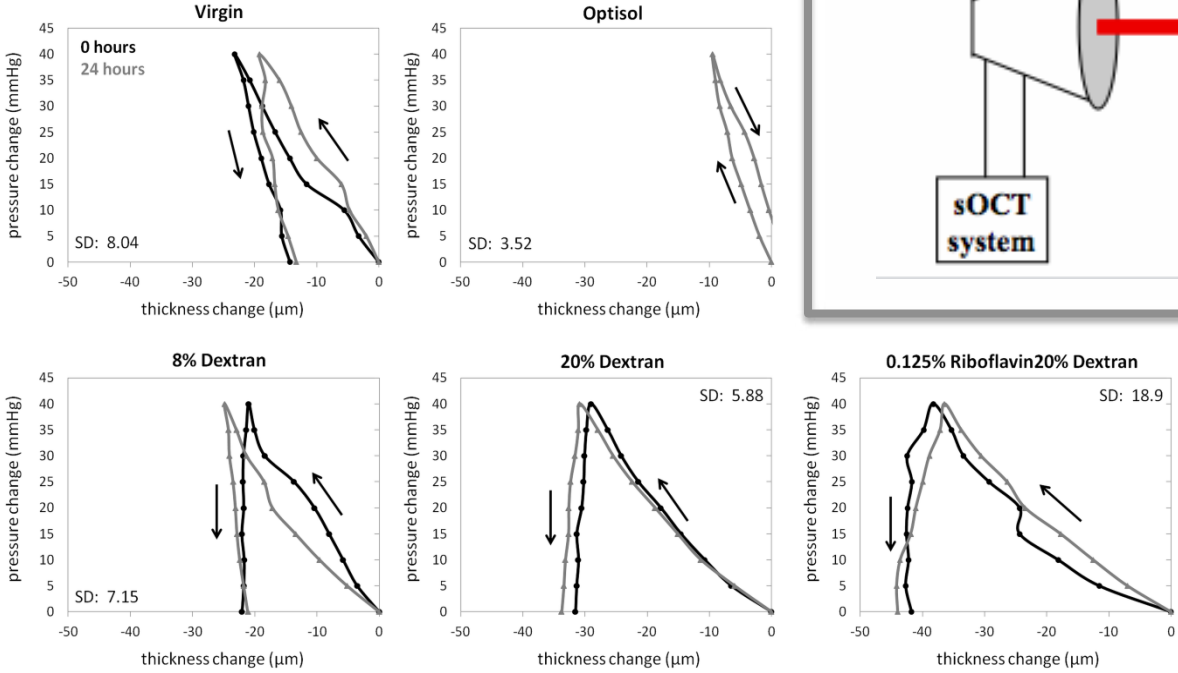
Scarcelli et al. IOVS 2013

Biomechanical modeling of ICRS



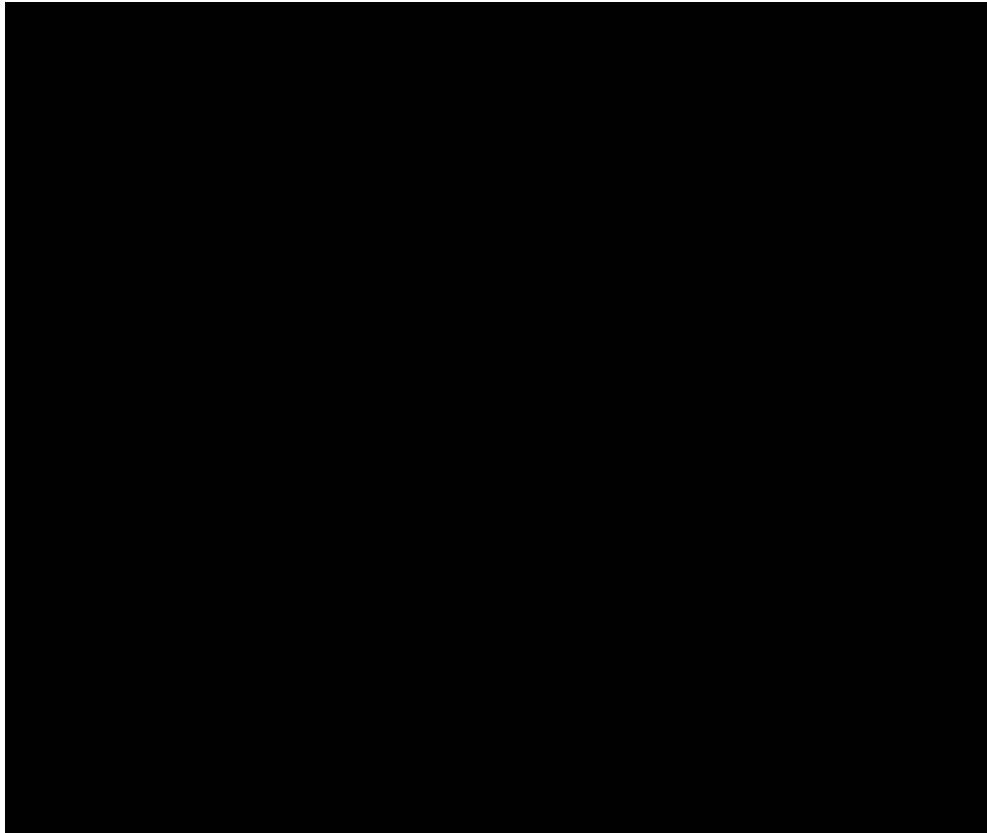
Kling et al. IOVS 2013

Effects of hydration on corneal biomechanics

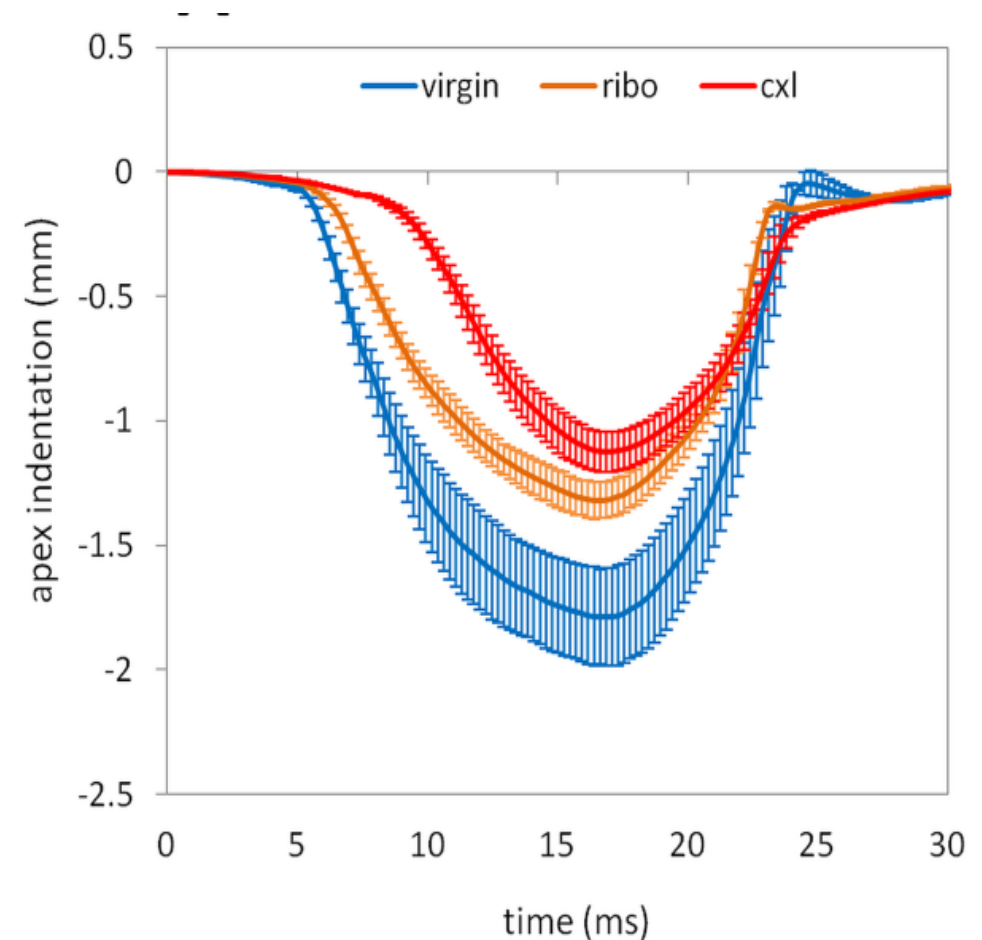


Kling et al. JRS 2013

Factors affecting air-puff corneal biomechanical deformation

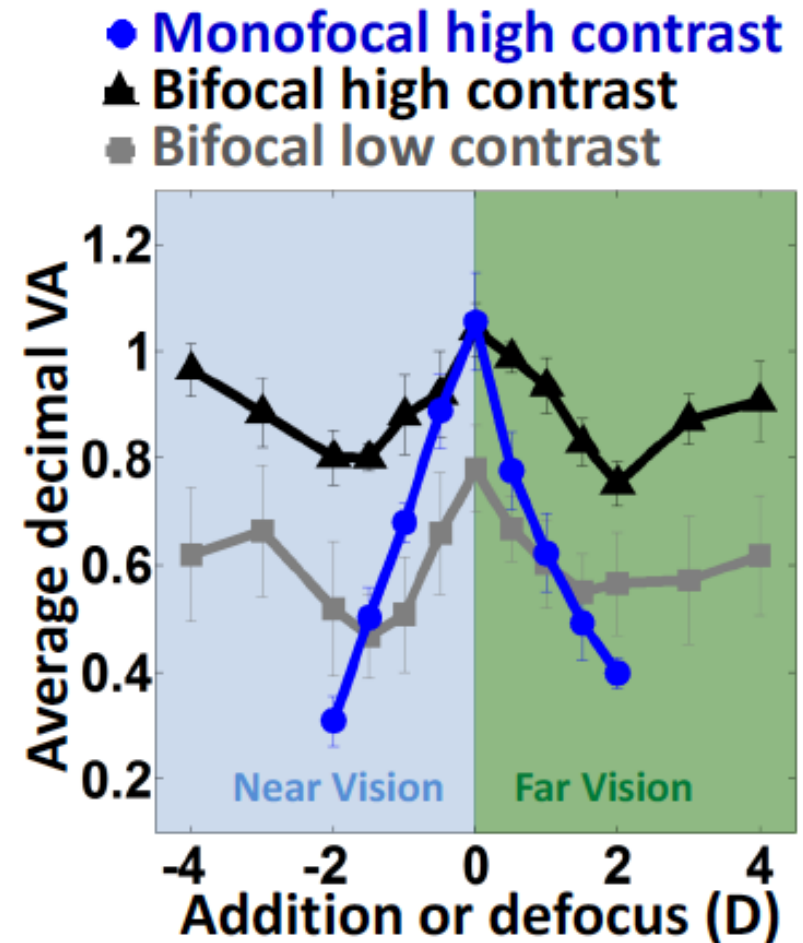
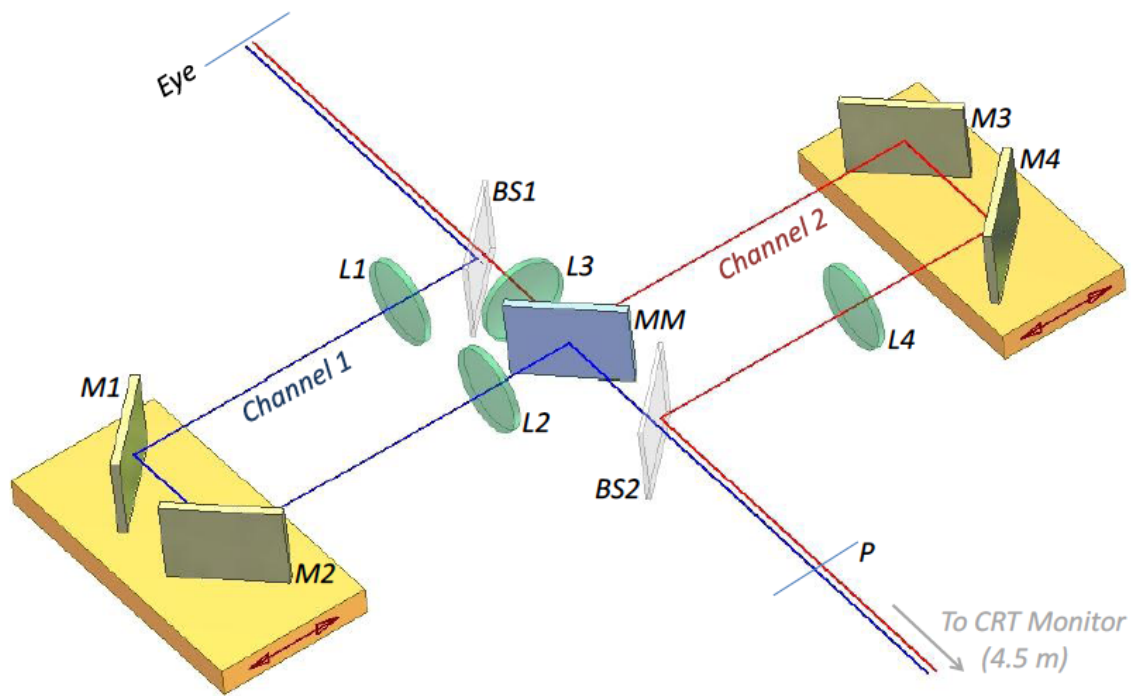


...also, effects of:



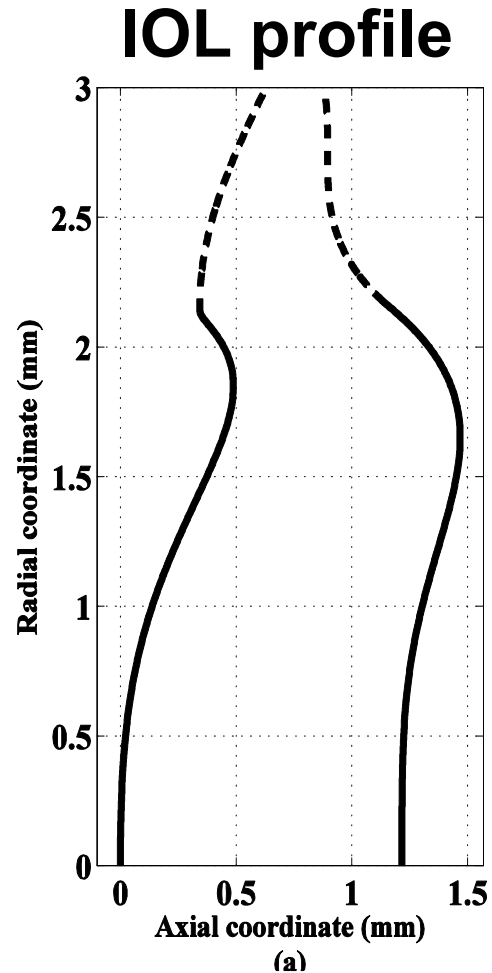
Kling et al. IOVS 2013

Simulating simultaneous vision

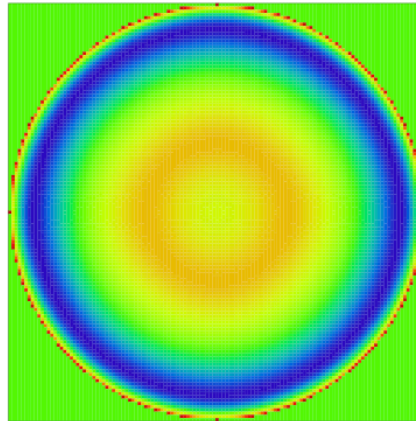


De Gracia et al. IOVS 2013

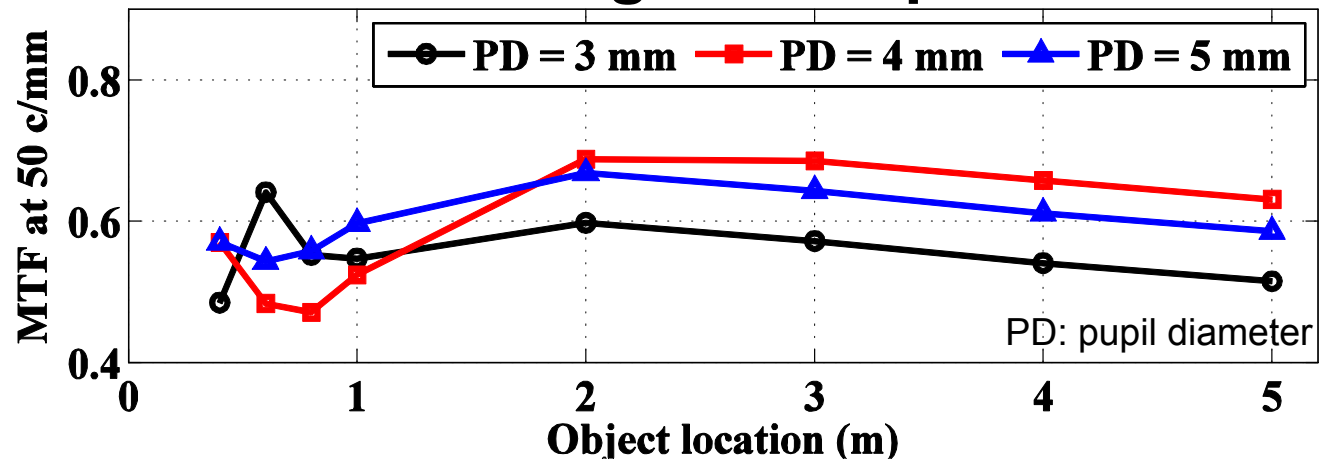
Multifocal IOL with extended focus



IOL power map

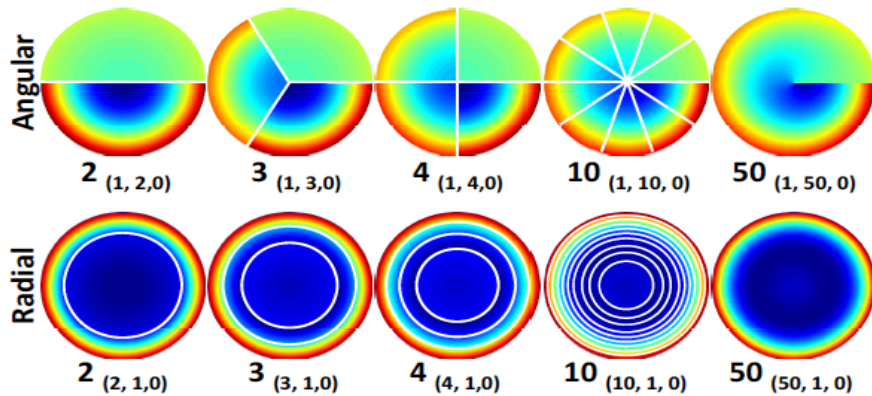


IOL through focus performance

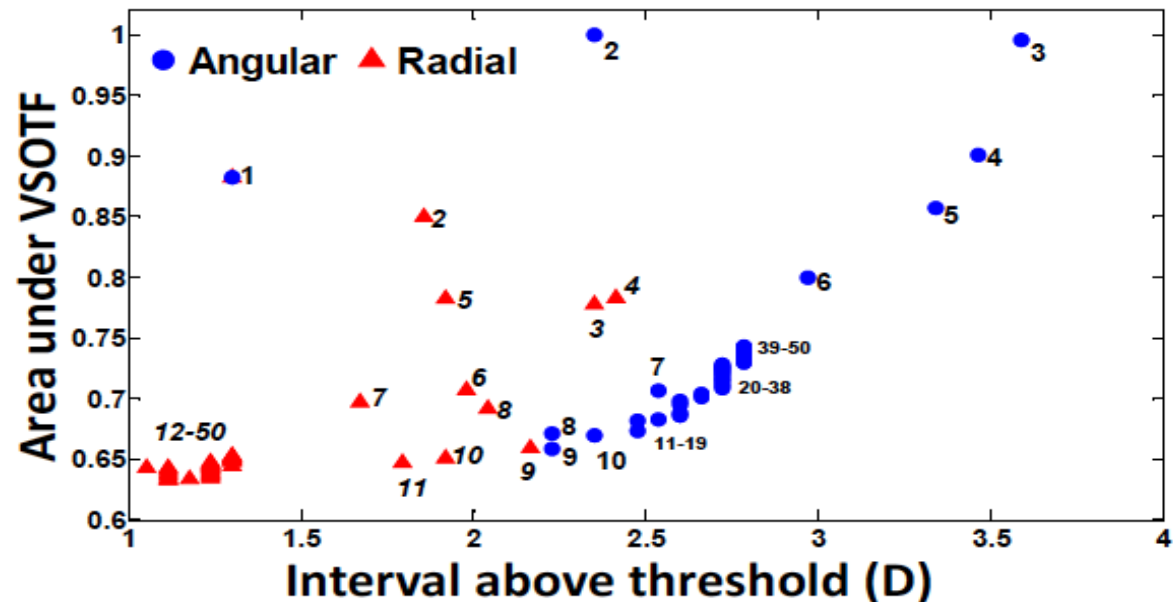


Angular and radial segmented multifocal patterns

Tested multifocal patterns

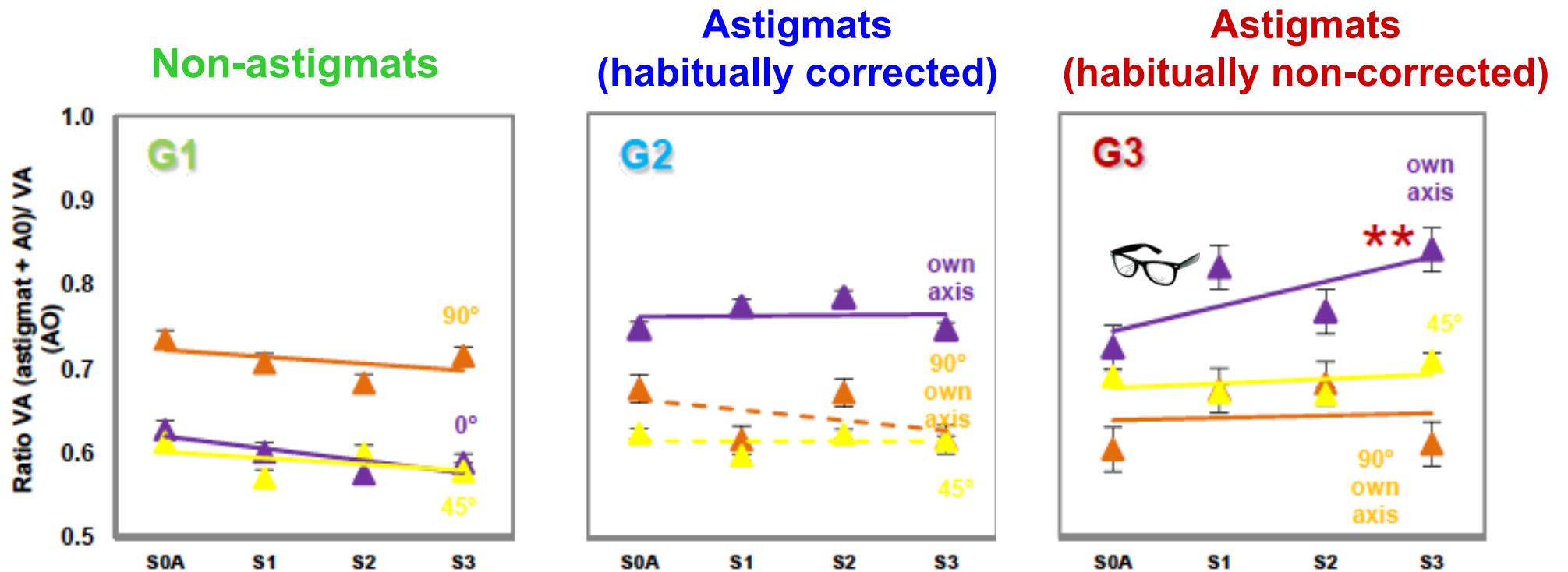


Simulated Optical Performance



Time-course visual performance with astigmatic correction/induction

Decrease in visual acuity upon induction of astigmatism:

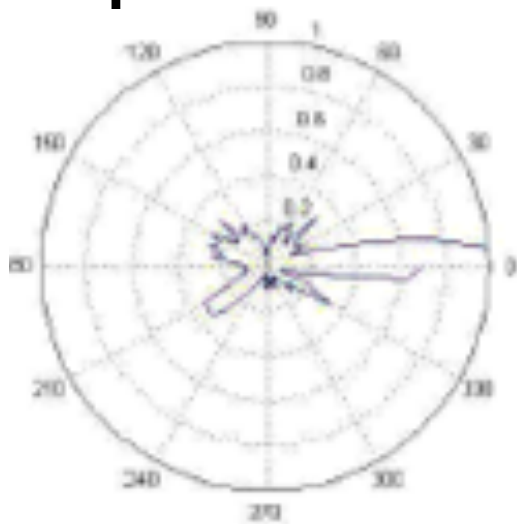


Vinas et al. OVS 2013

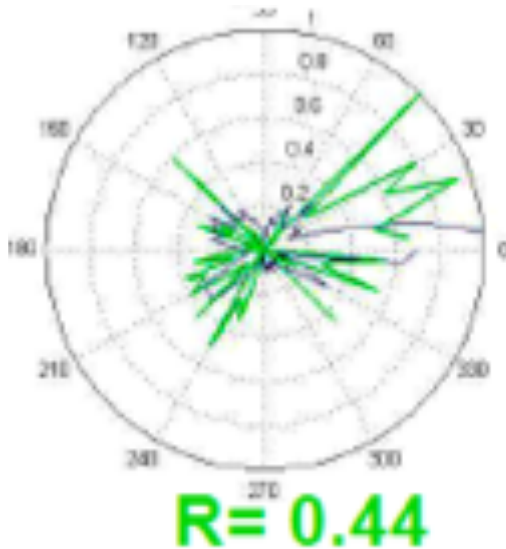
Estimating internal code for blur



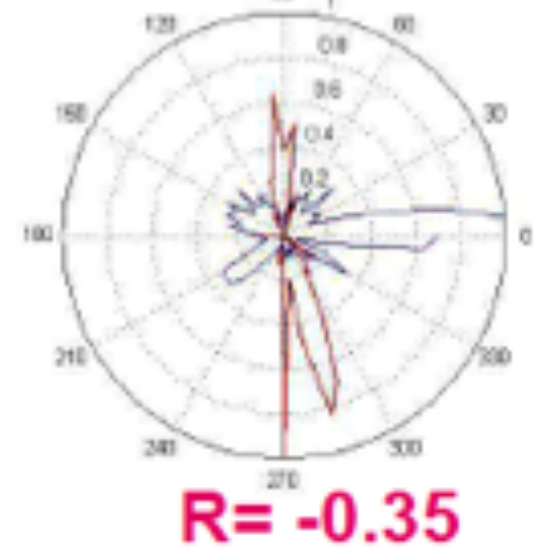
Subject's sampled optical PSF



Averaged/weighted positive response



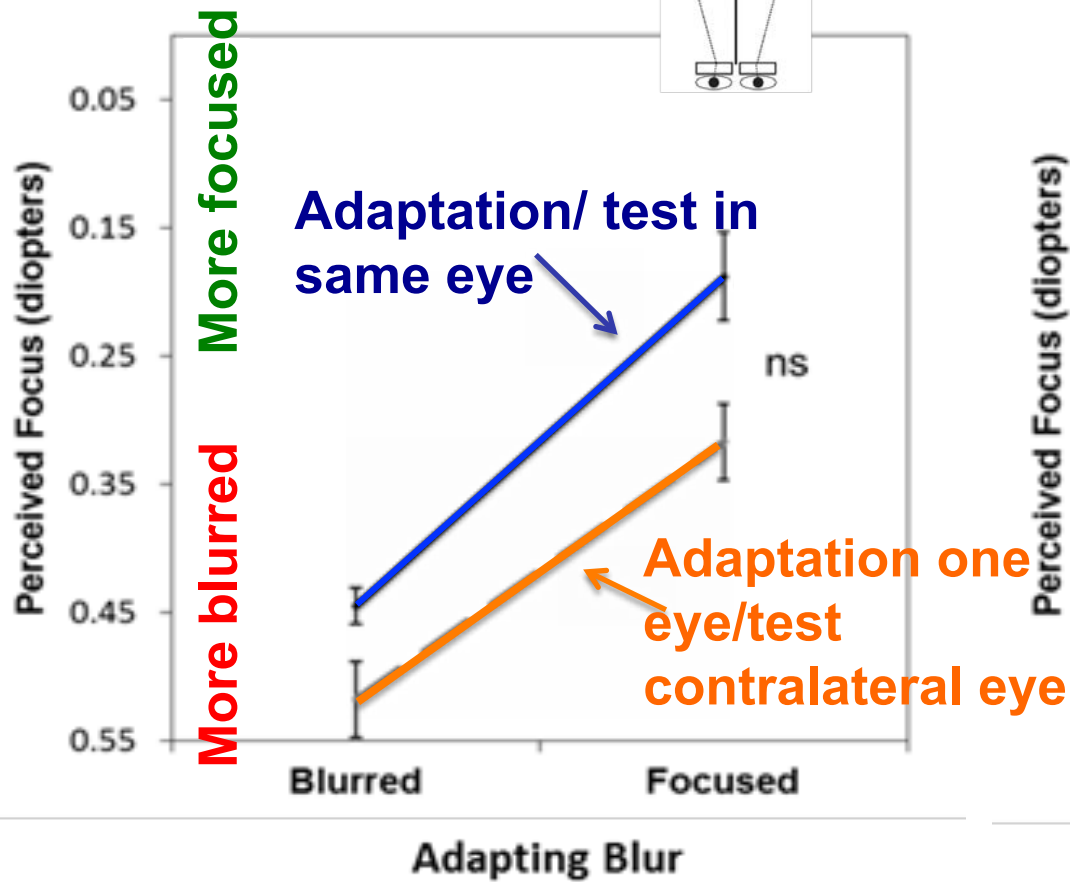
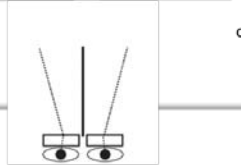
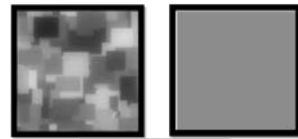
Averaged/weighted negative response



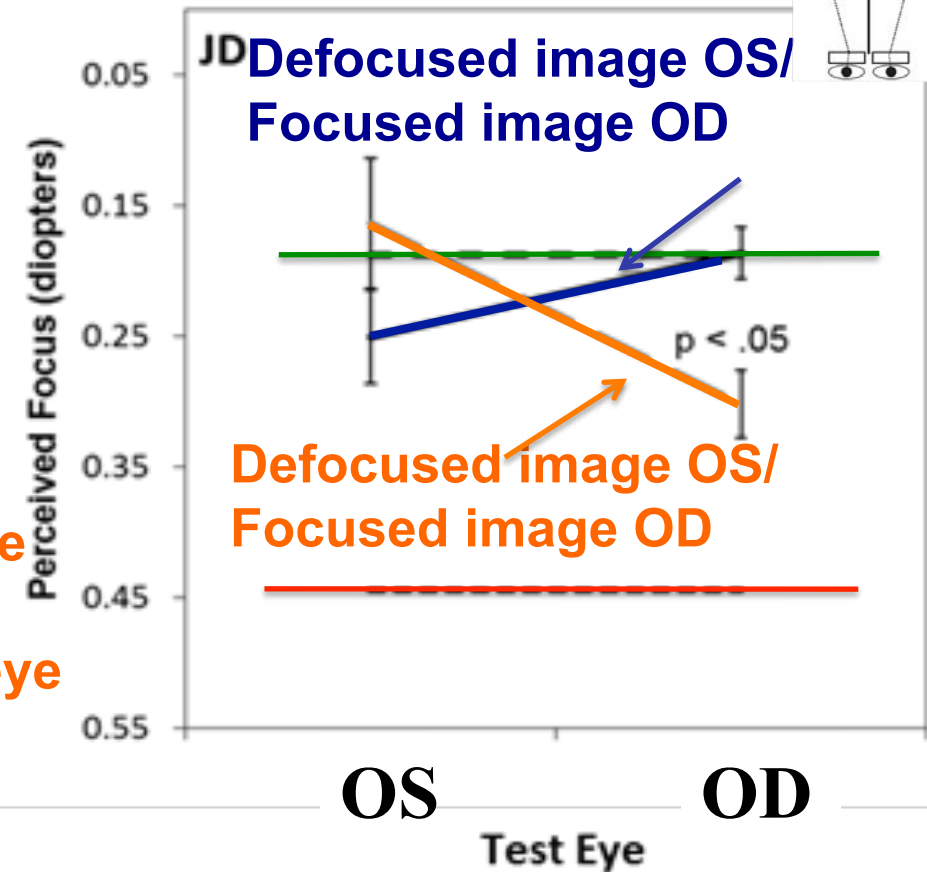
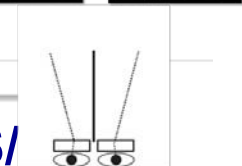
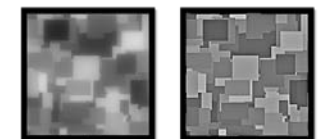
Sawides et al. PLOS One 2013

Interocular transfer of adaptation

Monocular adaptation



Contingent adaptation



Kompaniezh et al. JOV 2013

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i-link Program
PIE VioBio

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FIS 2011-25637



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