Two Alternate Refraction Methods That Use a Scheiner's Disc and Stenopaic Slit

Jonathan Janzen, Brent Roberts, Chad Hollifield, Thomas Salmon, OD, PhD, FAAO, David Simpson, OD

Northeastern State University Oklahoma College of Optometry

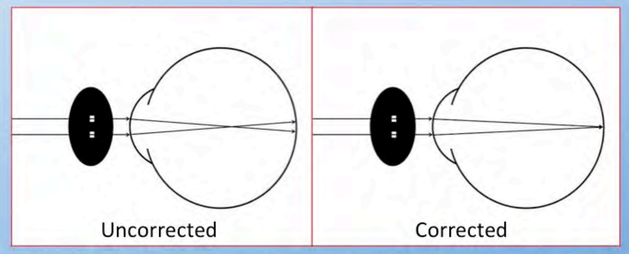
Introduction

Subjective refraction procedures using a Jackson Cross Cylinder and blur interpretation are well established, but little known and rarely used alternatives exist. Our purpose was to assess two alternate methods for possible advantages relative to traditional subjective refraction.

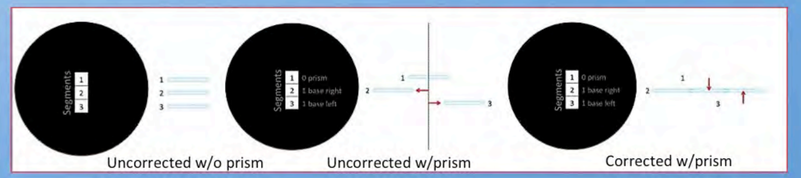
Methods

- $Method_1$ used a simple stenopaic slit to find the astigmatic axis then a Scheiner's disc to measure the refractive powers in each meridian.
- $Method_2$ used a modified Scheiner's disc overlaid with Fresnel prisms to measure power in each meridian after axis determination as done in $Method_1$.
- Both methods measured separate samples of 20 eyes.
- Mean power vector magnitude and visual acuity were compared for both methods and standard subjective refraction (JCC_1, JCC_2)

Theory



FIGURES: Scheiner's disc principle depicted (above). $Method_2$ prism dissociation principle depicted (below)



Results

	logMAR VA	Snellen VA	Wilcoxon test p=	Letters worse
Standard JCC_1	-0.14 ±0.11	20/14.6		
$Method_1$	-0.10 ±0.15	20/16.0	0.426	1.9
Standard JCC_2	-0.09 ±0.10	20/16.1		
$Method_2$	+0.18 ±0.39	20/30.3	0.003	13.7

$Method_1$ vs Standard JCC_1 (mean of 20)	
$Method_1$ refraction	**-0.48 -0.44 x 174.3**
Standard JCC_1 refraction	**-0.46 -0.35 x 176.6**
Axis difference	**2.3°**
Vector difference	**0.39 D**

$Method_2$ vs Standard JCC_2 (mean of 20)	
$Method_2$ refraction	**-3.45 -0.76 x 168.6**
Standard JCC_2 refraction	**-2.79 -0.96 x 177.8**
Axis difference	**9.2°**
Vector difference	**1.65 D**

Conclusions

Results for $Method_1$ indicated close agreement with standard subjective refraction, but was harder for some subjects to understand. It could be a viable alternative when standard refraction is unreliable. $Method_2$ showed poor agreement and significantly worse visual acuity. In its current stage of development, it is not a viable alternative to standard subjective refraction.

Heart of America Contact Lens Society, Kansas City, MO; February 11, 2017