← BACK TO ASPECTS OF VISUAL FUNCTION

POSTER ABSTRACT

Contrast Sensitivity Function in Cataract Disease measured with Active Learning

Augustine Bannerman
Massachusetts Eye and Ear

4:15 PM - 6:00 PM CEST on Saturday, May 1
Add to Calendar

Contrast Sensitivity Function in Cataract Disease measured with Active Learning

Author Block: *Augustine Bannerman[1] , Megan Kasetty[1] , Filippos Vingopoulos[1] , Itika Garg[1] , Rebecca Silverman[1] , Zhonghui Luo[1] , June Cho[1] , Raviv Katz[1] , Alice C. Lorch[1] , Luis A. Lesmes[1] , John B. Miller[1]*

[1] Massachusetts Eye and Ear Infirmary, Boston, Massachusetts, United States

Disclosure Block: Augustine Bannerman, None; Megan Kasetty, None; Filippos Vingopoulos, None; Itika Garg, None; Rebecca Silverman, None; Zhonghui Luo, None; June Cho, None; Raviv Katz, None; Alice C. Lorch, None; Luis A. Lesmes, None; John B. Miller, None

Purpose: To characterize contrast sensitivity function (CSF) in cataract and pseudophakia compared to healthy control eyes using a novel quick CSF test with active learning algorithms.

Methods:CSF was prospectively measured in eyes with visually significant cataract, at least 2+ nuclear sclerosis (NS) and visual acuity (VA) more than 20/50 (cataract group), as well as in pseudophakic eyes (pseudophakic group) and in healthy control eyes with no more than 1+ NS and no visual complaints (control group), using the novel Manifold Contrast Vision Meter (Adaptive Sensory Technology, San Diego, CA). Outcomes included Area under the Log CSF (AULCSF), contrast acuity (CA), and CS thresholds at 1, 1.5, 3, 12, and 18 cycles per degree (cpd). A subgroup analysis as performed on cataract eyes with good acuity (VA $\geq$ 20/25)

Results:A total of 167 eyes were included, 58 eyes in the cataract group, 77 controls, and 32 pseudophakic eyes with respective AULCSF of 1.053 (0.352) vs 1.228 (0.318) vs 1.256 (0.360). When controlling for VA and age in our multivariate regression model, the presence of cataract was associated with significantly reduced AULCSF (P= 0.04, β= -0.11) and contrast threshold at 6 cpd (P= 0.01, β= -0.16) compared to controls. Of note, contrast threshold at 6 cpd was significantly reduced even in the subgroup of cataract eyes with VA $\geq$ 20/25 (P=0.02, β=-0.16).The presence of cataract was not associated with significantly reduced CSF threshold at lower (1, 1.5, 3 cpd) or higher (12, 18 cpd) spatial frequencies. Pseukophakia was not associated with significantly different contrast outcome measures compared to control eyes.

Conclusions: The novel qCSF test was able to detect disproportionate significant contrast deficits at 6 cpd in cataract eyes, that remained significant even in the cataract eyes with VA $\geq$ 20/25.

CSF testing may be a valuable addition to standard cataract evaluation to enhance surgical decision-making, particularly in patients with subjective visual complaints despite good VA.

Layman Abstract (optional): Provide a 50-200 word description of your work that non-scientists can understand. Describe the big picture and the implications of your findings, not the study itself and the associated details.:

Session Track

POSTER ABSTRACT

← BACK TO ASPECTS OF VISUAL FUNCTION

POSTER ABSTRACT

Feasibility of quantitative Visual Acuity analysis for enriching Visual Acuity data collected in retina clinical trials

Raviv Katz, MSc
Massachusetts Eye and Ear Infirmary
Research Assistant

4:15 PM - 6:00 PM CEST on Saturday, May 1
Add to Calendar

Feasibility of quantitative Visual Acuity analysis for enriching Visual Acuity data collected in retina clinical trials

Author Block: *Raviv Katz[1] , Filippos Vingopoulos[1] , Rohan Bajaj[3] , Luis A. Lesmes[2] , John B. Miller[1]*

[1] Retina, Massachusetts Eye and Ear Infirmary Department of Ophthalmology, Boston, Massachusetts, United States; [2] Adaptive Sensory Technology, California, United States; [3] Massachusetts Eye and Ear Infirmary Department of Ophthalmology, Boston, Massachusetts, United States

Disclosure Block: Raviv Katz, None; Filippos Vingopoulos, None; Rohan Bajaj, None; Luis A. Lesmes, Adaptive Sensory Technolog INC (Code P (Patent)), Adaptive Sensory Technolog INC (Code E (Employment)), Adaptive Sensory Technolog INC (Code I (Personal Financial Interest)); John B. Miller, Alcon (Code C (Consultant)), Allergan (Code C (Consultant)), Genentech (Code C (Consultant)), Sunovion (Code C (Consultant)), Zeiss (Code C (Consultant))

Purpose: Visual acuity (VA) remains the primary functional endpoint for quantifying treatment effectiveness. To enrich VA information collected in retina trials, we apply a novel quantitative VA (qVA) framework to estimate VA thresholds from different testing paradigms (1). We propose that novel Bayesian analytics can reduce the uncertainty of VA estimates in patients with retinal disease.

Methods: Prospective, observational study performed at Mass Eye and Ear. We recruited patients with vision ranging from 20/15 to 20/100 during regular retina clinic visits. ETDRS testing, in the right and then left eye, was followed by qVA testing, which consisted of 15 sequential rows of 3 optotypes. Patients were retested in the opposite order after at least 30 minutes. We generate a qVA profile using a Bayesian model of VA that defines the probabilities for correctly reporting the different numbers of optotypes presented in ETDRS/qVA tasks. To quantify the evolution of a qVA profile, we calculate the half-width of 68.2% credible intervals (HWCI) for VA threshold estimates (2), as a function of 1-14 rows completed during ETDRS/qVA testing.

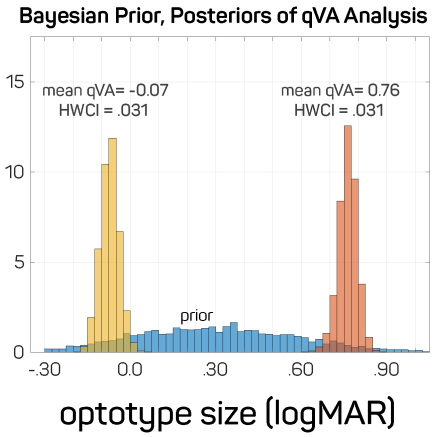
Results:53 eyes of 31 patients, with mean age of 65.1 + 13.3 and 21 females (68%) were included in the study. Repeat testing generated a total of 106 ETDRS/qVA tests. Figure 1 presents the Bayesian priors for VA threshold, and final posteriors for two patients. Figure 2a demonstrates the rapid reduction in average HWCI during VA testing. Figure 2b presents HWCIs for an aggregate analysis concatenating two ETDRS/qVA runs for each patient (N=53). Paired t-tests revealed statistically significant HCWI reductions for qVA: 22% for single and 20% for double runs ($p<10^{-6}$).

Conclusions: We demonstrate that the novel application of a qVA analysis reduces uncertainty in VA estimates from ETDRS/qVA testing. The qVA advantage most likely emerges from its intelligent sampling and fine-grain resolution, relative to coarse, static sampling of ETDRS. These results support the feasibility for qVA testing and analysis to improve the signal-noise features of VA data in clinical trials.

References:
Lesmes & Dorr (2019) https://doi.org/10.475/123_4
Zhao et al (2021) https://doi.org/10.1167/tvst.10.1.1

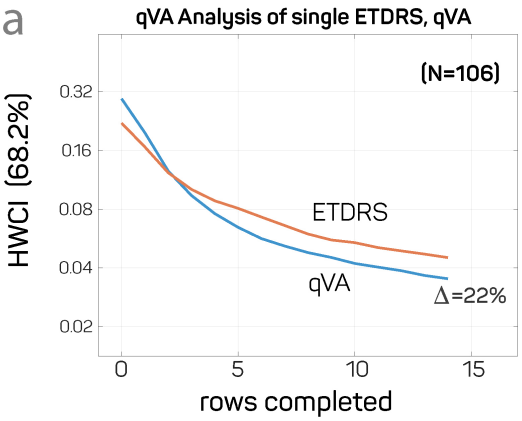
Layman Abstract (optional): Provide a 50-200 word description of your work that non-scientists can understand. Describe the big picture and the implications of your findings, not the study itself and the associated details.:

1

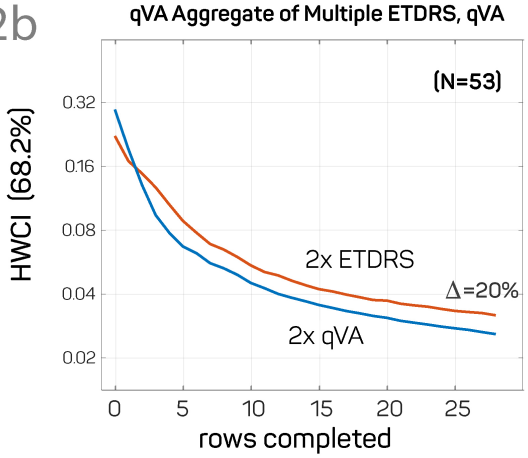

Bayesian Prior, Posteriors of qVA Analysis
mean qVA= -0.07
HWCI = .031
mean qVA= 0.76
HWCI = .031
prior
15
10
5
0
-.30
0.0
.30
.60
.90
optotype size (logMAR)

,

2a


qVA Analysis of single ETDRS, qVA
(N=106)
HWCI (68.2%)
0.32
0.16
0.08
0.04
0.02
ETDRS
qVA
Δ=22%
0
5
10
15
rows completed

2b


qVA Aggregate of Multiple ETDRS, qVA
(N=53)
HWCI (68.2%)
0.32
0.16
0.08
0.04
0.02
2x ETDRS
Δ=20%
2x qVA
0
5
10
15
20
25
rows completed

Session Track

POSTER ABSTRACT

← BACK TO AMD: CLINICAL AND TRANSLATIONAL RESEARCH II

Presentation files will not be visible until May 1. If you are a presenter, you can use the Manage link to make changes until April 30.

POSTER ABSTRACT

Contrast Sensitivity Function in Non-Neovascular Age-related Macular Degeneration Measured with Active Learning

Filippos Vingopoulos
Massachusetts Eye and Ear, Harvard Ophthalmology
Postdoctoral Research Fellow

4:15 PM - 6:00 PM CEST on Tuesday, May 4
Add to Calendar

Contrast Sensitivity Function in Non-Neovascular Age-related Macular Degeneration Measured with Active Learning

Author Block: *Filippos Vingopoulos[1] , Neal Patel[1] , Raviv Katz[1] , Itika Garg[1] , Edward S. Lu[1] , Ines Lains[1] , Megan Kasetty[1] , Rebecca Silverman[1] , Archana Nigalye[1] , Luis A. Lesmes[2] , Ivana K. Kim[1] , Leo A. Kim[1] , Deeba Husain[1] , Joan W. Miller[1] , Demetrios G. Vavvas[1] , John B. Miller[1]*

[1] Ophthalmology, Massachusetts Eye and Ear Infirmary, Boston, Massachusetts, United States; [2] Adaptive Sensory Technology, California, United States

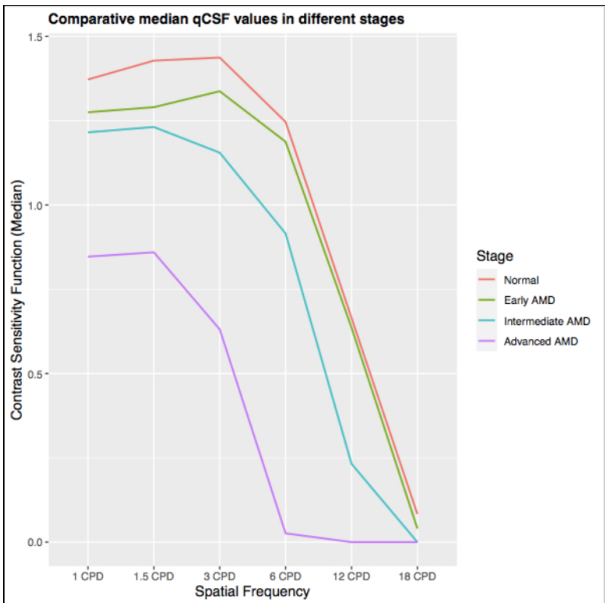
Disclosure Block: Filippos Vingopoulos, None; Neal Patel, None; Raviv Katz, None; Itika Garg, None; Edward S. Lu, None; Ines Lains, None; Megan Kasetty, None; Rebecca Silverman, None; Archana Nigalye, None; Luis A. Lesmes, Adaptive Sensory Technology (Code P (Patent)), Adaptive Sensory Technology (Code I (Personal Financial Interest)), Adaptive Sensory Technology (Code E (Employment)); Ivana K. Kim, Allegran (Code F (Financial Support)), Biophytis (Code C (Consultant)), Castle Biosciences (Code C (Consultant)), Kodiak Sciences (Code C (Consultant)), Novartis (Code C (Consultant)); Leo A. Kim, CureVac AG (Code F (Financial Support)), National Eye Institute (Code F (Financial Support)), Pykos Pharmaceuticals (Code I (Personal Financial Interest)), Pykos Pharmaceuticals (Code F (Financial Support)); Deeba Husain, Allegran (Code C (Consultant)), Commonwealth Grant (Code F (Financial Support)), Genetech (Code C (Consultant)), Lions VisionGift (Code F (Financial Support)), Macular Society (Code F (Financial Support)), National Eye Institute (Code F (Financial Support)), OMEICOS (Code C (Consultant)), Ophthalmics Inc (Code C (Consultant)); Joan W. Miller, Genetech/Roche (Code C (Consultant)), Kalvista Pharmaceuticals (Code C (Consultant)), Lowy Medical Research Institute (Code F (Financial Support)), ONL Therapeutics LLC (Code C (Consultant)), ONL Therapeutics LLC (Code I (Personal Financial Interest)), ONL Therapeutics LLC (Code P (Patent)), Sunovion (Code C (Consultant)), Valeant Pharmaceuticals (Code P (Patent)); Demetrios G. Vavvas, Alcon Research Institute (Code F (Financial Support)), Loefflers Family Foundation (Code F (Financial Support)), National Eye Institute (Code F (Financial Support)), Olix Pharmaceuticals (Code C (Consultant)), Research to Prevent Blindness (Code F (Financial Support)), Valitor Inc (Code C (Consultant)), Yeatts Family Foundation (Code F (Financial Support)); John B. Miller, Alcon (Code C (Consultant)), Allegran (Code C (Consultant)), Carl Zeiss Meditech Inc (Code C (Consultant)), Genetech (Code C (Consultant)), Heidelberg engineering inc (Code C (Consultant))

Purpose: Compared to visual acuity, contrast sensitivity function (CSF) better correlates with vision-related quality of life and subjectively perceived visual impairment, and may be affected earlier in the course of age-related macular degeneration (AMD). Inherent imperfections of the existing contrast tests have prevented its adoption in the clinical practice. Our aim is to characterize CSF in different stages of non-neovascular AMD (nnAMD) compared to healthy controls employing a novel active learning quick CSF (qCSF) method.

Methods: This prospective cross-sectional study included nnAMD patients graded by consensus grading (clinical exam, color fundus photos, and OCT) and healthy controls. Contrast was measured using the Manifold Contrast Vision Meter (Adaptive Sensory Technology, San Diego, CA). Outcomes included Area under the Log CSF (AULCSF), contrast sensitivity (CS) thresholds at 1, 1.5, 3, 6, 12, and 18 cycles per degree (cpd). Mixed-model multiple linear regression analyses were performed to evaluate the association between presence and stage of nnAMD (vs controls) and the CSF outcome measures.

Results:A total of 363 eyes were included, 249 nnAMD eyes (68 Early, 154 Intermediate, 27 Advanced) and 114 control eyes. Mean BCVA for controls was 0.020 versus 0.040 in early (P> 0.05), 0.140 in intermediate (P= 0.002) and 0.550 in advanced nnAMD eyes (P< 0.001). When controlling for age and lens status, early nnAMD was significantly associated with reduced CSF thresholds at low spatial frequencies (1, 1.5, 3 cpd) (β= -0.09, β= -0.09, and β= -0.11, respectively, all P< 0.01) compared to controls, despite no difference in BCVA. Intermediate and advanced nnAMD were significantly associated with reduced CSF at 1, 1.5, 3, 6 and 12 cpd and reduced AULCSF (all P< 0.01). On trend analysis, nnAMD progression was associated with corresponding significant progressive decline in AULCSF (Early β=-0.06, Intermediate β=-0.18, Advanced β=-0.64 vs controls)(Figure 1).
Conclusions: Early nnAMD was associated with reduced CSF compared to controls as measured by the novel qCSF method, despite no difference in BCVA. Worsening nnAMD stages were associated with a progressive decline in AULCSF. The qCSF may emerge as a promising visual function endpoint in the routine clinical practice and future nnAMD clinical trials.

Layman Abstract (optional): Provide a 50-200 word description of your work that non-scientists can understand. Describe the big picture and the implications of your findings, not the study itself and the associated details.:



Contrast sensitivity fucntion in AMD stages vs controls as measured by the qCSF method.

Session Track

POSTER ABSTRACT

POSTER ABSTRACT

A Novel Active Learning Contrast Sensitivity Test to Assess Visual Function in Central Serous Chorioretinopathy

Rebecca Zeng
Massachusetts Eye and Ear Infirmary
Medical Student

10:30 PM - 12:15 AM CEST on Monday, May 3
Add to Calendar

A Novel Active Learning Contrast Sensitivity Test to Assess Visual Function in Central Serous Chorioretinopathy

Author Block: *Rebecca Zeng[1,2] , Esther Lee Kim[1] , Merina Thomas[3] , Filippos Vingopoulos[1] , Itika Garg[1] , Eun Young Choi[1] , Ines Lains[1] , Leo A. Kim[1] , Luis A. Lesmes[4] , David N. Zacks[3] , John B. Miller[1]*

[1] Ophthalmology, Massachusetts Eye and Ear Infirmary, Boston, Massachusetts, United States; [2] Boston University School of Medicine, Boston, Massachusetts, United States; [3] University of Michigan, Ann Arbor, Michigan, United States; [4] Adaptive Sensory Technology, San Diego, California, United States

Disclosure Block: Rebecca Zeng, None; Esther Lee Kim, None; Merina Thomas, None; Filippos Vingopoulos, None; Itika Garg, None; Eun Young Choi, None; Ines Lains, None; Leo A. Kim, None; Luis A. Lesmes, Adaptive Sensory Technology (Code F (Financial Support)), Adaptive Sensory Technology (Code I (Personal Financial Interest)), Adaptive Sensory Technology (Code E (Employment)); David N. Zacks, None; John B. Miller, Alcon (Code C (Consultant)), Allergan (Code C (Consultant)), Genentech (Code C (Consultant)), Sunovion (Code C (Consultant)), Zeiss (Code C (Consultant))

Purpose: To characterize the contrast sensitivity function (CSF) in patients with central serous chorioretinopathy (CSCR) compared to healthy controls using novel computerized contrast sensitivity (CS) testing with active learning algorithms.
Methods:CSF was prospectively measured in CSCR eyes and healthy controls between December 2016 and November 2017 at W. K. Kellogg Eye Center and Massachusetts Eye and Ear Infirmary using the novel active learning Sentio Platform (Adaptive Sensory Technology, San Diego, CA). A mixed effects multivariate regression model was employed and outcomes included Area under the Log CSF (AULCSF), CS thresholds at 1, 1.5, 3, 12, and 18 cycles per degree (cpd) and best corrected visual acuity (BCVA). Associations of contrast outcomes with structural findings and subjective symptomatology were investigated.
Results:A total of 40 eyes of 36 CSCR patients and 84 healthy control eyes were included. Median BCVA in CSCR eyes was logMAR 0.10 (0.23) versus 0.00 (0.04) in controls (P = 0.01). The median AULCSF in CSCR eyes was 1.11(0.70) versus 1.24 (0.31) in controls. When accounting for age, the presence of CSR was associated with significantly reduced median AULCSF (P =.02, β= -0.14) and reduced mean CS thresholds at spatial frequencies of 6cpd (P = .009, β= -0.18), 12cpd (P <.001, β= -0.23) and 18cpd (P = .04, β= -0.09), compared to controls. Within the CSCR group, subjectively perceived visual impairment (N=22) was associated with decreased contrast thresholds at all spatial frequencies and in AULCSF, when compared to asymptomatic CSCR eyes (N=18). Ellipsoid zone attenuation was associated with decreased AULCSF (P= 0.002, β=-0.473) and decreased contrast thresholds specifically at 3,6 and 12 cpd, whereas presence of extrafoveal fluid was associated with decreased thresholds at 1, 1.5, 3 and 6 cpd.
Conclusions: Contrast sensitivity is significantly reduced in CSCR, and seems to strongly correlate with subjective visual impairment. Different structural biomarkers correlate with contrast thresholds reductions at different spatial frequencies. The novel qCSF method may serve as a valuable adjunct visual function metric for CSCR patients in the routine clinical practice.
Layman Abstract (optional): Provide a 50-200 word description of your work that non-scientists can understand. Describe the big picture and the implications of your findings, not the study itself and the associated details.:

Session Track

POSTER ABSTRACT

POSTER ABSTRACT

Hierarchical Bayesian modeling of the contrast sensitivity function

Luis Andres Lesmes
Adaptive Sensory Technology
President, Co-Founder

8:15 PM - 10:00 PM CEST on Friday, May 7
Add to Calendar

Hierarchical Bayesian modeling of the contrast sensitivity function

Author Block: *Luis A. Lesmes[4] , Yukai Zhao[1] , Michael Dorr[3] , Zhong-Lin Lu[1,2]*

[1] Center for Neural Science, New York University, New York, New York, United States; [2] Division of Arts and Sciences, New York University Shanghai, Shanghai, Shanghai, China; [3] Adaptive Sensory Technology, Germany; [4] Adaptive Sensory Technology, Inc, San Diego, California, United States

Disclosure Block: Luis A. Lesmes, Adaptive Sensory Technology Inc (Code E (Employment)), Adaptive Sensory Technology Inc (Code P (Patent)), Adaptive Sensory Technology Inc (Code I (Personal Financial Interest)); Yukai Zhao, None; Michael Dorr, Adaptive Sensory Technology Inc (Code E (Employment)), Adaptive Sensory Technology Inc (Code I (Personal Financial Interest)), Adaptive Sensory Technology Inc (Code I (Personal Financial Interest)), Adaptive Sensory Technology Inc (Code P (Patent)); Zhong-Lin Lu, Adaptive Sensory Technology Inc (Code I (Personal Financial Interest)), Adaptive Sensory Technology Inc (Code P (Patent))

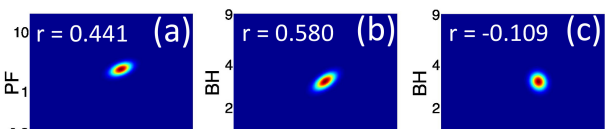
Purpose: The qCSF method applies Bayesian active learning to provide an accurate, precise and efficient assessment of spatial vision (Lesmes et al. 2010). To date, qCSF testing has not been informed by regularities in CSF shape observed when individuals are tested across low, medium, and high luminance conditions. To improve CSF analysis, and leverage information provided by cross-test regularities, we developed a hierarchical Bayesian model (HBM), which infers joint posterior distributions of CSF parameters and hyperparameters from qCSF data obtained from 112 subjects tested in three luminance conditions (Hou et al. 2016).

Methods: The CSF was modeled with a log-parabola with peak gain (PG), peak spatial frequency (PF), and bandwidth at half height (BH). The two-level HBM consisted of multiple 3-dimensional Gaussian distributions of CSF parameters at the population and individual test levels. The 3×3 covariance distributions at two levels quantified cross- and within-test regularities. The means of the parameter distributions at the individual test level were sampled from the hyperparameter distribution at the population level, while all individual tests shared the same 3×3 within-test covariance. We compared the average half-width of the 68.2% credible intervals (HWCIs) of the CSF parameters and area under log CSF (AULCSF) estimates with the qCSF and HBM.

Results: The HBM recovered significant correlations among CSF parameters at the population (Fig. 1; r(PG&PF)=0.441, r(PG&BH)=0.580, r(PF&BH)=-0.109) and individual (r(PF&BH)=-0.719) test levels. The average HWCI (in log10 units) of the estimated CSF parameters and AULCSF decreased with the number of trials in both the qCSF and HBM analyses (Table 1). Analysis of AULCSF estimates obtained with 50 trials provided HWCI values of 0.040 for qCSF and 0.035 for HBM. Relative to estimates of CSF parameters and AULCSF obtained with the qCSF, the HBM reduced the HWCI by 60-74% and 32% with 15 trials, and 30-55% and 13% for 50 trials. The average absolute difference between qCSF and HBM estimates was not statistically significant.

Conclusions: Incorporating both cross- and within-test regularities, the HBM can further improve the precision of CSF and AULCSF estimates, especially when the number of tested trials is relatively small.

Layman Abstract (optional): Provide a 50-200 word description of your work that non-scientists can understand. Describe the big picture and the implications of your findings, not the study itself and the associated details.:



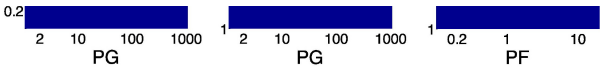


Fig1. 2-D marginal distributions at the population level in the HBM.,

		trials completed		
		15	25	50
qCSF	peak gain	0.151	0.096	0.053
	peak frequency	0.263	0.174	0.091
	bandwidth	0.082	0.057	0.034
	AULCSF	0.088	0.062	0.040
HBM	peak gain	0.056	0.049	0.037
	peak frequency	0.069	0.057	0.044
	bandwidth	0.033	0.027	0.022
	AULCSF	0.060	0.048	0.035

Table1. 68.2% HWCI of estimated CSF parameters and AULCSF with the qCSF and HBM (log10 units).

Session Track

POSTER ABSTRACT

← BACK TO PSYCHOPHYICS

POSTER ABSTRACT

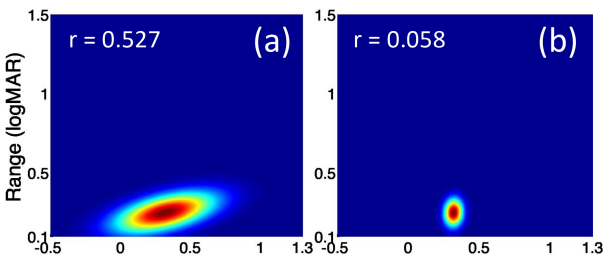
Hierarchical Bayesian modeling of E-ETDRS and FrACT test data

Zhong-Lin Lu
NYU
Professor

8:15 PM - 10:00 PM CEST on Friday, May 7
Add to Calendar

Hierarchical Bayesian modeling of E-ETDRS and FrACT test data

Author Block: *Zhong-Lin Lu[1,2], Yukai Zhao[2], Luis A. Lesmes[3], Michael Dorr[3]*
[1] Division of Arts and Sciences, NYU Shanghai, Shanghai, China; [2] Center for Neuroscience, New York University, New York, New York, United States; [3] Adaptive Sensory Technology, inc, San Diego, California, United States
Disclosure Block: Zhong-Lin Lu, Adaptive Sensory Technology (Code P (Patent)), Adaptive Sensory Technology, inc. (Code I (Personal Financial Interest)); Yukai Zhao, None; Luis A. Lesmes, Adaptive Sensory Technology (Code E (Employment)), Adaptive Sensory Technology (Code P (Patent)), Adaptive Sensory Technology, inc. (Code I (Personal Financial Interest)); Michael Dorr, Adaptive Sensory Technology (Code E (Employment)), Adaptive Sensory Technology (Code P (Patent)), Adaptive Sensory Technology, inc. (Code I (Personal Financial Interest))
Purpose:E-ETDRS and FrACT are the two most popular electronic visual acuity (VA) tests. To improve the precision of VA threshold estimates from the tests, we re-analyzed the E-ETDRS and FrACT data from 14 eyes in four Bangerter foil conditions in Zhao et al. (2021) with the qVA method and a hierarchical Bayesian model (HBM) based on the qVA method (Lesmes & Dorr, 2019).
Methods: The HBM consisted of hyperparameters and parameters at the population and individual test levels, each of which is a 2-dimensional Gaussian distribution of VA threshold and range. The covariances were set up to capture the cross- and within-test regularities. We compared the average half width of the 68.2% credible interval (HWCI) of the VA threshold and range estimates from the qVA and HBM analyses.
Results: The HBM analysis recovered the correlations between VA threshold and range from the E-ETDRS (0.527 and 0.058) and FrACT (0.755 and 0.218) datasets at the population and individual test levels (Fig. 1). Table 1 shows the average HWCI of the VA threshold and range estimates. The average HWCI of the VA threshold estimates from the E-ETDRS dataset were 0.050 and 0.039 logMAR from the qVA and HBM analyses, respectively, with a 22% reduction by the HBM. The average HWCI of the VA threshold estimates from the FrACT dataset were 0.049 and 0.043 logMAR, with an 11% reduction by the HBM. Compared with the qVA analysis, the HBM also significantly reduced the average HWCI of the range estimates from the E-ETDRS (from 0.148 to 0.072 logMAR, a 51% reduction) and FrACT (from 0.214 to 0.96 logMAR, a 55% reduction) datasets. In comparison, HBM analysis of the qVA data from the same subjects in the same testing conditions resulted in average HWCIs of 0.019 and 0.048 logMAR for VA threshold and range (Table 1).
Conclusions: Incorporating both cross- and within-test regularities, the HBM analysis greatly improved the precision of VA threshold and range estimates in the E-ETDRS (30 optotypes) and FrACT (45 optotypes) datasets, although the combination of the HBM and qVA test is the best option.
Layman Abstract (optional): Provide a 50-200 word description of your work that non-scientists can understand. Describe the big picture and the implications of your findings, not the study itself and the associated details.:



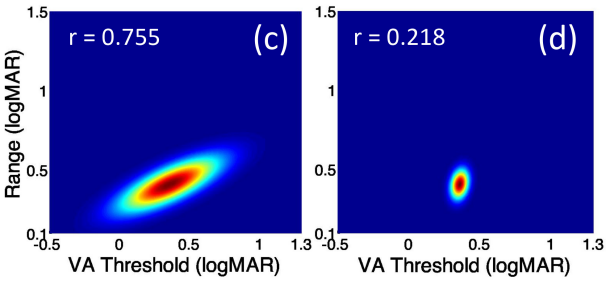


Fig 1. Two-dimensional VA threshold vs range distributions at the (a, c) population and (b, d) individual test levels for the E-ETDRS and FrACT datasets in the HBM.,

Parameter	Analysis	Dataset				
		E-ETDRS	FrACT	qVA/# of optotypes		
				30	45	135
Threshold	qVA	0.050	0.049	0.049	0.038	0.020
	HBM	0.039	0.043	0.042	0.033	0.019
Range	qVA	0.148	0.214	0.164	0.127	0.065
	HBM	0.072	0.096	0.087	0.070	0.048

Table 1. 68.2% HWCI of VA threshold and range estimates (logMAR).

Session Track

POSTER ABSTRACT