

Threshold Measurements Of Visual Functions Don't Tell The Whole Story

The Third Revolution In Ophthalmological Diagnostics

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Conflict of interest

Founder and shareholder of Ocuspecto Oy

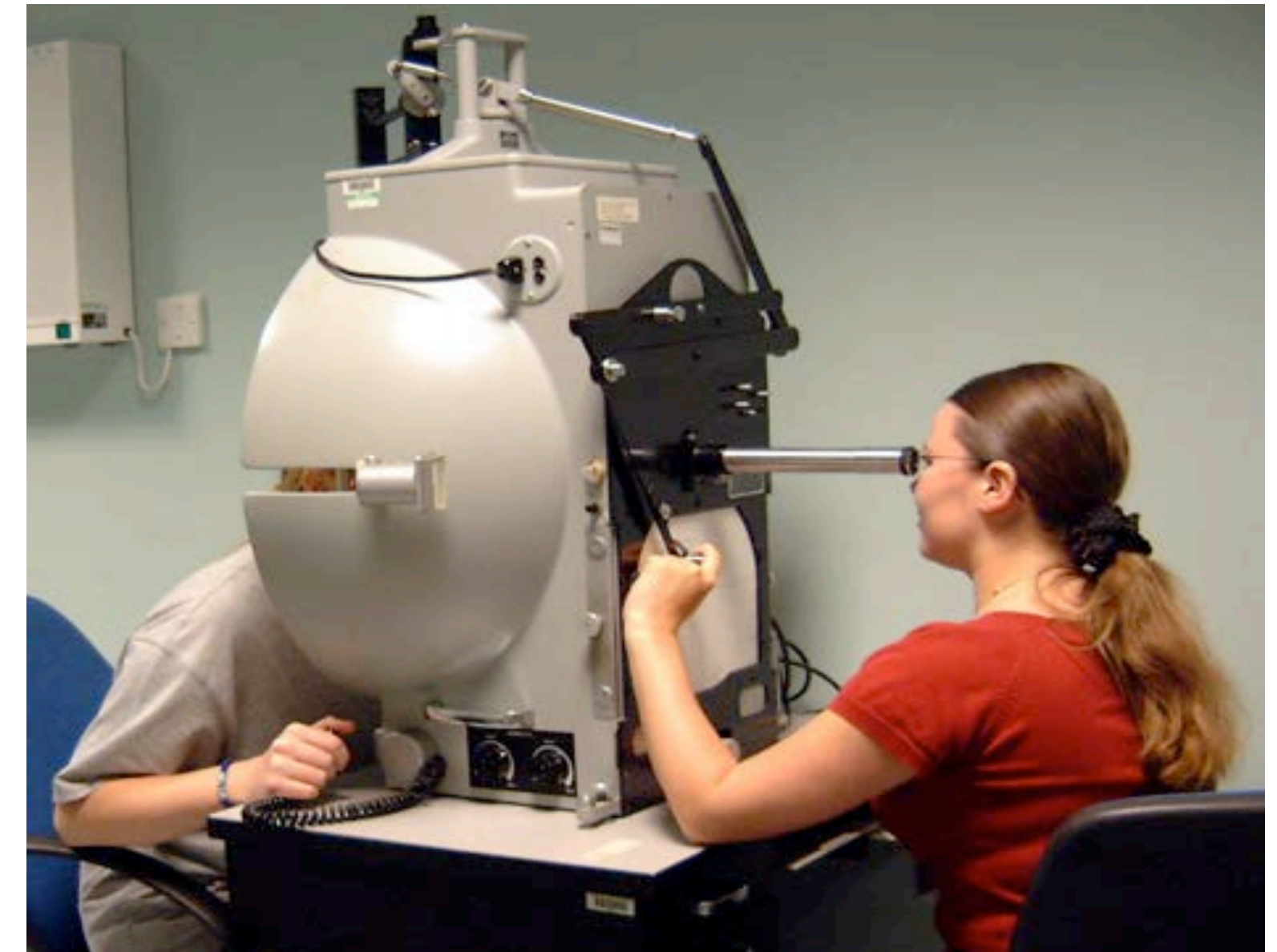
Working in the development of Ocusweep™ vision assessing system

Chief Scientific Officer at Ocuspecto Oy



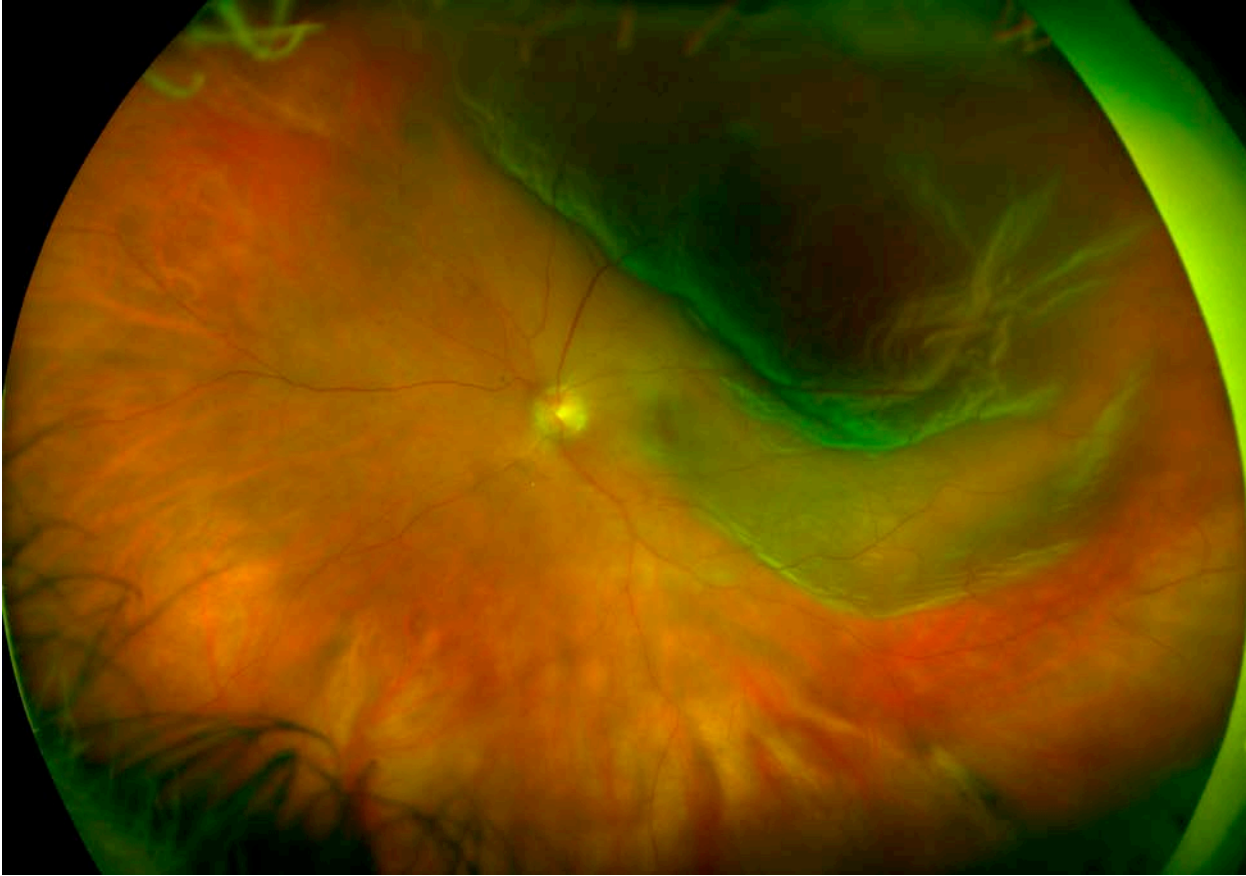
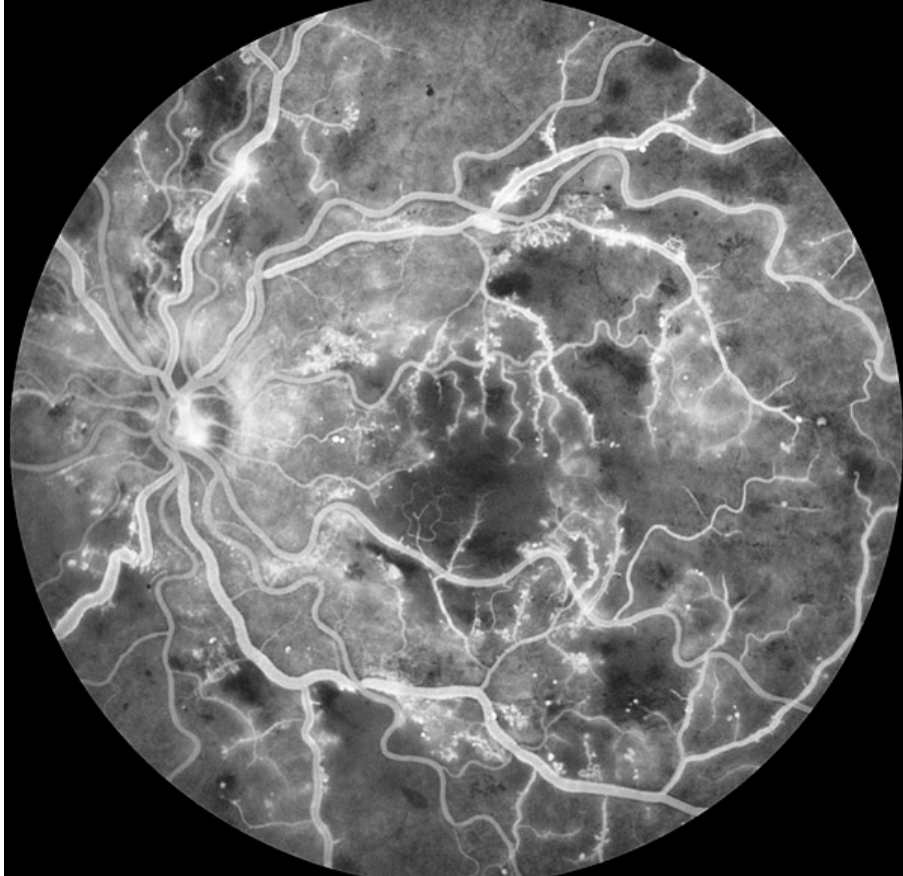
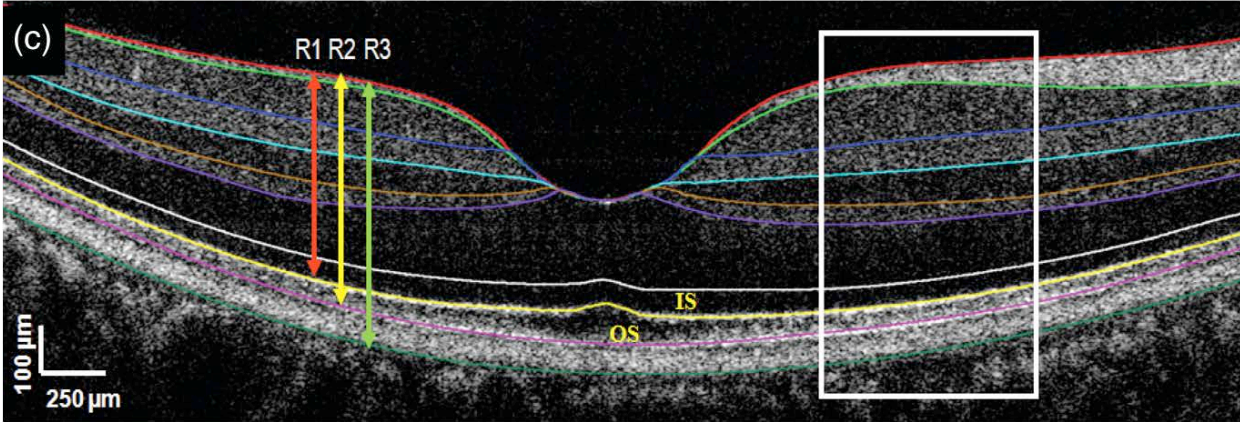
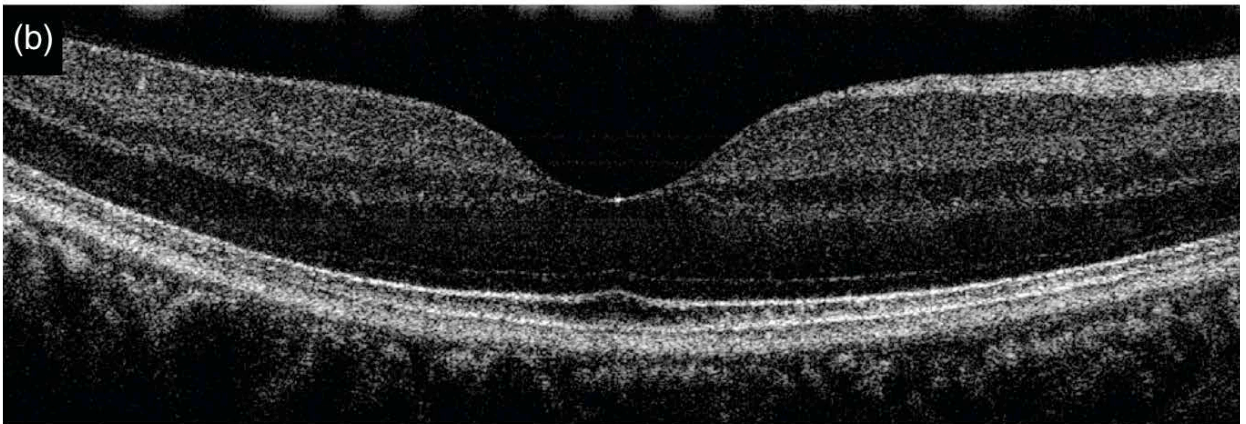
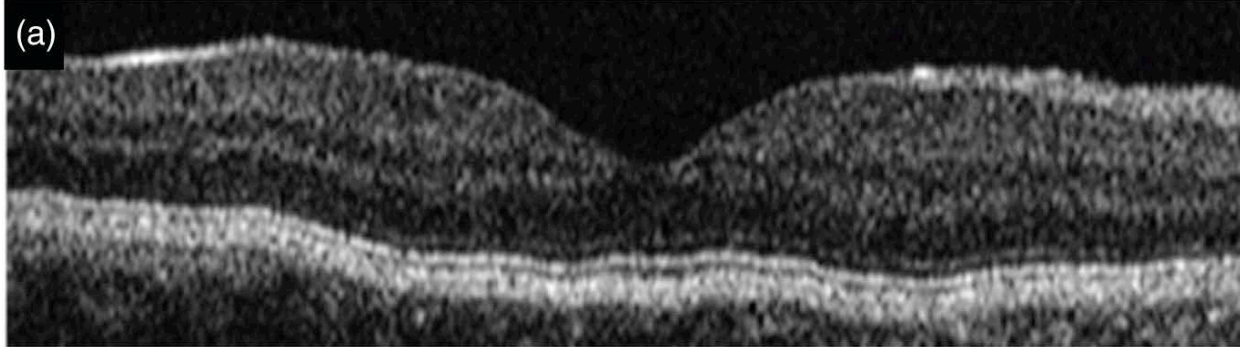
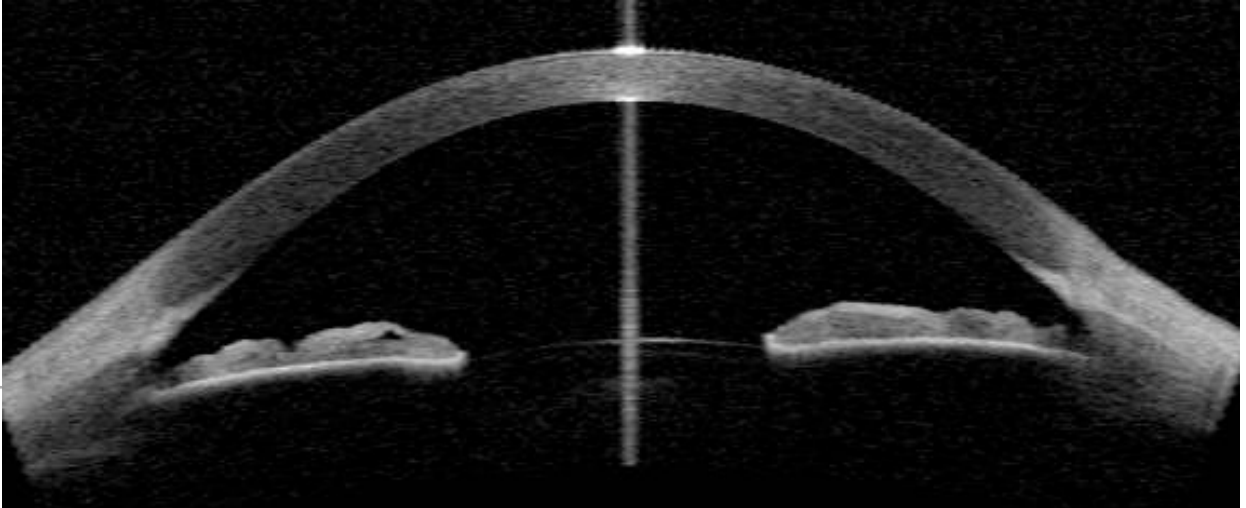
First Revolution In Ophthalmological Diagnostics: From Manual Perimetry to Automated Perimetry

- No more operator influence on test results
- Minimal training for the operator required
- Automated algorithms
 - Threshold measurements
 - Reliability measures for the testing (catch trials)
- Accuracy of the diagnostics and follow up enhanced
- Possible to calculate indexes to describe and follow the progression of visual field



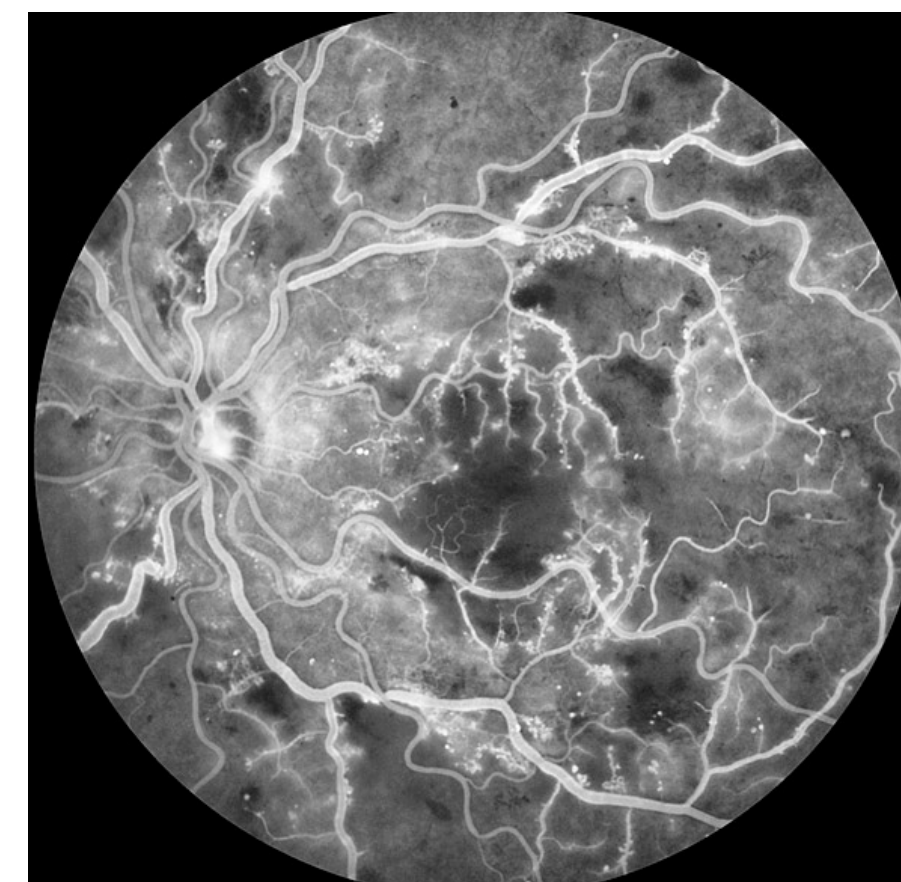
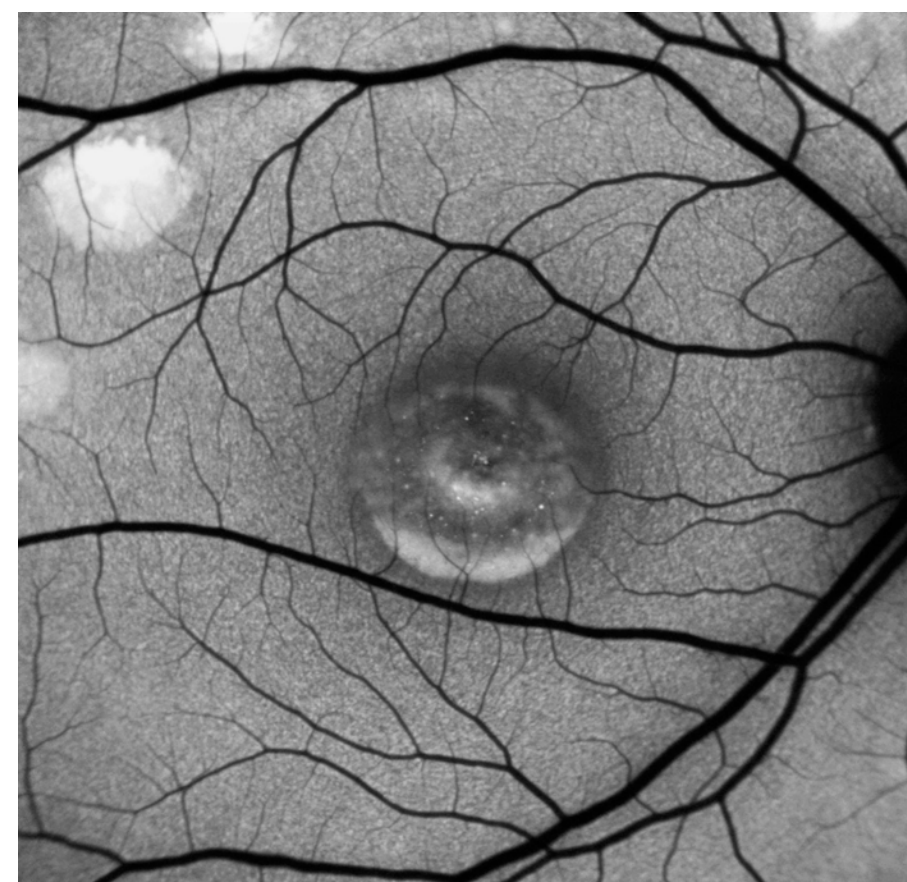
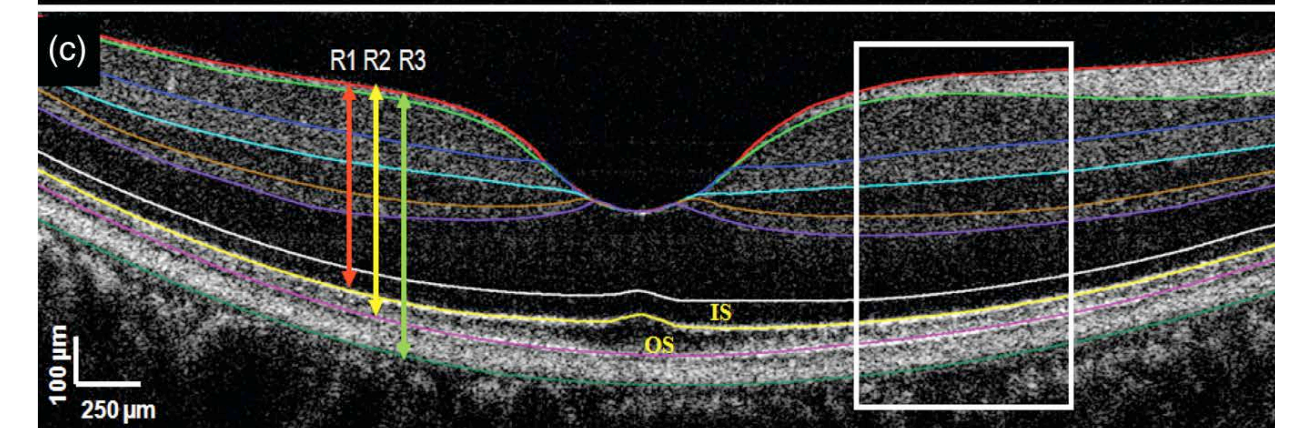
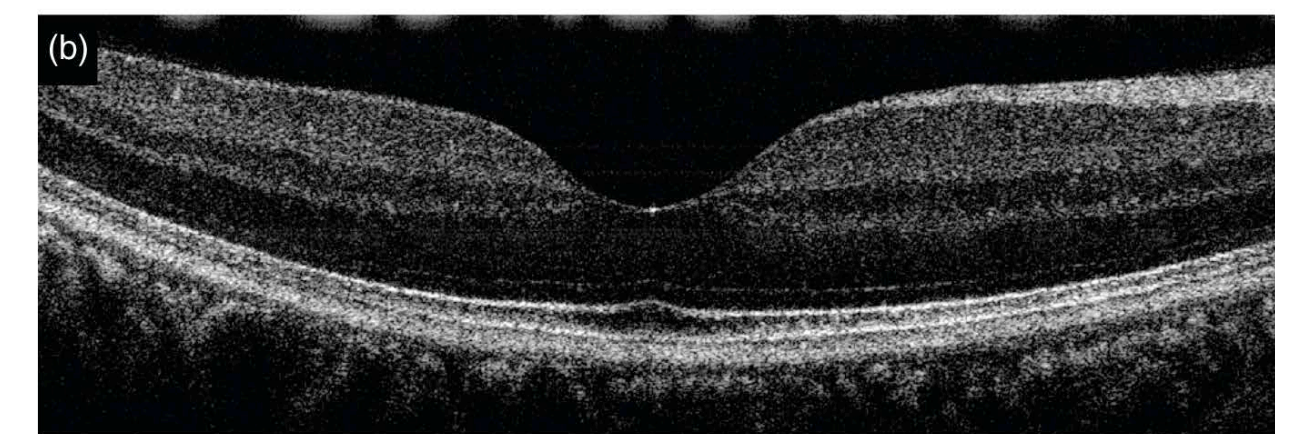
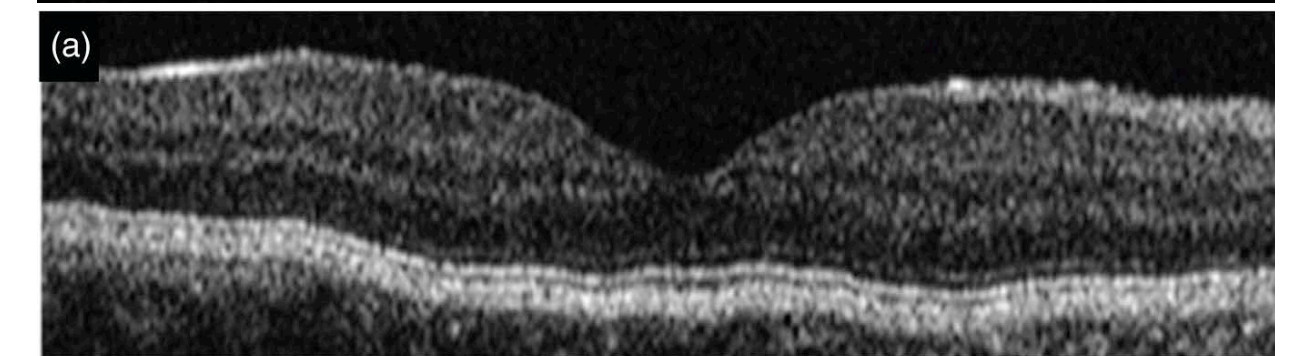
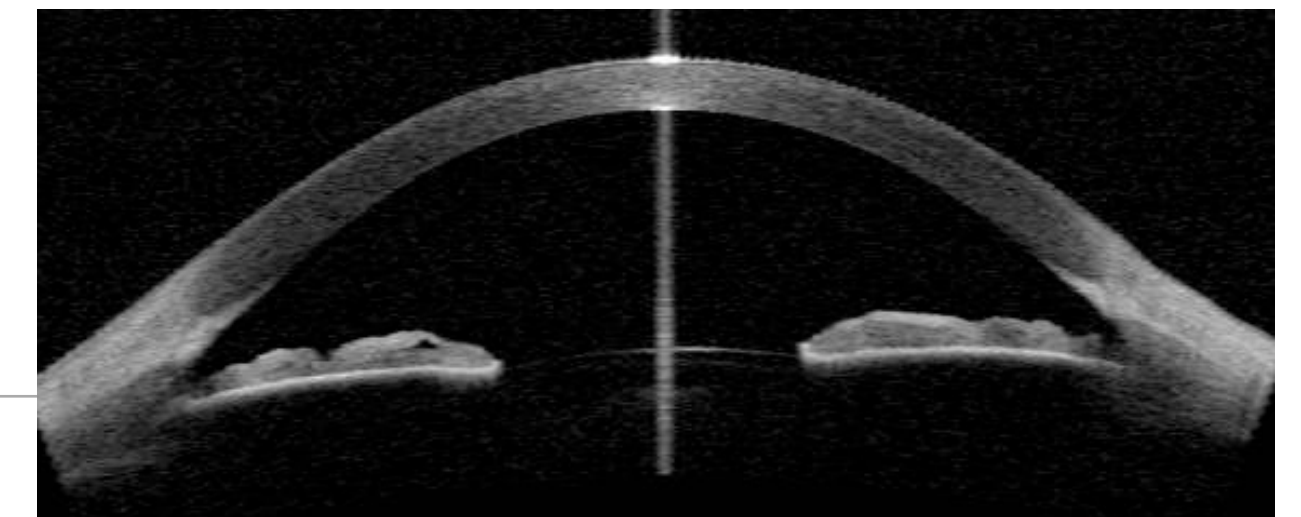
Second Revolution: Ophthalmic imaging

- Ophthalmic Photography
 - Fundus photography (color & B&W)
 - Wide field fundus photography
 - FAG (fluorescein angiography)
 - FAF (Fundus autofluorescence)
 - SLO (Scanning Laser Ophthalmoscopy)
 - OCT (Optical Coherence Tomography)



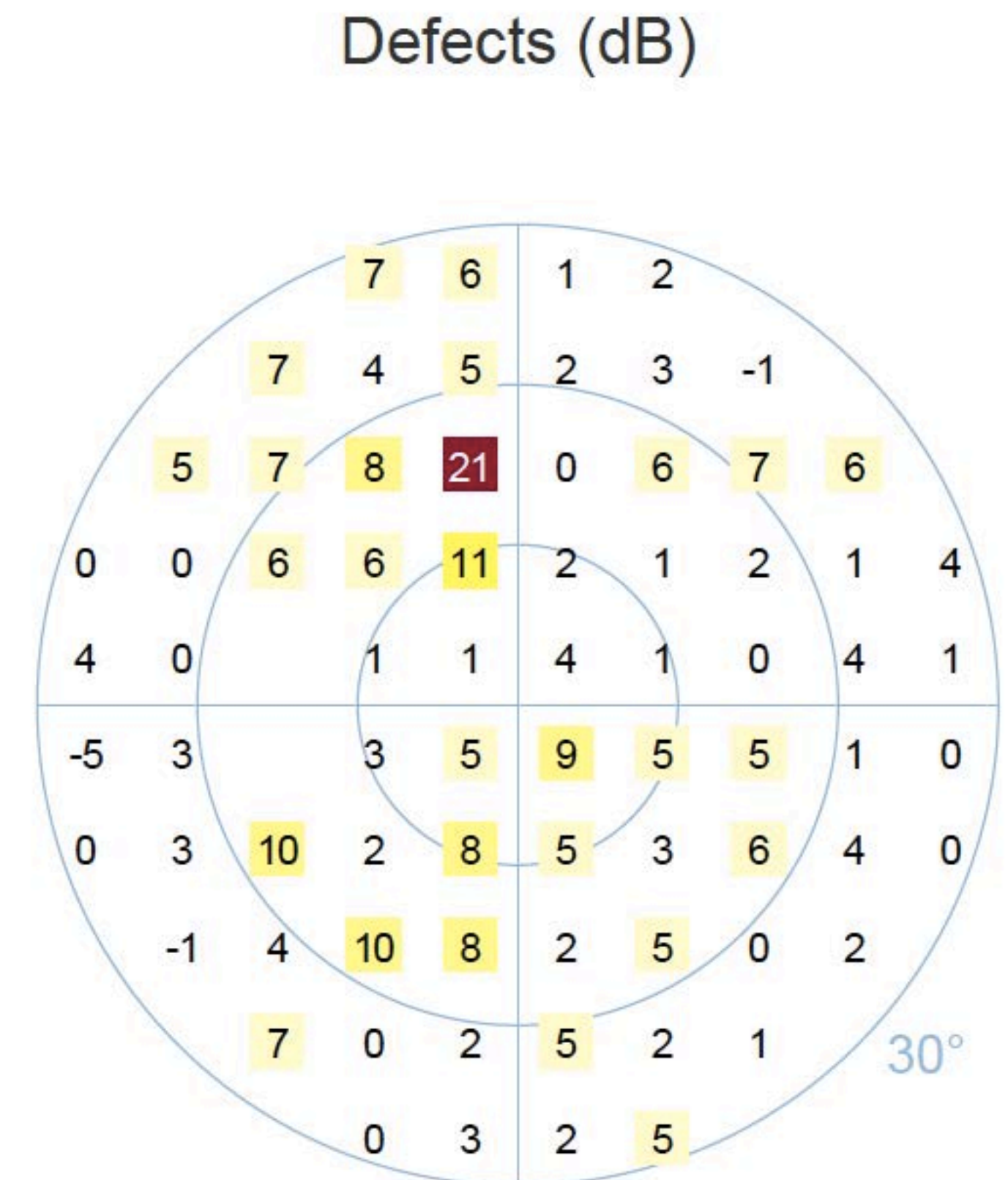
Second Revolution: Ophthalmic imaging

- Repeated imaging
 - Earlier eye disease diagnostics
 - Progression of the disease more easily recognized if baseline situation is documented
- Helps to tailor the treatment



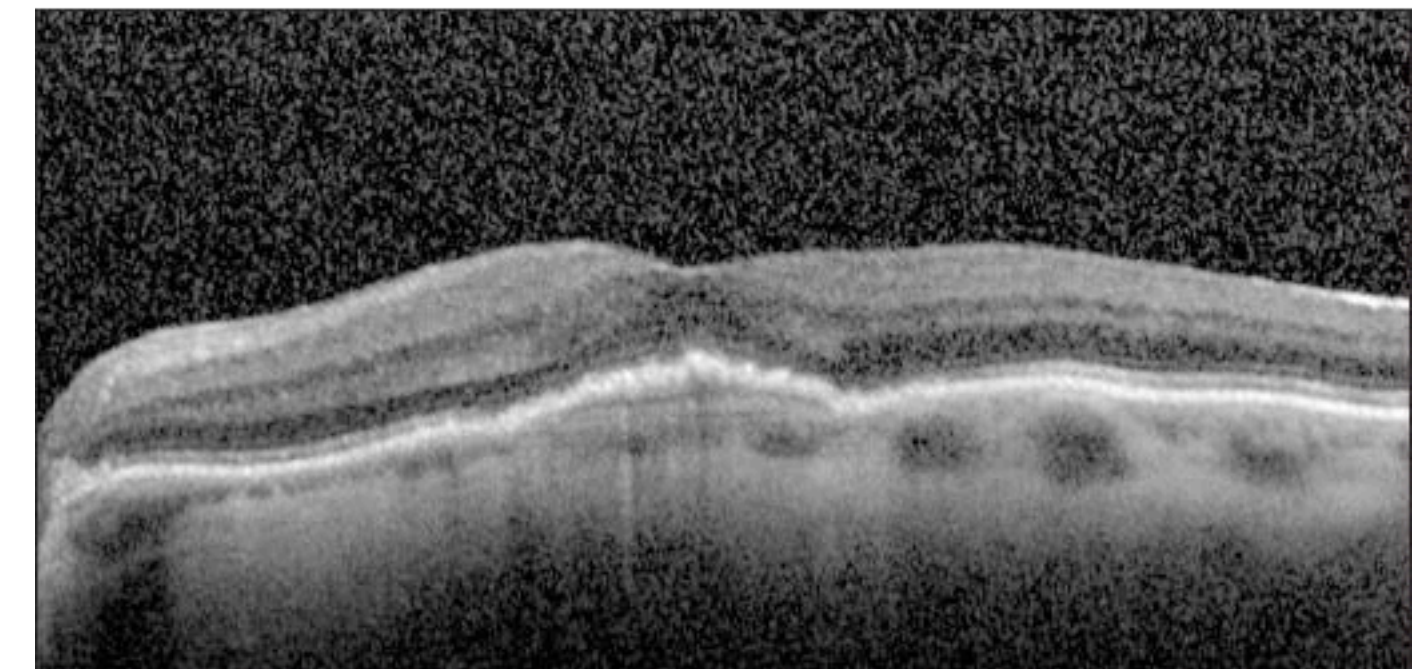
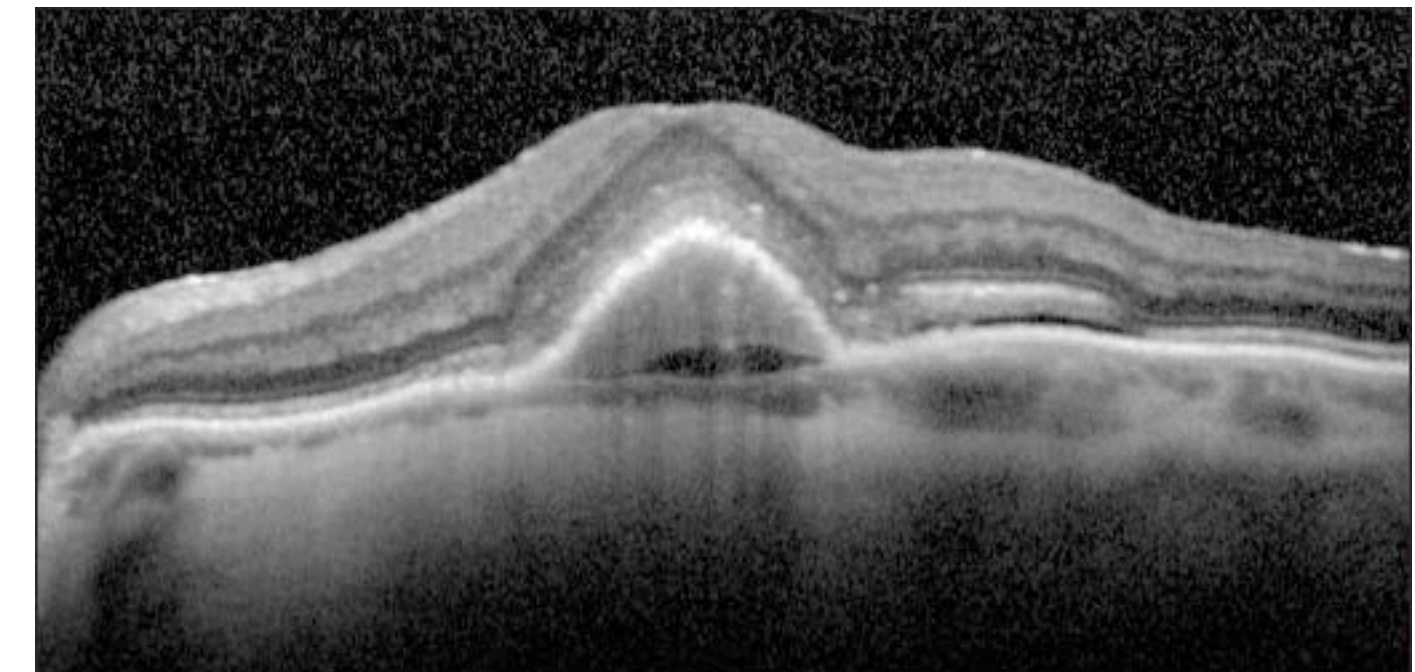
Function and structure as measures of disease progress

- Progressing eye diseases cause changes to the structures of the ocular tissues and to the visual functions
- Usually visual functions decline before structural damage is visible
- Glaucoma diagnosis can be based on typical visual field defects even if optic nerve cupping or retinal nerve fibre layer (RNFL) are within normal limits
- Decisions about glaucoma medication for lowering the eye pressure are usually based on progression in visual field defects



Function and structure as measures of disease progress

- Age related macular degeneration (AMD)
- Therapy (intravitreal injections) is driven by structural changes in retinal thickness in macular region measured by OCT
- Visual acuity is the only follow up measure describing visual function
- It only measures the function of very small area (foveola) of the macula



Visual acuity as a measure of disease progress

Visual acuity

- Sensitive test for indicating
 - refractive error
 - opacities in ocular media
- Not sensitive for indicating
 - disease progress in AMD, glaucoma or diabetic retinopathy
 - vision related quality of life

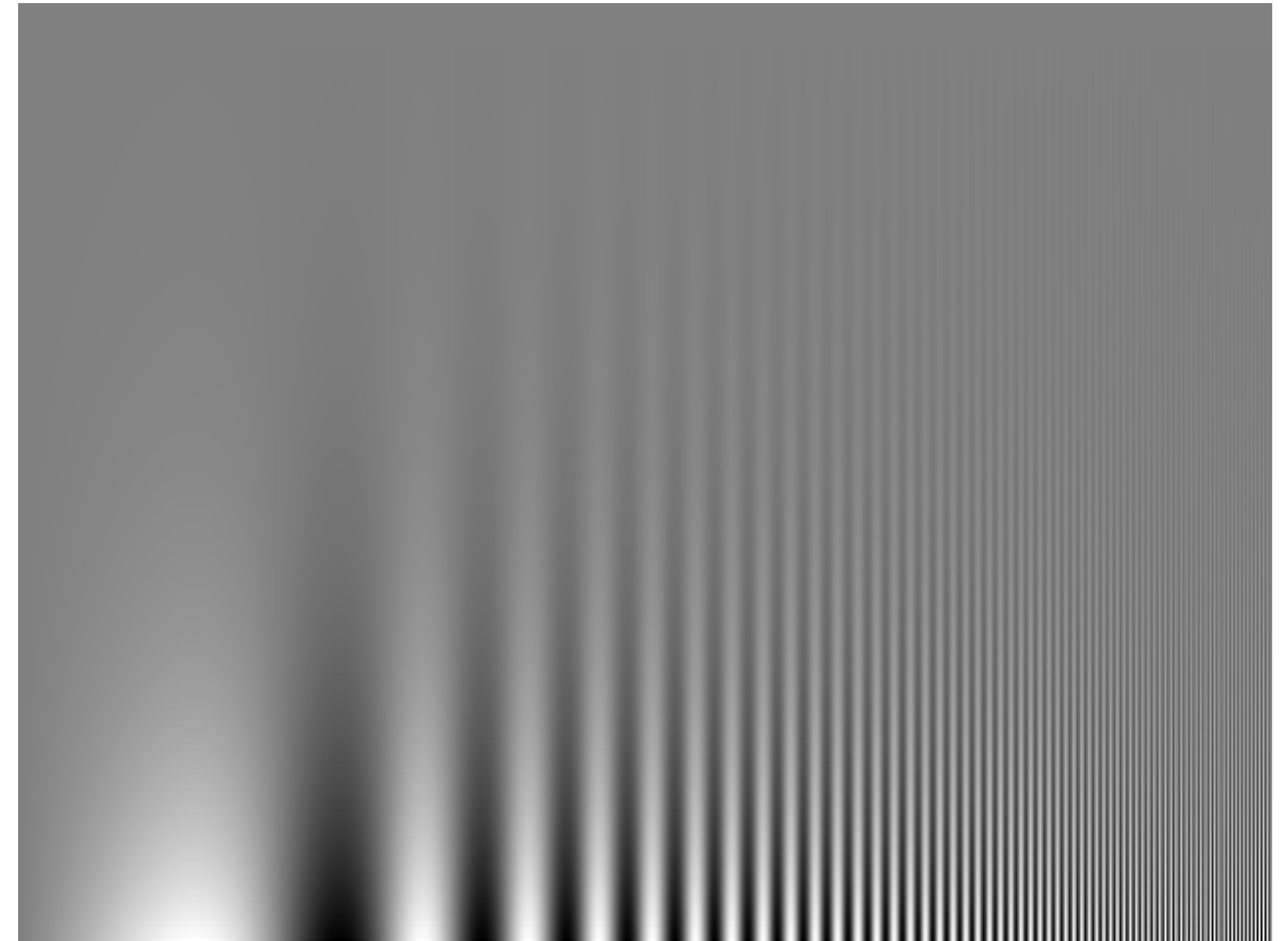
Problems in visual acuity measurements

- Thresholds are determined manually
 - using variable stop criteria
 - stopping even before the real threshold (= no VA better than 1.0)
 - using variable amount of time for recognising optotypes
 - allowing guessing and several tries
 - large operator influence on results
- Poor repeatability
 - true change is difficult to detect: variation of two lines may be observed when no actual change has occurred
 - Therefore scores must be averaged over several measurements



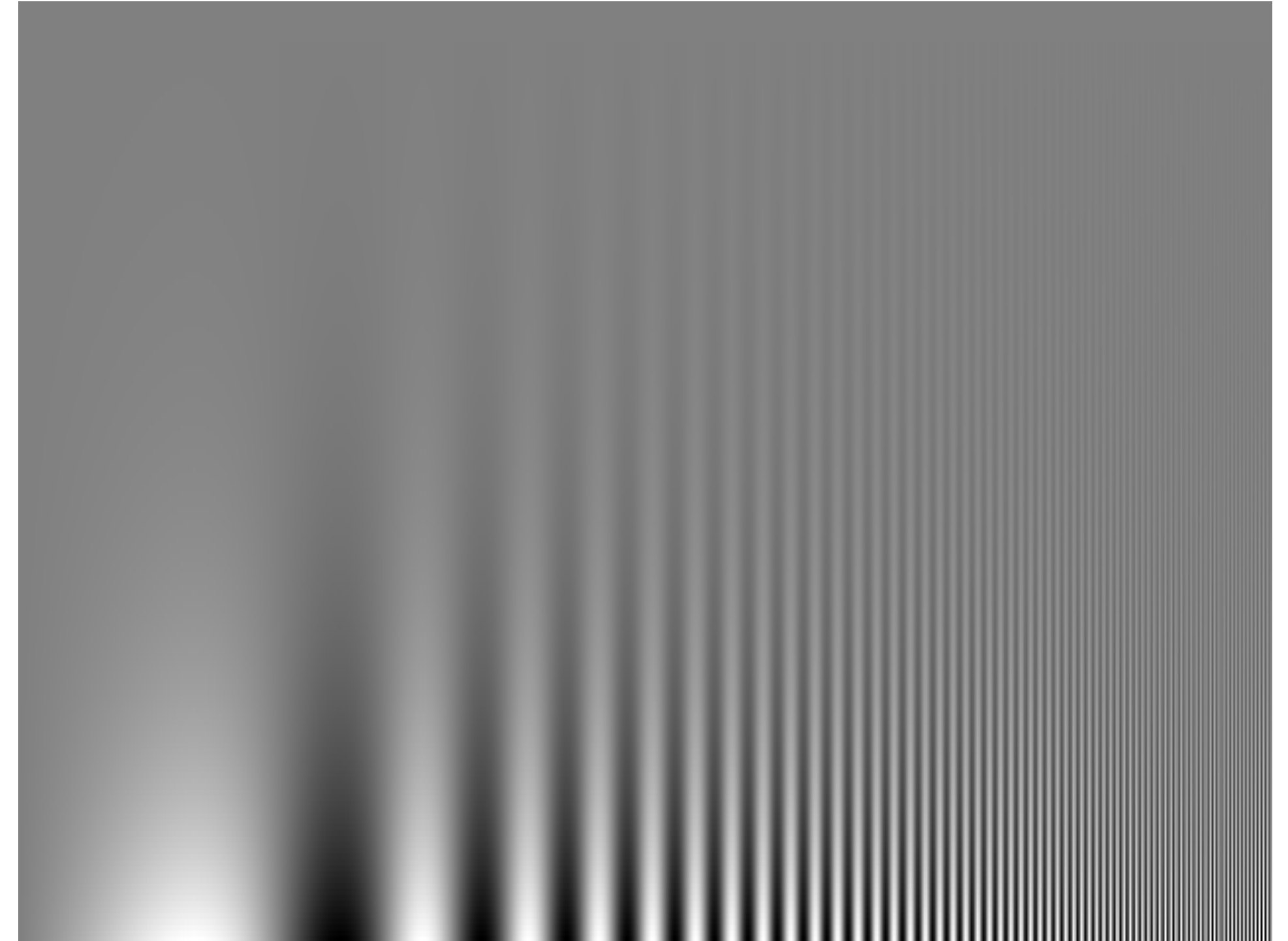
Contrast sensitivity as a measure of disease progress

- Contrast sensitivity defines the threshold between the visible and invisible.
- The existence of a pattern or object is dependable upon seeing the difference in luminance of the two adjacent areas
- Provides another visual method to monitor the impact of treatment intervention



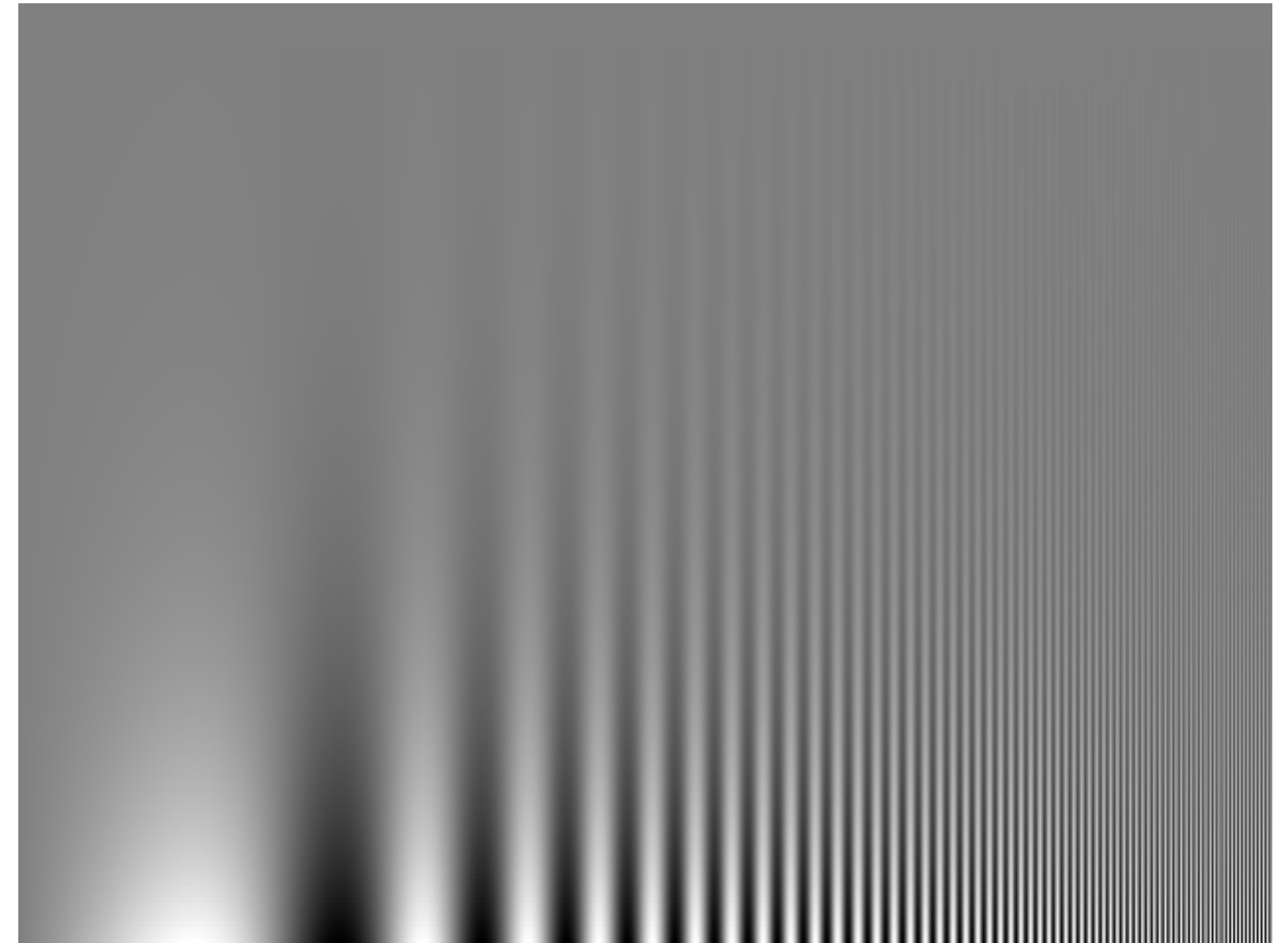
Contrast sensitivity is impaired in eye diseases

- Age-related macular degeneration (AMD)
- Amblyopia
- Dry eye syndrome
- Glare
- Glaucoma
- Myopia
- Ocular hypertension
- Multiple sclerosis
- Visual neuropathologies that do not affect acuity



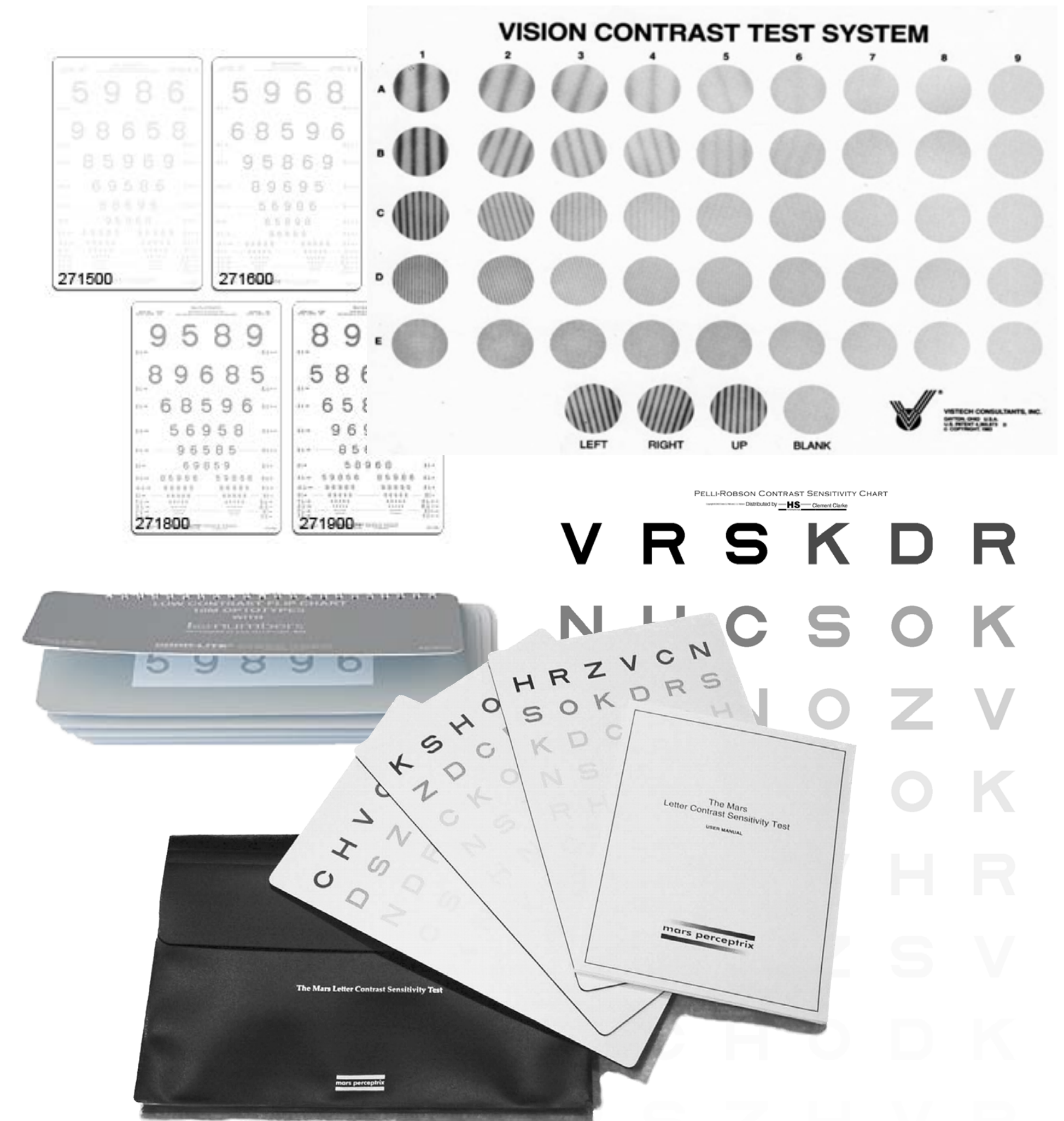
Contrast sensitivity and visual disability

- Contrast sensitivity impairment is closely linked to visual-task performance problems
- Visual acuity is not good for indicating vision related quality of life
- Impairment in contrast vision independently associated with
 - difficulties in mobility
 - driving
 - reading
 - face recognition
 - using tools
 - finding objects (Owsley 2003)



Problems in contrast sensitivity measurements

- No normative data available for comparison
- Usability problems
 - hard to find a place for large wall charts - can't be moved to neighboring room
 - lengthy measurement protocols of computer based tests
- No generally accepted standards are available for measuring contrast vision



Problems in contrast sensitivity measurements

- Sine wave grating stimuli
 - Calibration of the display of computer based contrast tests is difficult
 - Enhanced luminance resolution of the display is required to enable presentation of contrast levels near and below the human threshold for detection.



Problems in contrast sensitivity measurements

- Letter chart tests
 - Contain a broad range of spatial frequencies at different orientations
 - Complicate the interpretation of contrast sensitivity deficits in ocular diseases
 - Letter identification is based on object frequencies higher than the nominal frequency based on letter stroke width
 - makes letter tests more vulnerable to refraction errors and increases thus result variability
 - Variability to results from uneven illumination, fading and dirt



The Third Revolution for Visual Acuity and Contrast Vision

From manual measurements to automated algorithms

- Visual threshold must be determined by automated algorithm
- Viewing time of the visual objects must be limited – otherwise it doesn't tell the whole story about functional vision
- Thresholds must be measured several times to enhance repeatability
- The reliability of the measurement must be monitored
- Information about visual ability should be available on-line for follow-up and comparison later in life for early detection of diseases of visual system

The Third Revolution for Visual Acuity and Contrast Vision ocusweep™ FIND OUT YOUR TRUE VISION

From manual measurements to automated algorithms

- Visual threshold determined using Ocusweep custom algorithm
- Viewing time is limited (2.5 s)
 - No forced choice guessing
 - Measures more functional ability - no unlimited viewing time in real life either
- Confirmation of the threshold: at least three threshold measurement for every test
 - increases the repeatability of measurement results



The Third Revolution for Visual Acuity and Contrast Vision ocusweep™ FIND OUT YOUR TRUE VISION

From manual measurements to automated algorithms

- Visual threshold determined using Ocusweep custom algorithm
- Measurement reliability monitored using
 - positive and negative catch trial steps
 - direction errors
 - testing time
 - increased time indicates variability in test subject answers and leads to extra threshold measurement rounds



The Third Revolution for Visual Acuity and Contrast Vision



From manual measurements to automated algorithms

- Ocusweep Contrast Vision test
 - Sine wave gratings (1 cpd)
 - not sensitive to refraction errors
 - more appropriate for isolating the low-level analyzers that are thought to underlie pattern vision

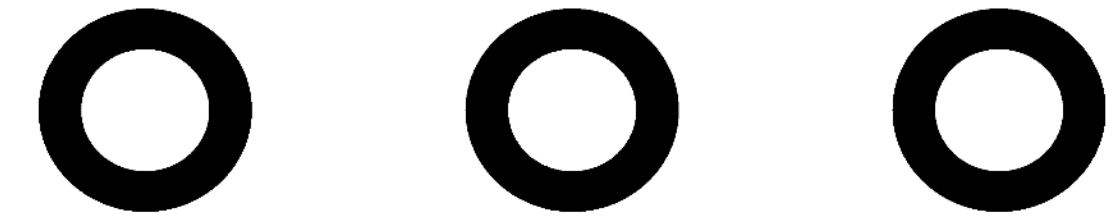


The Third Revolution for Visual Acuity and Contrast Vision



From manual measurements to automated algorithms

- Ocusweep Visual acuity test
 - Landolt C in two directions
 - Highly standardized, repeatable measurements
 - Measures the real threshold even for young healthy individuals
 - long journey from VA 2.0 → 1.0
 - It's wise to save the personal baseline for comparison later in life for early detection of diseases
- Viewing distances 3 m, 1 m, 0.40 m
- Detection of accommodation problems



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Tests:

1) Visual acuity 2) Visual field 3) Contrast sensitivity 4) Reaction time field



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Tests:

1) Visual acuity 2) Visual field 3) Contrast sensitivity 4) Reaction time field

[Video](#)

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Tests:

1) Visual acuity 2) Visual field 3) Contrast sensitivity 4) Reaction time field

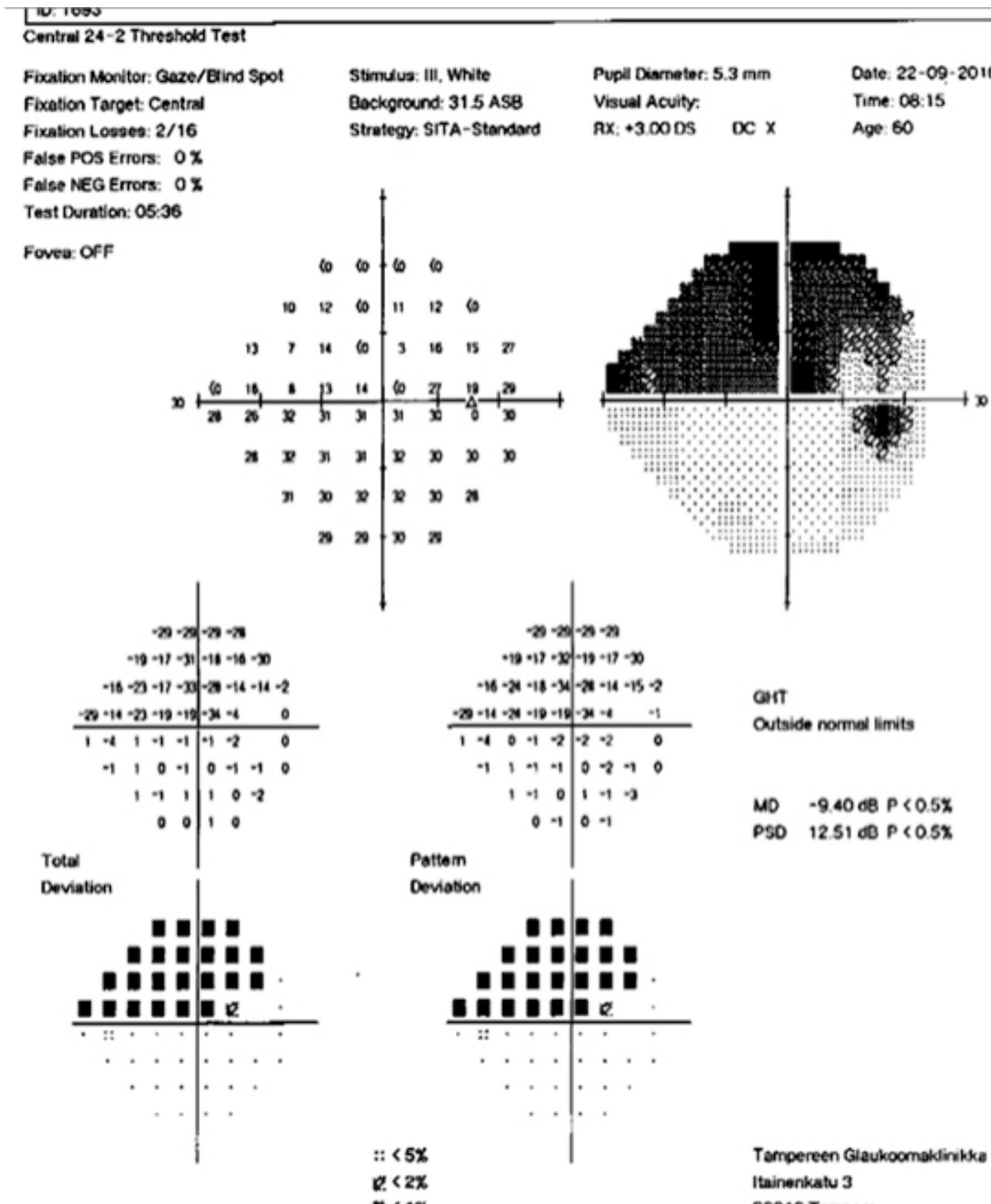
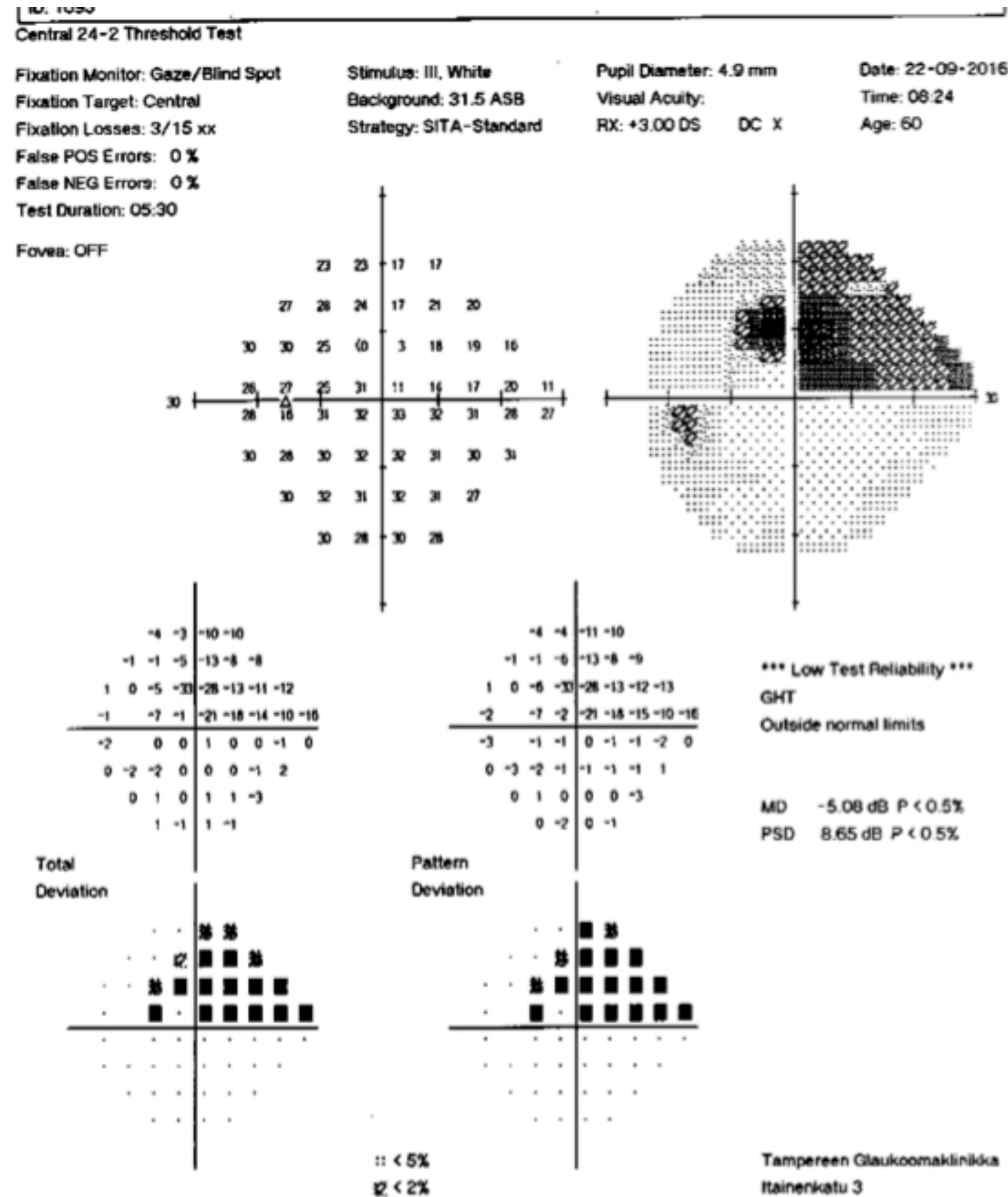


Born 1956: Glaucoma, driver's
license evaluation

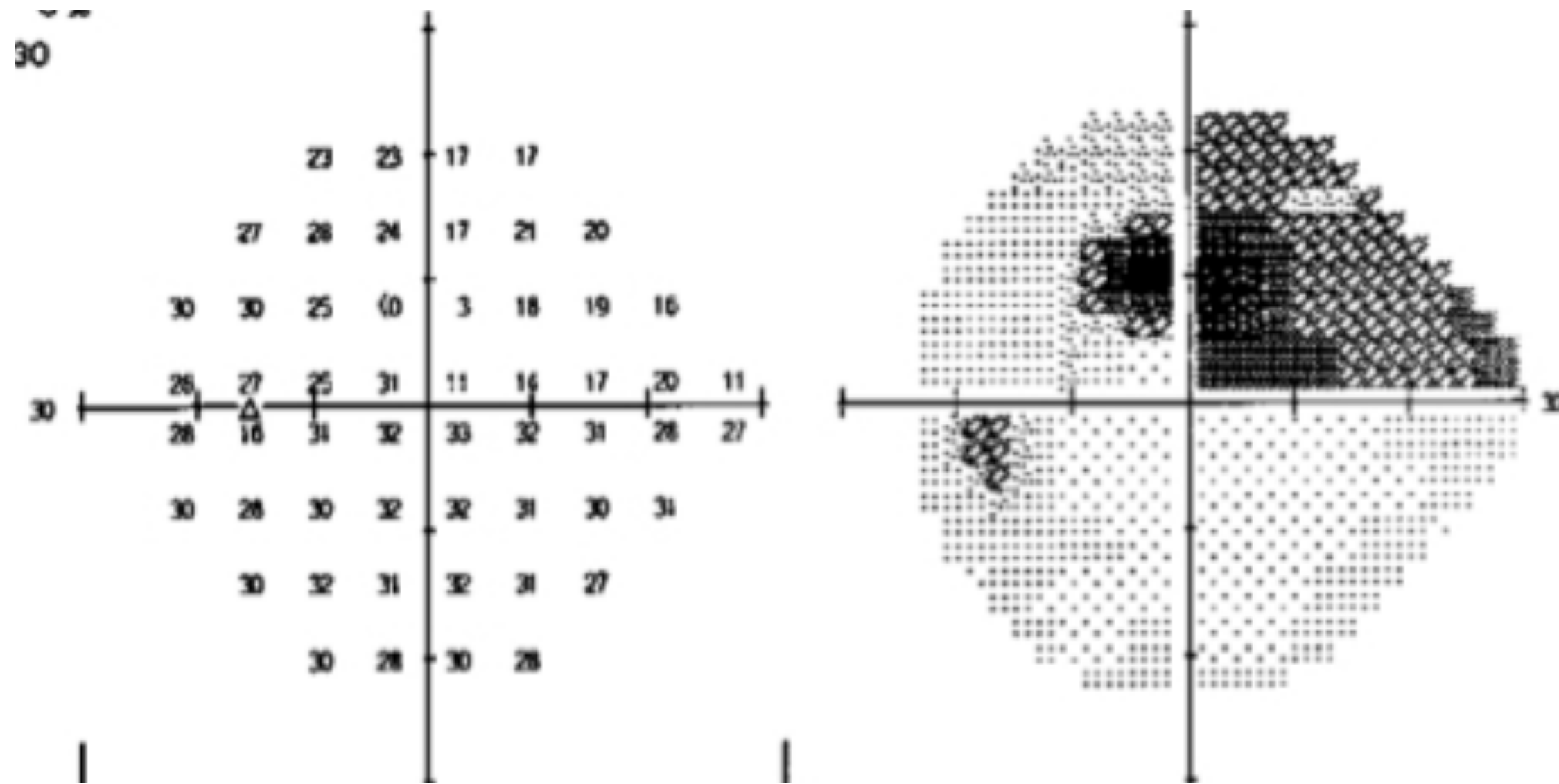
Tests:

1) Humphrey 24-2 monocular
2) Reaction time field
3) Visual field 30° binocular

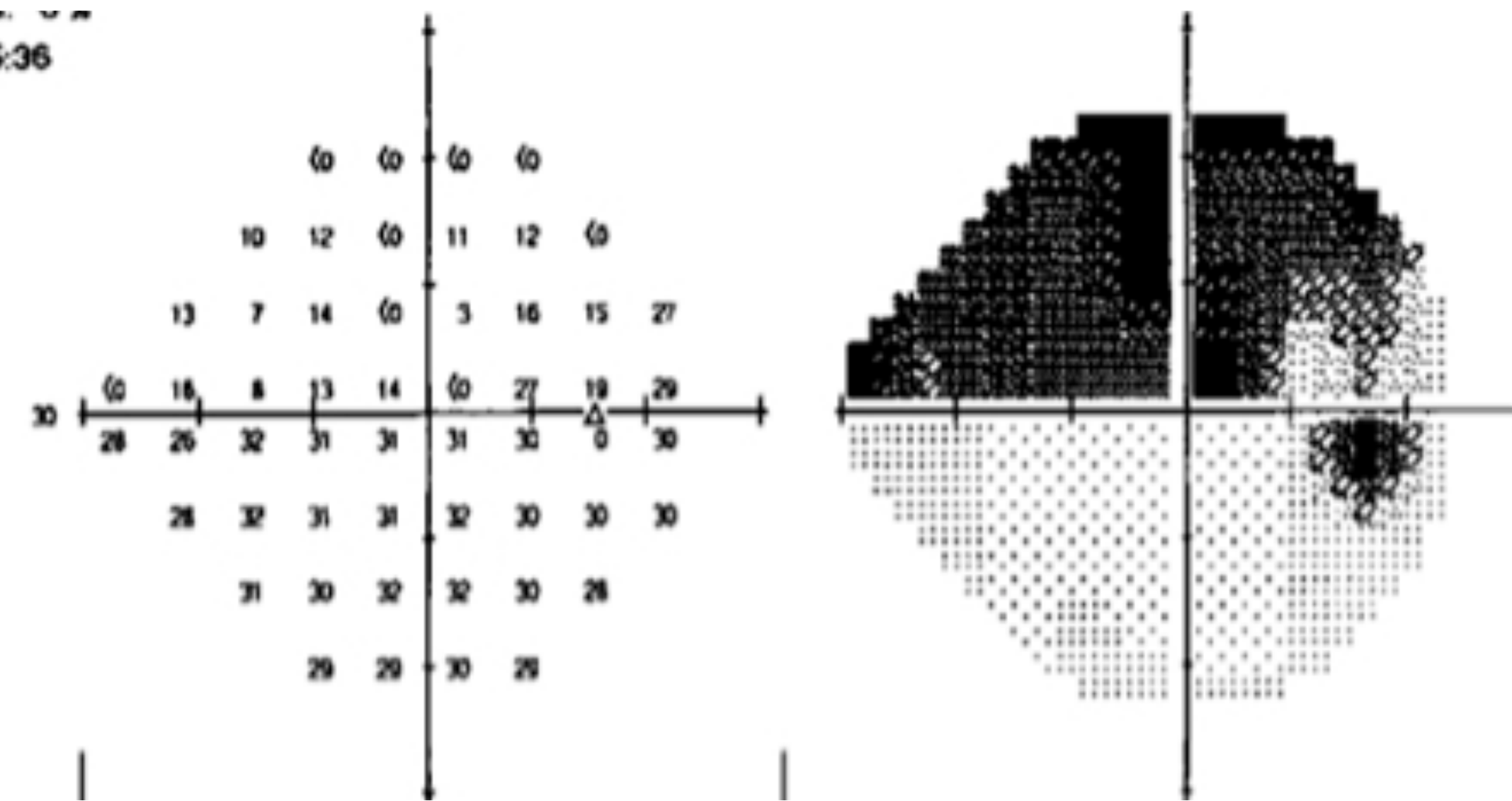
Born 1956 – Glaucoma, driver's license evaluation



Born 1956 – Glaucoma, driver's license evaluation

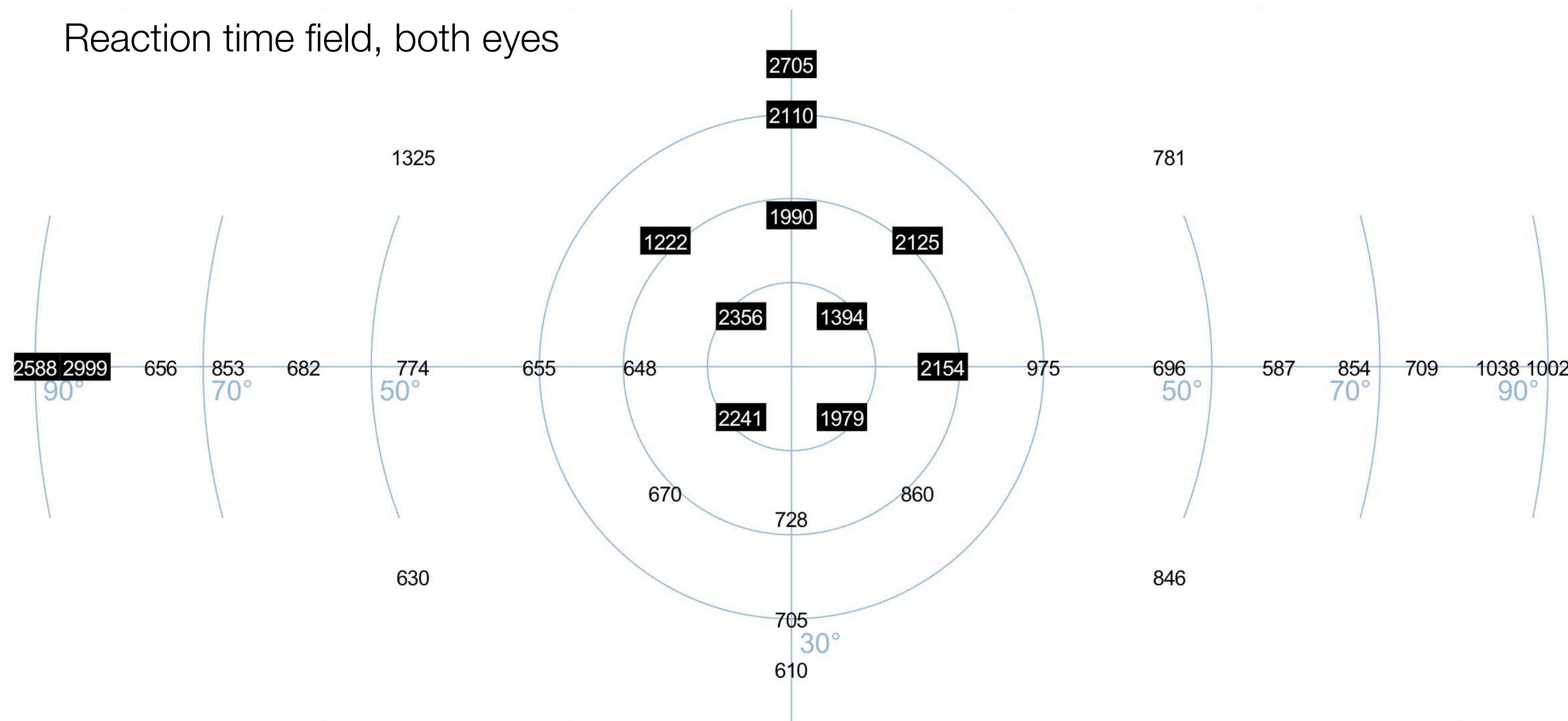


Test Duration: 05:36
Fovea: OFF



Born 1956 – Glaucoma, driver's license evaluation

Reaction time field, both eyes



RT Brigh FO [ms/%]	563 / 78
FR in Phases [%]	74 / 65 / 65
FO level used [dB]	22.7
Stim. level >30° [dB]	0
Stim. level ≤30° [dB]	20y norm. +8dB

RTP indexes	
Reaction Time (RT) [ms]	718
Fixation Obj.(FO) [dB]	26.0
Perception speed (PS) [°/s]	26.8
Fast Reactions (FR) [%]	65

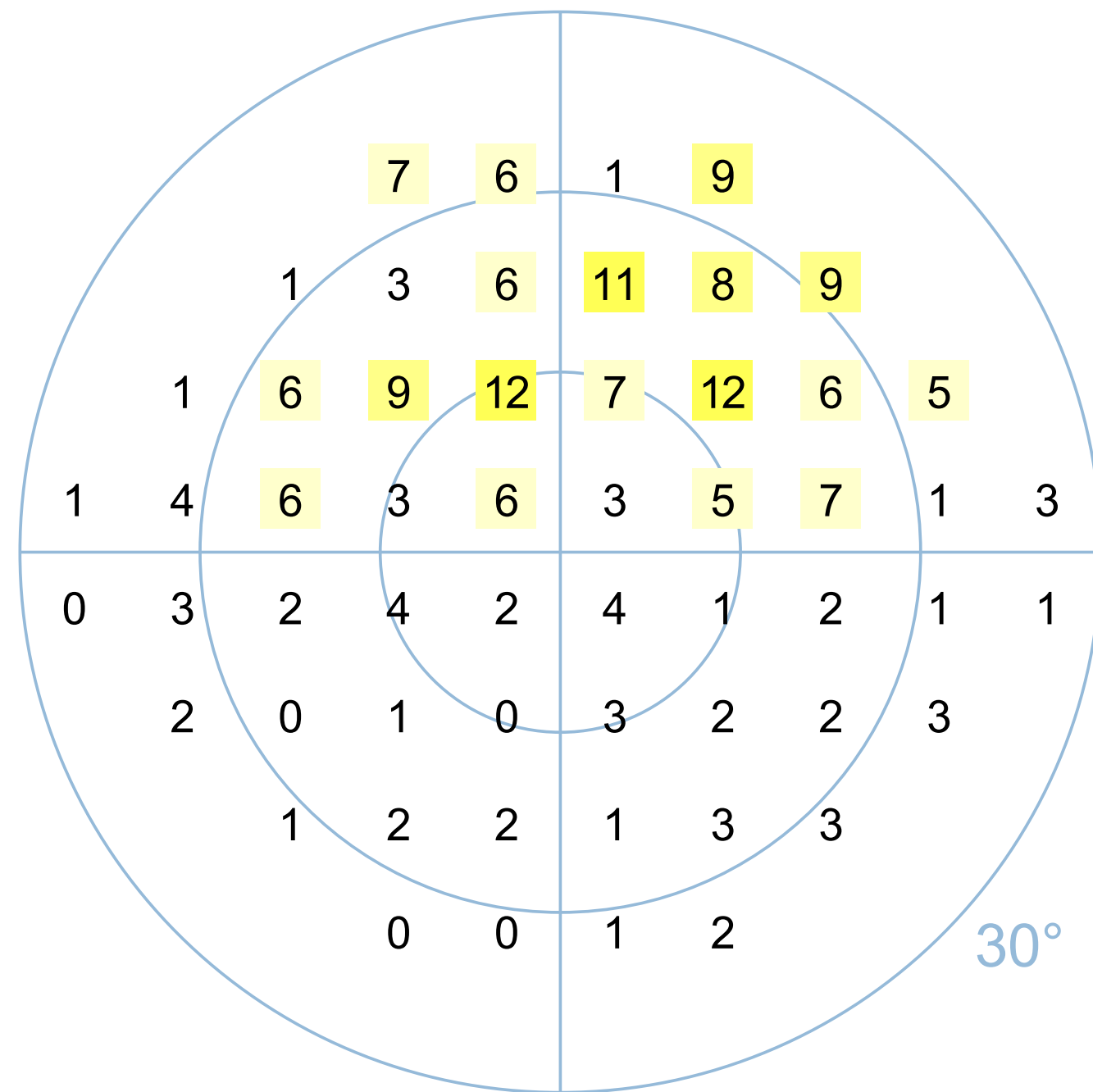
Reliability (RI) [>80 %]	100
Errors (E%) [<15 %]	4.6
Seen darks (FP)	0 / 9
Unseen brights (FN)	0 / 5
Duration (TD) [s]	251

Born 1956 – Glaucoma, driver's license evaluation

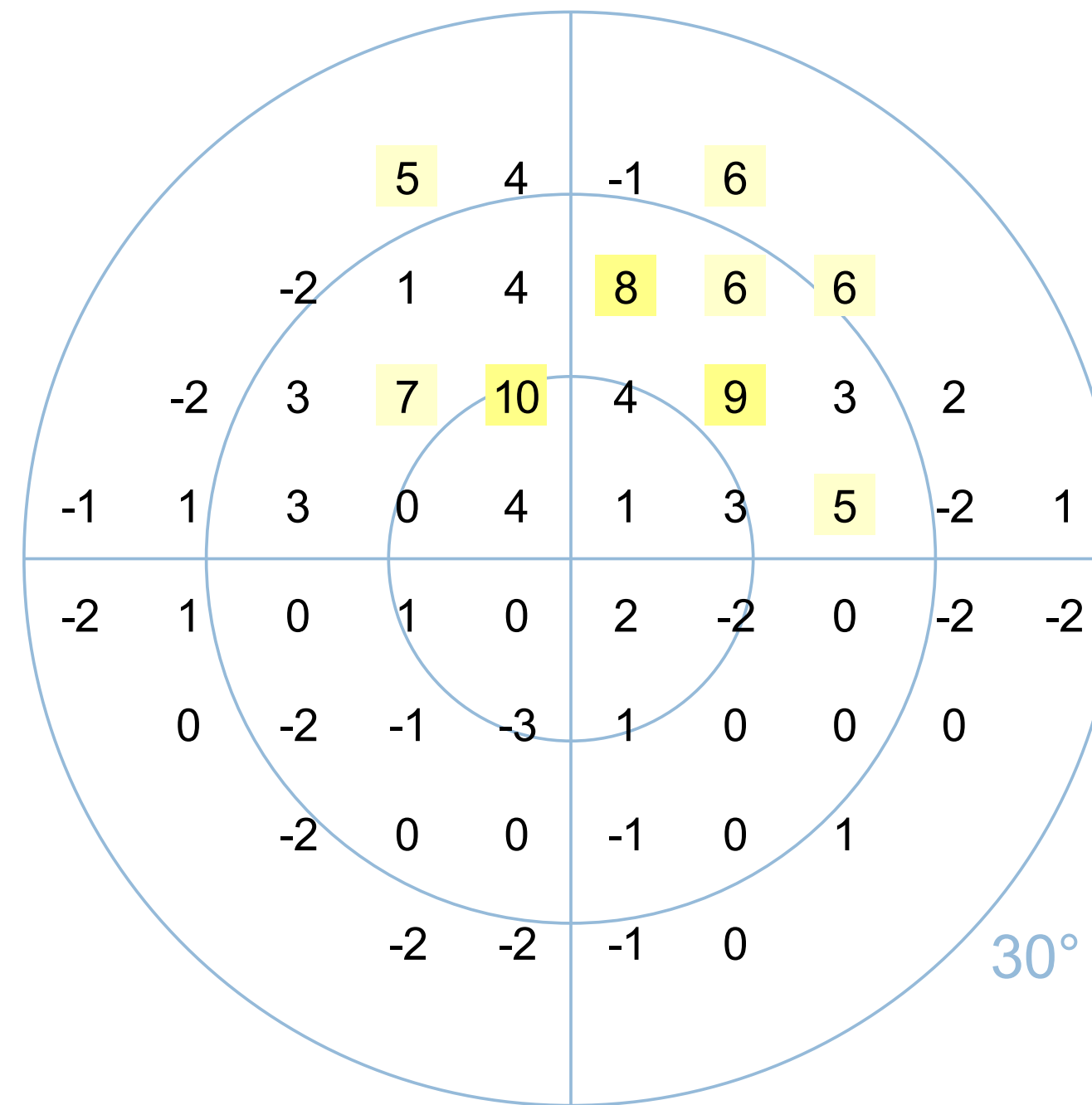


Visual field Threshold 24-2 (No glasses) Both

Defects (dB)



Local defects (dB)



<30° indexes	
Mean sens.(MS) [dB]	22.9
Mean dev.(MD) [<2.0 dB]	3.8
St.Loss Var.(sLV) [<2.5 dB]	3.1
Diffuse Defect (DD) [dB]	2.4

Reliability (RI) [>80 %]	91
Duration (TD) [s]	283
Seen darks (FP)	0 / 11
Unseen brights (FN)	2 / 11
Duration (TD) [s]	283
Questions	158
Avg. ambient light [cd/m2]	50

Threshold / 9L / 100ms / 42.5cm

The test result is reliable based on catch trial answers.

Vision tests done with both eyes open can hide defective vision of one eye.

Slightly lower than normal visual field sensitivity with local variation.

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Tests:

1) Visual acuity 2) Visual field 3) Contrast sensitivity 4) Reaction time field



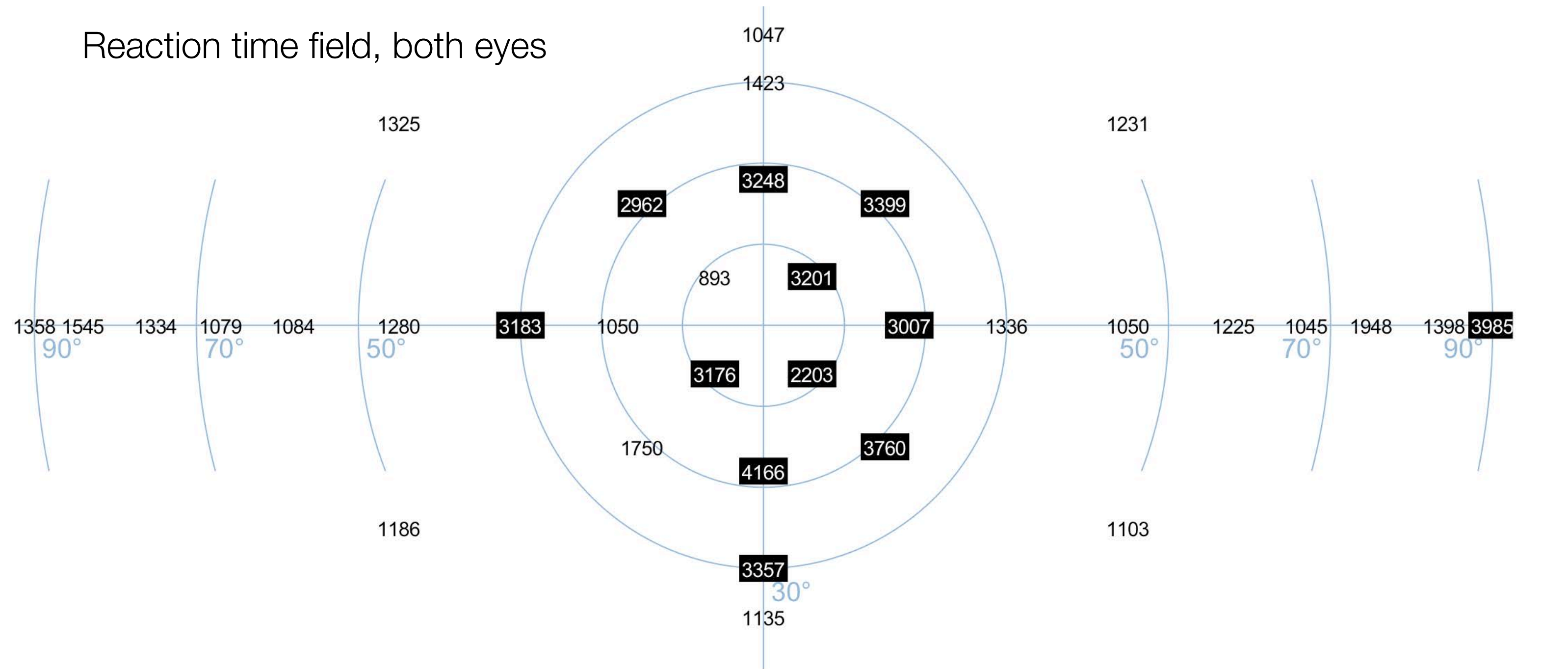
Born 1955: Glaucoma, driver's
license evaluation

Tests:

1) Reaction time field binocular
2) Visual field EU driver class 1 binocular

Born 1955, Driver's license evaluation

Reaction time field, both eyes



RT Brigh FO [ms/%]
 FR in Phases [%]
 FO level used [dB]
 Stim. level >30° [dB]
 Stim. level ≤30° [dB]

807 / 82
 56 / 62 / 65
 22.7
 0
 20y norm. +8dB

RTP indexes	
Reaction Time (RT) [ms]	988
Fixation Obj.(FO) [dB]	26.0
Perception speed (PS) [°/s]	17.8
Fast Reactions (FR) [%]	65

Reliability (RI) [>80 %] 92
 Errors (E%) [<15 %] 0.0
 Seen darks (FP) 0 / 6
 Unseen brights (FN) 1 / 6
 Duration (TD) [s] 476

Born 1955, Driver's license evaluation

Visual field Threshold EU Driver Class 1 (No glasses) Both

Vision tests done with both eyes open can hide defective vision of one eye.

3

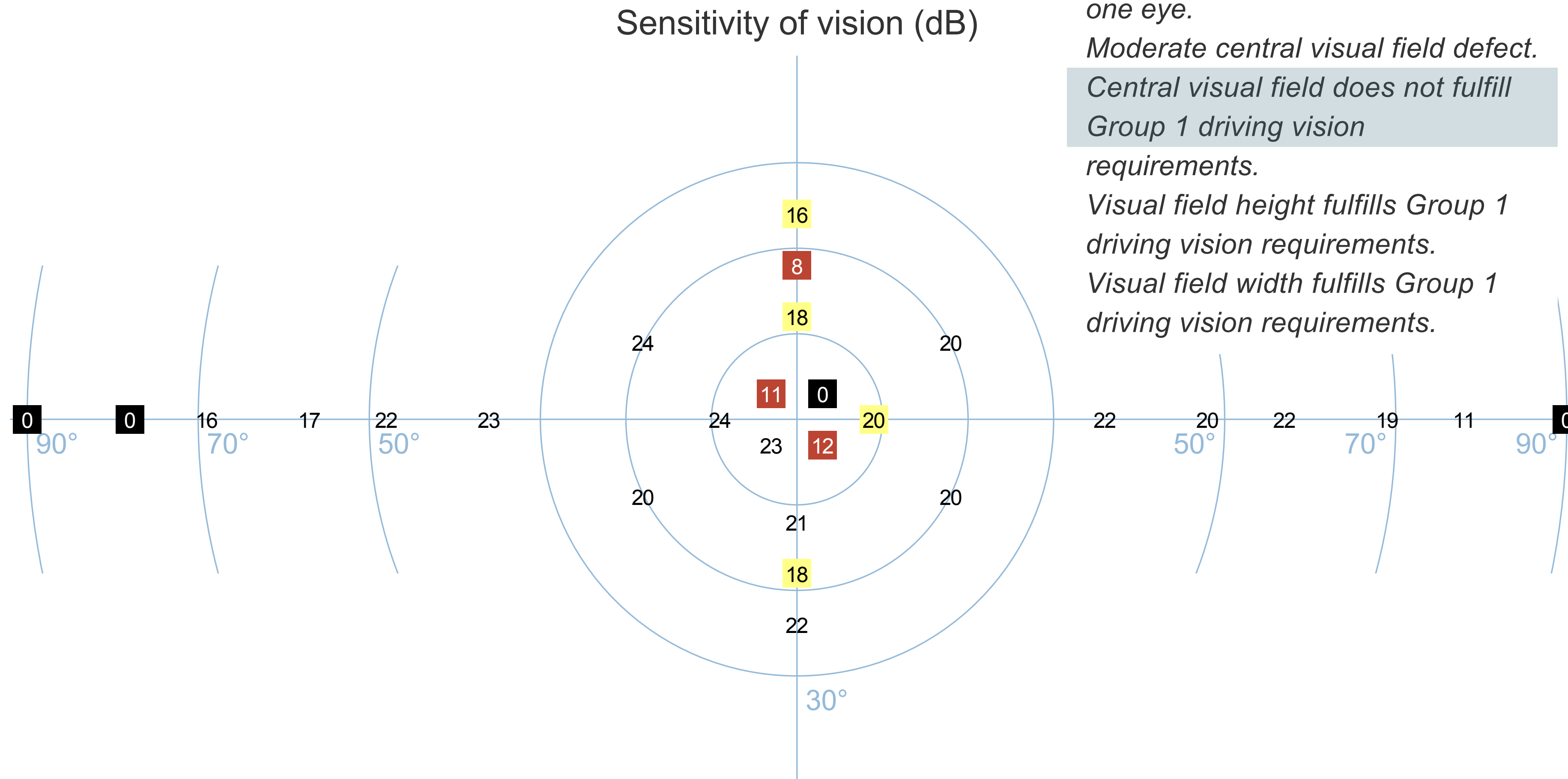
Moderate central visual field defect.

Central visual field does not fulfill Group 1 driving vision requirements.

requirements.

Visual field height fulfills Group 1 driving vision requirements.

Visual field width fulfills Group 1 driving vision requirements.



Driver evaluation: Ocusweep results requiring further actions based on automated statements and report findings



Statement or finding	Repeat measurement	Further testing	Consult eye doctor
Reliability < 80% (FP high → guessing, FN high → doesn't answer)	X		
Visual acuity (3 m) does not fulfill driving vision criterion *	X Near acuity bino	Check glasses 24-2 mono	X
Contrast sensitivity does not fulfill driving vision criterion *	X Contrast mono	10-1 mono Contrast mono	X
Central visual field does not fulfill driving vision requirements *	X	24-2 mono	X
Visual field height or width does not fulfill driving vision requirements *	X	OcuMap mono	X
Slightly lower than normal visual field sensitivity / Minor central visual field defect *	X	24-2 mono	
Local variation *	X	24-2 mono	
Moderate or significant visual field defect *	X	24-2 mono	

Visual functions and traffic accidents

Visual acuity

- Binocular visual acuity a stronger risk indicator than monocular (Alsbirk 1999)
- In UK 58% 71-75 year old drivers failed the number plate test
- The insufficiently accommodating and under-corrected hyperopic older drivers a significant problem in traffic



Visual functions and traffic accidents

Contrast sensitivity

- Stronger relation with traffic accidents and violations than visual acuity
- The highway sign discrimination seems more related to contrast sensitivity than to visual acuity
- The contrast sensitivity is significantly reduced in glare
- In darkness, perception of contrast compensates the loss of visual acuity and depth perception as well as chromatic vision
- Reduced contrast sensitivity appeared to be the visual variable that was most constantly and independently associated with increased accident risks (Alsbirk 1999)



Visual functions and traffic accidents

Visual field

- Clinical visual perimetry underestimates peripheral visual field problems in older adults (Ball et al, 1990) compared to the UFOV method.
- A visual field, artificially restricted to 40 degrees in young, normal subjects significantly reduced driving ability (Wood and Troutbeck, 1992).



Visual functions and traffic accidents

Central and paracentral visual field defects

- A two to three fold increase in accident risk was found in drivers aged > 50 with such defects.
- Significantly more defects were found in the non-police registered accidents
- The paracentral visual field is of utmost importance for traffic safety



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Tests:

1) Visual acuity 2) Visual field 3) Contrast sensitivity 4) Reaction time field

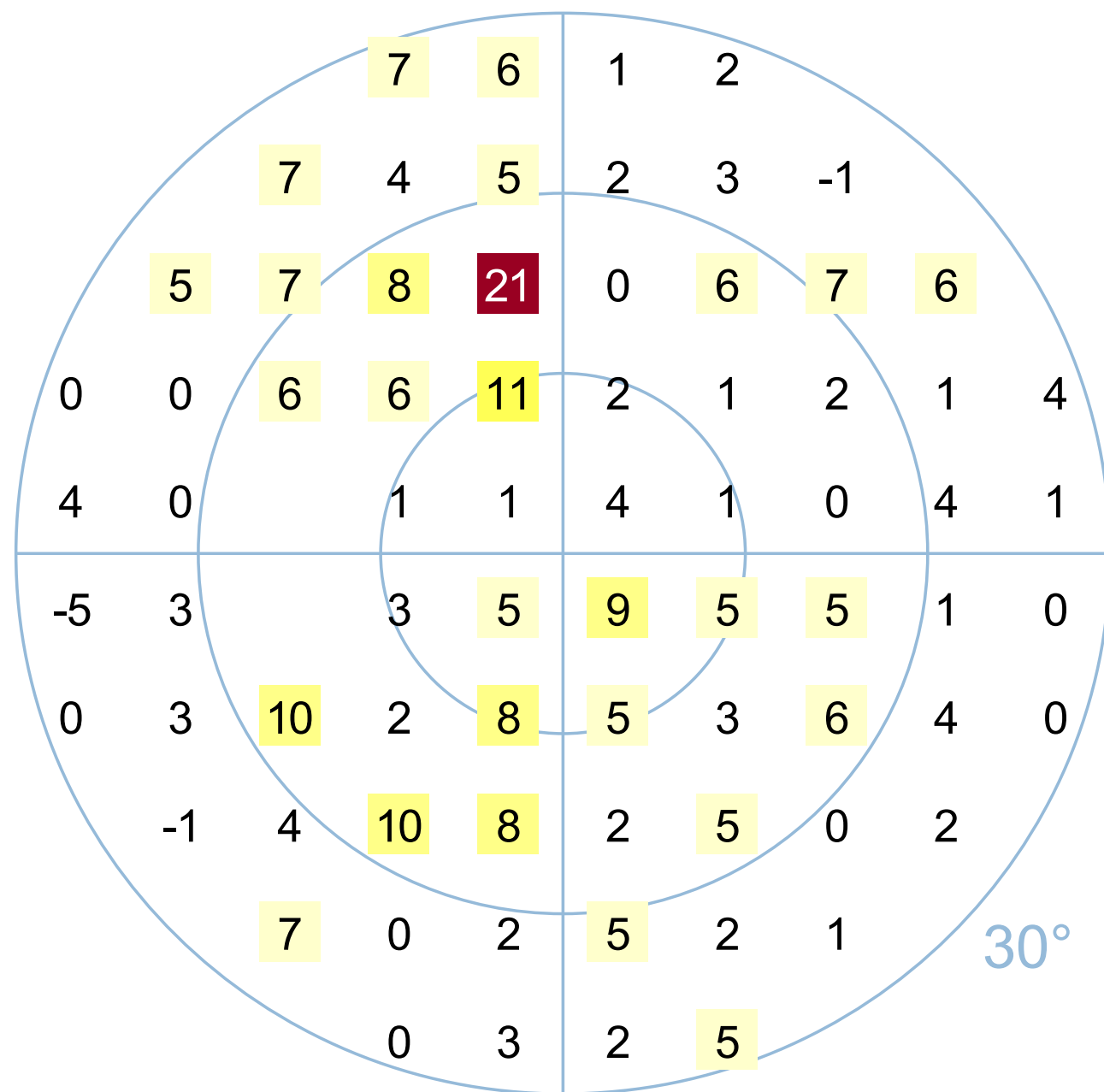


Born 1948: Glaucoma suspect,
Local variation in visual field

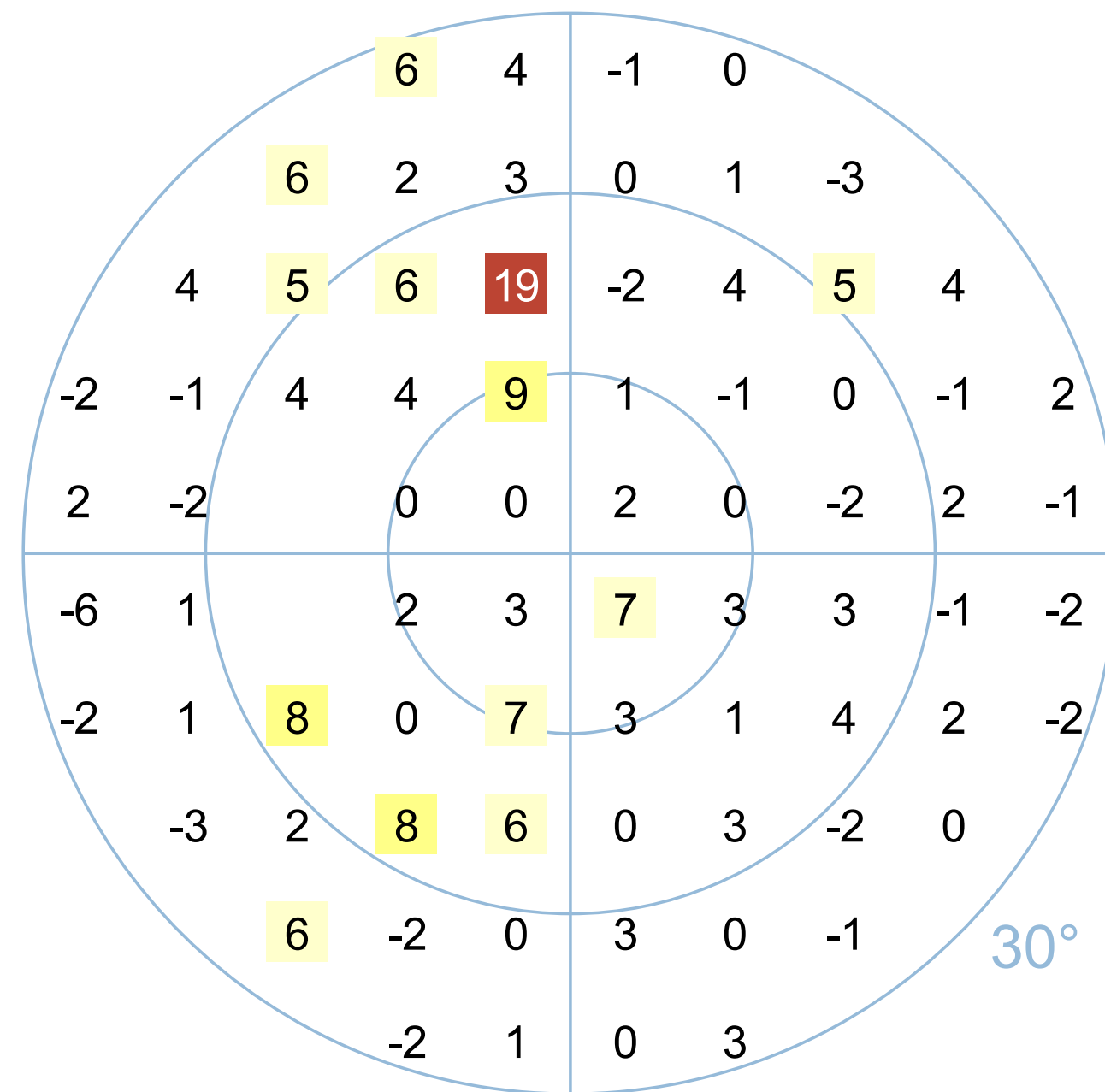
Tests:
1) Visual field 30° (30-2)

Born 1948: Glaucoma suspect, Local variation in VF

Defects (dB)



Local defects (dB)



<30° indexes	
Mean sens.(MS) [dB]	20.1
Mean dev.(MD) [<2.0 dB]	3.8
St.Loss Var.(sLV) [<2.5 dB]	3.7
Diffuse Defect (DD) [dB]	1.9

Reliability (RI) [>80 %]	80
Duration (TD) [s]	698
Seen darks (FP)	2 / 24
Unseen brights (FN)	8 / 27
Duration (TD) [s]	698
Questions	314
Avg. ambient light [cd/m2]	152

Threshold / 9L / 100ms / 42.5cm
The test result is reliable based on catch trial answers.

Slightly lower than normal visual field sensitivity with local variation.

Ocusweep results requiring further actions based on automated statements and report findings



Statement or finding	Index limit	Repeat measurement	Follow-up	Consult eye doctor if repeatable finding
Reliability < 80% (FP high → guessing, FN high → doesn't answer)		X		
Slightly lower than normal visual field sensitivity / Minor central visual field defect *	MD > 2 dB MD < 6 dB	X	X	
Local variation *	sLV > 2.5 dB	X		X
Moderate or significant visual field defect *	MD ≥ 6 dB	X		X
24-2/30-2: Adjacent local defects	≥ 5 dB	X		X
10-1: Single local defect	≥ 5 dB	X		X
OcuMap: Single local defect (excluding 90° and 4 locations in far nasal side)	≥ 5 dB	Measure also 24-2 or 10-1		X
Contrast sensitivity below normal	Worse than 95% confidence limit	Measure also 10-1		X

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Tests:

1) Visual acuity 2) Visual field 3) Contrast sensitivity 4) Reaction time field



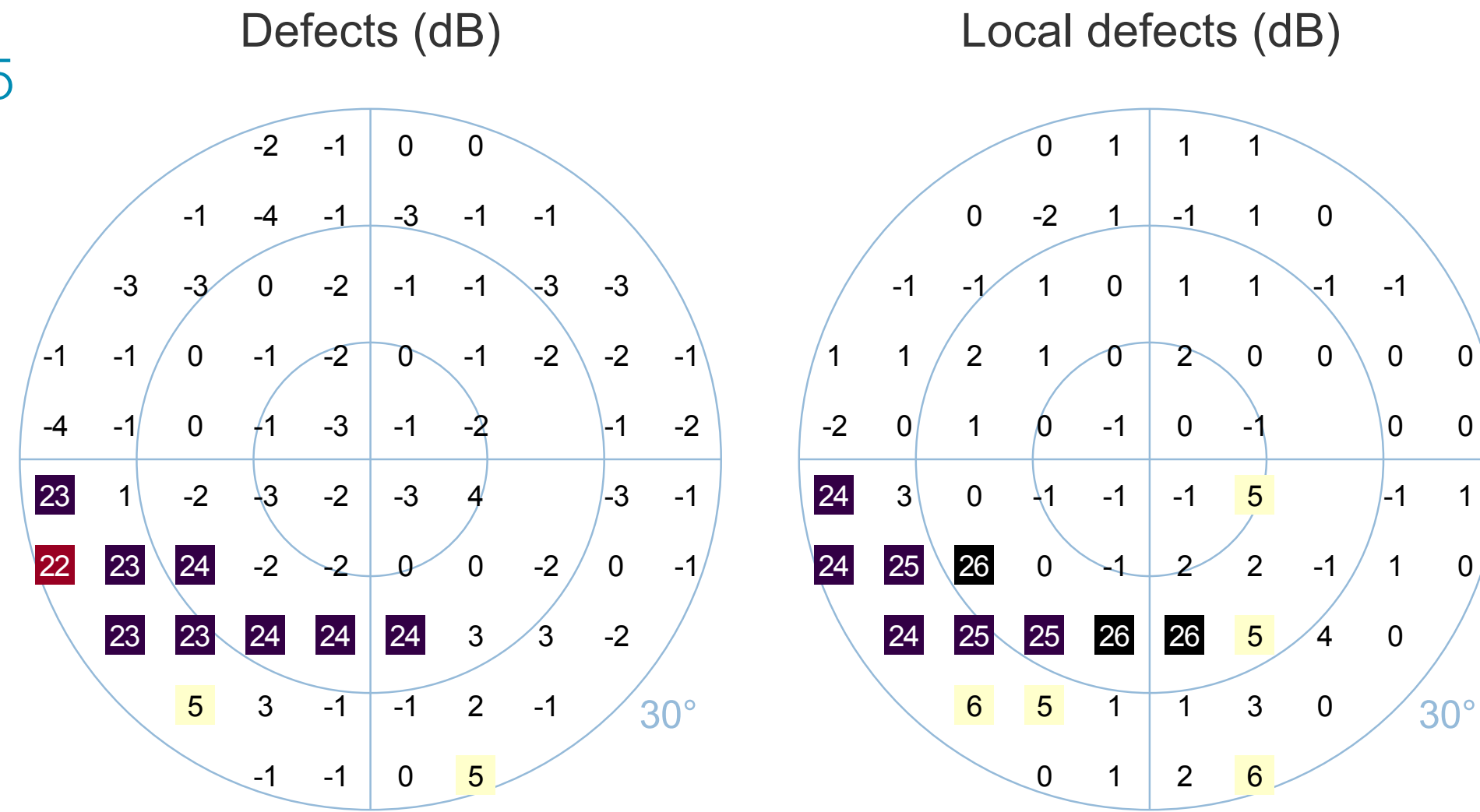
Born 1948: Scotoma follow-up

Tests:

1) Visual field 30° (30-2)
2) Visual field 30° 1.5 years later

Born 1948: Scotoma follow-up

July 2015



<30° indexes	
Mean sens.(MS) [dB]	21.8
Mean dev.(MD) [<2.0 dB]	2.1
St.Loss Var.(sLV) [<2.5 dB]	8.1
Diffuse Defect (DD) [dB]	-1.5

Reliability (RI) [>80 %]	93
Duration (TD) [s]	360
Seen darks (FP)	0 / 10
Unseen brights (FN)	2 / 17
Duration (TD) [s]	360
Questions	260
Avg. ambient light [cd/m2]	81

Threshold / 9L / 100ms / 42.5cm

Early central visual field defect with local variation.

Mean sens.(MS) [dB]	21.7
Mean dev.(MD) [<2.0 dB]	2.1
St.Loss Var.(sLV) [<2.5 dB]	7.2
Diffuse Defect (DD) [dB]	-0.4

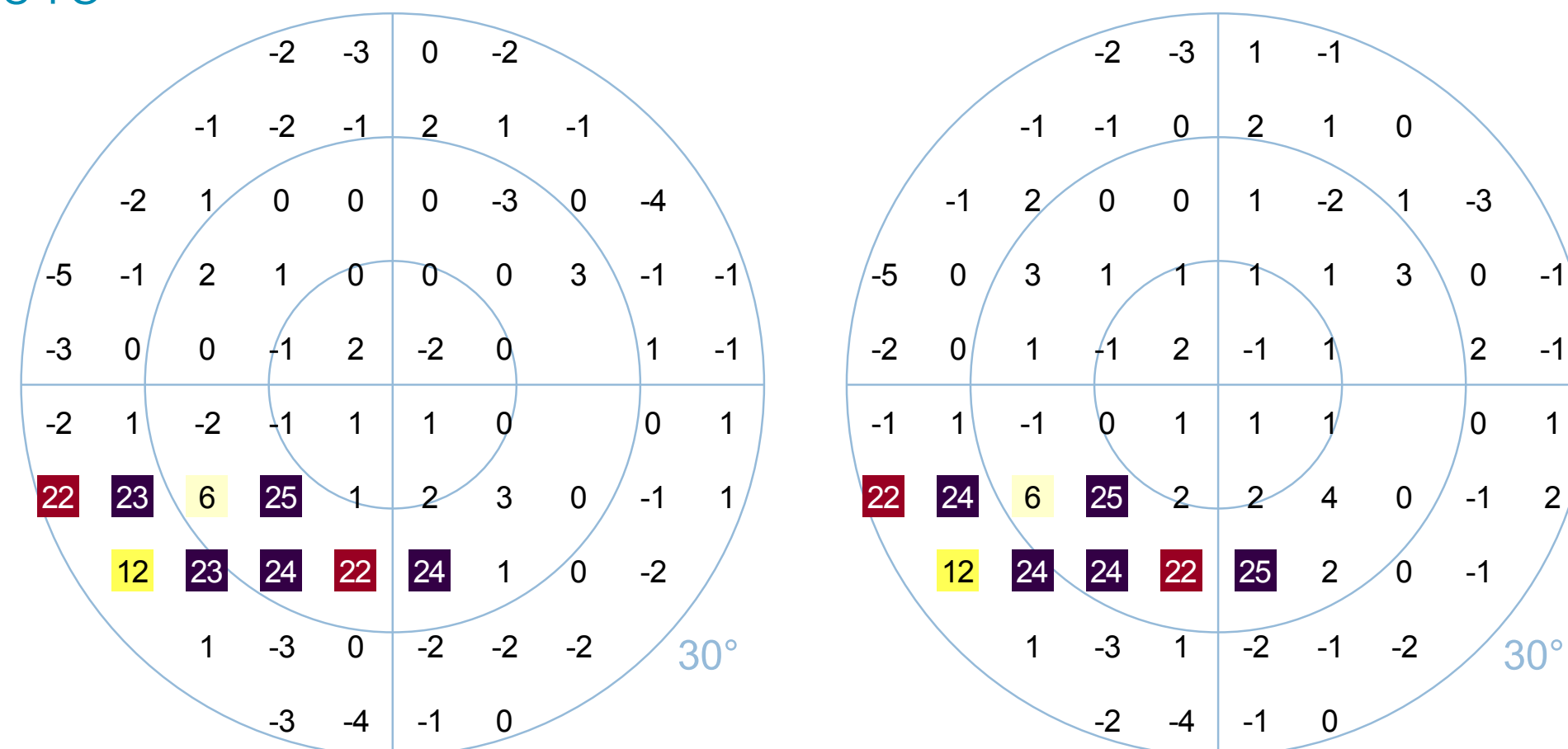
Reliability (RI) [>80 %]	98
Duration (TD) [s]	507
Seen darks (FP)	0 / 26
Unseen brights (FN)	1 / 31
Duration (TD) [s]	507
Questions	318
Avg. ambient light [cd/m2]	198

Threshold / 9L / 100ms / 42.5cm

The test result is reliable based on catch trial answers.

Slightly lower than normal visual field sensitivity with local variation.

November 2016



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Tests:

1) Visual acuity 2) Visual field 3) Contrast sensitivity 4) Reaction time field



Born 1940: Corneal dystrophy,
macular drusen, mild cataract

Tests:

1) Visual acuity
2) Contrast sensitivity
3) Visual field 10° (10-1)

Born 1940: Corneal dystrophy, macular drusen, mild cataracta



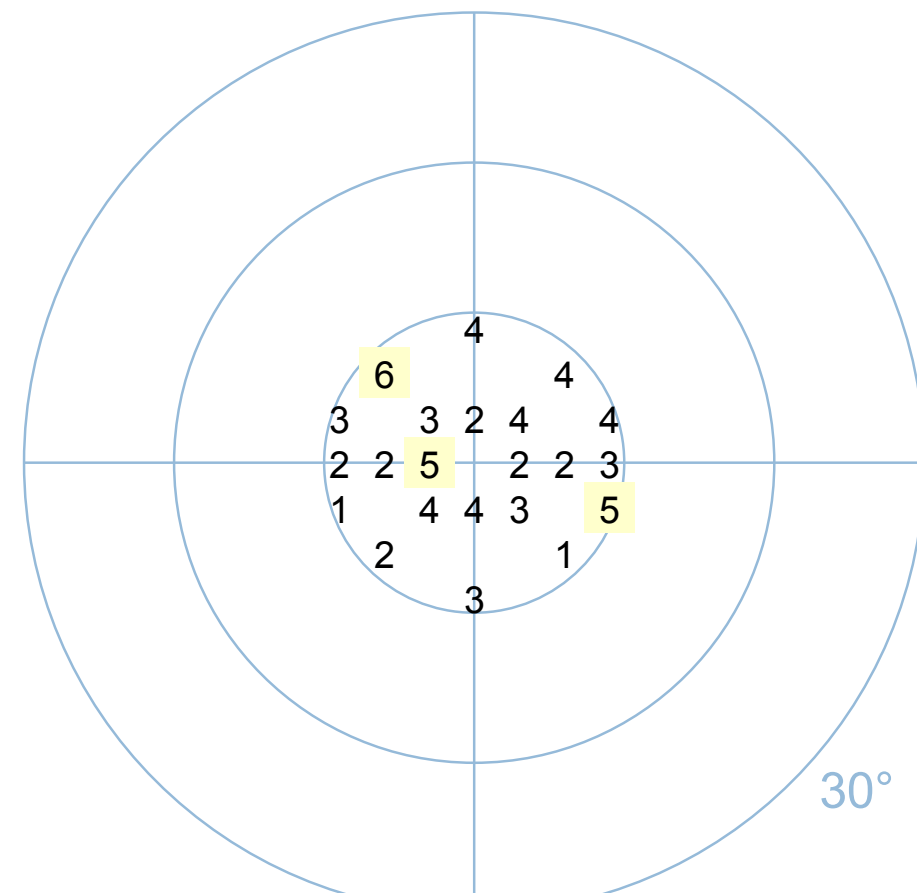
	Right	Both	Left	
Visual acuity 3m (Far+Near)				1
	0.45		0.48	[>1.00 Dec]
Reliability (RI)	80		80	[>80 %]
Errors (E%)	0.0		0.0	[<20 %]
Duration (TD)	29		30	[<50 s]
Automated statement	<p><i>The test result is reliable based on catch trial answers, error rate in directions and testing time.</i></p> <p><i>Near-normal vision.</i></p> <p><i>Group 1 driving vision criterion for one eyed driver is not fulfilled.</i></p> <p><i>Fulfills Group 2 driving vision criterion for eye with lower visual acuity.</i></p>		<p><i>The test result is reliable based on catch trial answers, error rate in directions and testing time.</i></p> <p><i>Near-normal vision.</i></p> <p><i>Group 1 driving vision criterion for one eyed driver is not fulfilled.</i></p> <p><i>Does not fulfill Group 2 driving vision criterion for better eye.</i></p>	

	Right	Both	Left	
Contrast sensitivity (No glasses)				2
	5		4.7	[<3.4 %]
Reliability (RI)	100		100	[>80 %]
Errors (E%)	0.0		0.0	[<20 %]
Duration (TD)	31		36	[<60 s]
Automated statement	<p><i>The test result is reliable based on catch trial answers, error rate in directions and testing time.</i></p> <p><i>Contrast sensitivity below normal.</i></p> <p><i>Contrast sensitivity does not fulfill Group 2 driving vision requirements.</i></p>		<p><i>The test result is reliable based on catch trial answers, error rate in directions and testing time.</i></p> <p><i>Contrast sensitivity below normal.</i></p> <p><i>Contrast sensitivity does not fulfill Group 2 driving vision requirements.</i></p>	

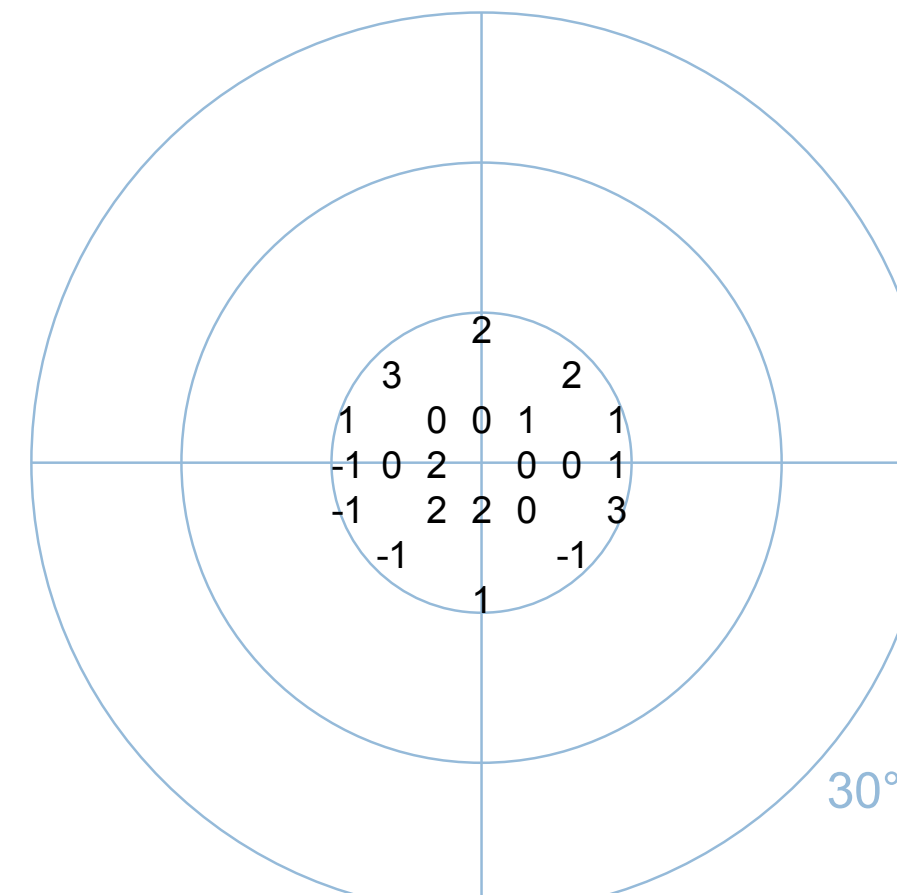
Born 1940: Corneal dystrophy, macular drusen, mild cataracta

Right eye

Defects (dB)



Local defects (dB)

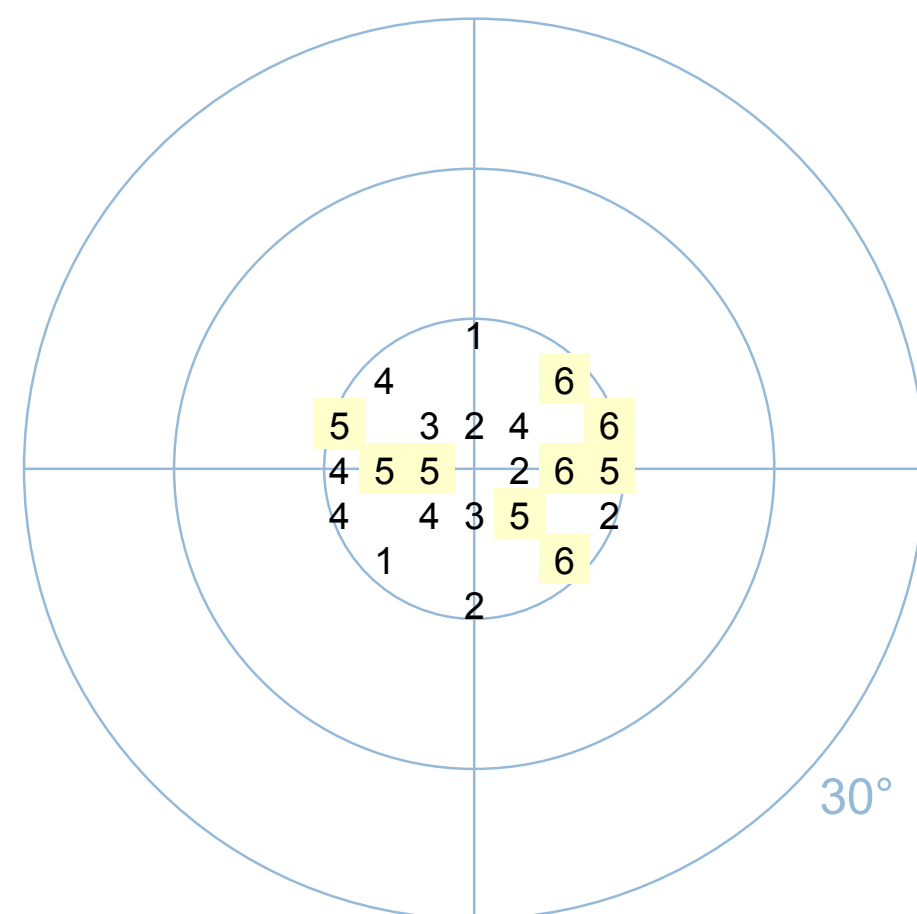


<30° indexes	
Mean sens.(MS) [dB]	22.2
Mean dev.(MD) [<2.0 dB]	3.3
St.Loss Var.(sLV) [<2.5 dB]	1.2
Diffuse Defect (DD) [dB]	2.4

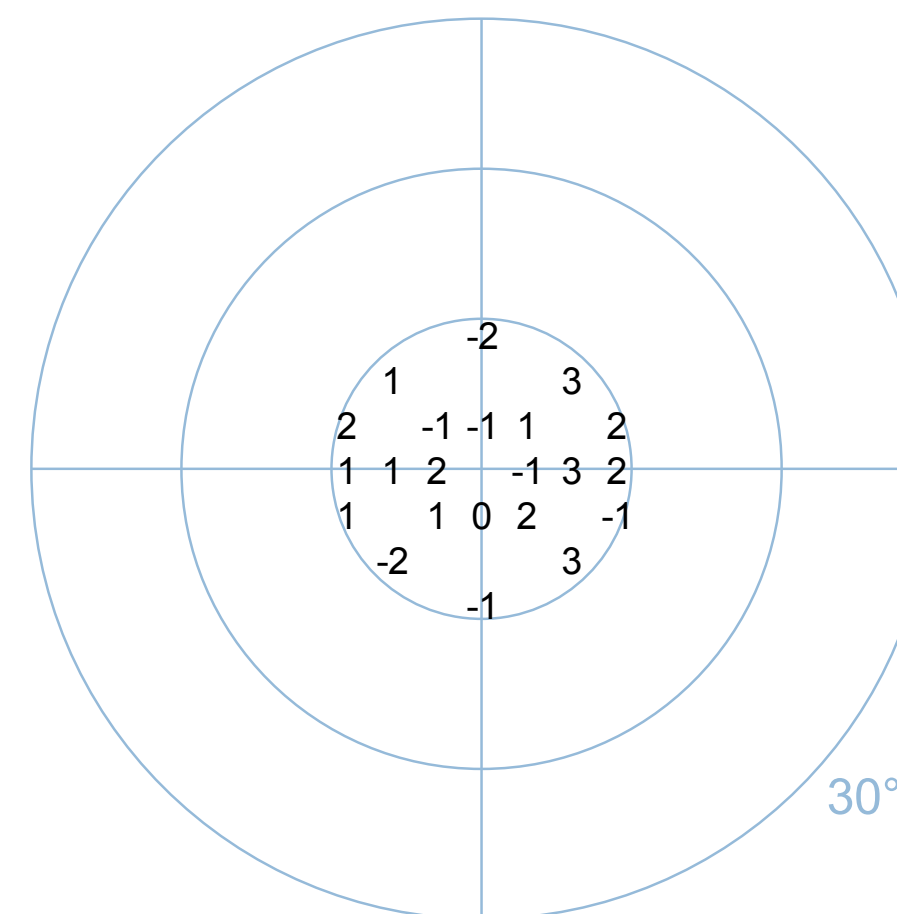
Reliability (RI) [>80 %]	100
Duration (TD) [s]	123
Seen darks (FP)	0 / 3
Unseen brights (FN)	0 / 3
Duration (TD) [s]	123
Questions	54
Avg. ambient light [cd/m2]	265
Threshold / 9L / 100ms / 42.5cm	
<i>Slightly lower than normal visual field</i>	

Left eye

Defects (dB)



Local defects (dB)



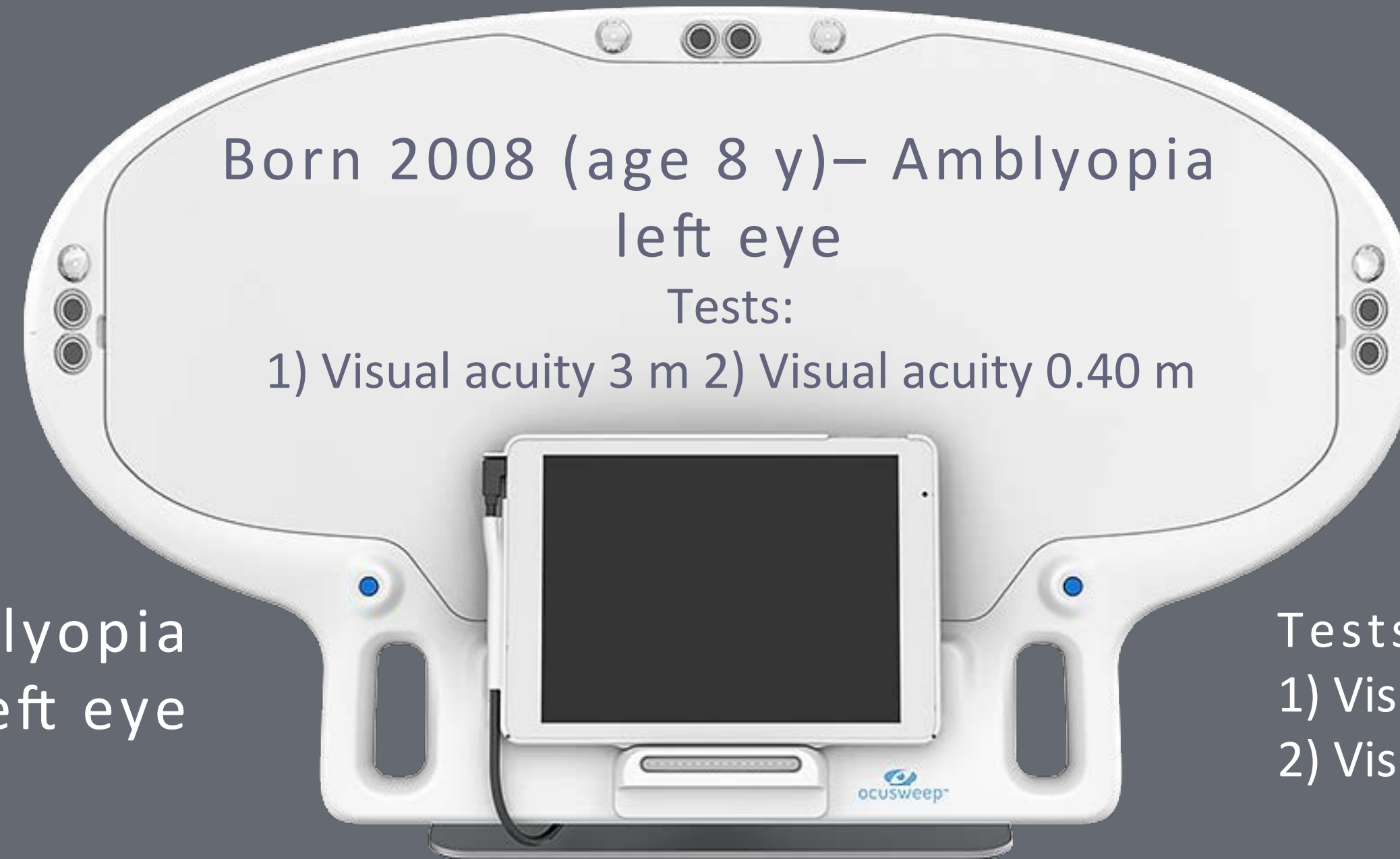
<30° indexes	
Mean sens.(MS) [dB]	21.4
Mean dev.(MD) [<2.0 dB]	4.0
St.Loss Var.(sLV) [<2.5 dB]	1.6
Diffuse Defect (DD) [dB]	3.1

Reliability (RI) [>80 %]	100
Duration (TD) [s]	126
Seen darks (FP)	0 / 4
Unseen brights (FN)	0 / 4
Duration (TD) [s]	126
Questions	58
Avg. ambient light [cd/m2]	260
Threshold / 9L / 100ms / 42.5cm	
<i>Slightly lower than normal visual field sensitivity, no local variation.</i>	

OCUSWEEP

Tests:

1) Visual acuity 2) Visual field 3) Contrast sensitivity 4) Reaction time field



Born 2008 (age 8 y)– Amblyopia
left eye

Tests:

1) Visual acuity 3 m 2) Visual acuity 0.40 m

Born 2008 (age 8 y): Amblyopia
left eye

Tests:

1) Visual acuity 3 m
2) Visual acuity 0.40 m

Born 2008 (age 8 y): Amblyopia left eye

	Right	Both	Left	
Visual acuity 3m (No glasses)				1
	<u>0.66</u>		<u>0.45</u>	[>1.00 Dec]
Reliability (RI)	100		100	[>80 %]
Errors (E%)	0.0		0.0	[<20 %]
Duration (TD)	34		27	[<50 s]
Automated statement	<p><i>The test result is reliable based on catch trial answers, error rate in directions and testing time.</i> <i>Near-normal vision.</i> <i>Fulfills Group 1 driving vision criterion for one eyed driver.</i> <i>Does not fulfill Group 2 driving vision criterion for better eye.</i></p>		<p><i>The test result is reliable based on catch trial answers, error rate in directions and testing time.</i> <i>Near-normal vision.</i> <i>Group 1 driving vision criterion for one eyed driver is not fulfilled.</i> <i>Fulfills Group 2 driving vision criterion for eye with lower visual acuity.</i></p>	



	Right	Both	Left	
Visual acuity 40cm (No glasses)				2
	<u>0.51</u>		<u>0.35</u>	[>1.00 Dec]
Reliability (RI)	100		100	[>80 %]
Errors (E%)	0.0		0.0	[<20 %]
Duration (TD)	31		34	[<50 s]
Automated statement	<p><i>The test result is reliable based on catch trial answers, error rate in directions and testing time.</i> <i>Near-normal vision.</i></p>		<p><i>The test result is reliable based on catch trial answers, error rate in directions and testing time.</i> <i>Near-normal vision.</i></p>	



There's more to vision than meets the eye.



OCUSWEEP™
FIND OUT YOUR TRUE VISION

Ocusweep in Vision Health Evaluation

Ocusweep screening tests if fundus photography is normal or missing

Eye pressure > 21, or age > 45 y and positive family history of glaucoma

Glaucoma screening

→ Monocular: 24-2 VF, Contrast test and Visual acuity

Age > 55 y and positive family history of AMD OR the person has diabetes

Macular screening

→ Monocular: 10-1 VF, Contrast test and Visual acuity
Binocular: OcuMap VF (for revealing neurological defects)

Not a member of previous groups; no visual symptoms

General screening

→ Monocular: OcuMap VF, Contrast test and Visual acuity

Ocusweep screening tests if fundus photography is abnormal

Suspicious optic nerve head

→ Monocular OD & OS: 24-2 VF, Contrast test, Visual acuity

Suspected retinal detachment or retinal break especially with visual symptoms (floaters, flashes of light)

→ Monocular: OcuMap VF, Contrast test, Visual acuity

Macular pathology (atrophy, RPE degeneration, exudates, edema, drusen, pucker, hole, etc.)

→ Monocular: 10-1 VF, Contrast test, Visual acuity

Something else

→ Monocular: Depending on the location of the pathology OcuMap VF, 24-2 VF or 10-1 VF; Contrast test, Visual acuity

Ocusweep results requiring further actions based on automated statements and report findings

Statement or finding	Index limit	Repeat measurement	Follow-up	Consult eye doctor if repeatable finding
Reliability < 80% (FP high → guessing, FN high → doesn't answer)		X		
Slightly lower than normal visual field sensitivity / Minor central visual field defect *	MD > 2 dB MD < 6 dB	X	X	
Local variation *	sLV > 2.5 dB	X		X
Moderate or significant visual field defect *	MD ≥ 6 dB	X		X
24-2/30-2: Adjacent local defects	≥ 5 dB	X		X
10-1: Single local defect	≥ 5 dB	X		X
OcuMap: Single local defect (excluding 90° and 4 locations in far nasal side)	≥ 5 dB	Measure also 24-2 or 10-1		X
Contrast sensitivity below normal	Worse than 95% confidence limit	Measure also 10-1		X

Driver evaluation: Ocusweep results requiring further actions based on automated statements and report findings

Statement or finding	Repeat measurement	Further testing	Consult eye doctor
Reliability < 80% (FP high → guessing, FN high → doesn't answer)	X		
Visual acuity (3 m) does not fulfill driving vision criterion *	X Near acuity bino	Check glasses 24-2 mono	X
Contrast sensitivity does not fulfill driving vision criterion *	X Contrast mono	10-1 mono Contrast mono	X
Central visual field does not fulfill driving vision requirements *	X	24-2 mono	X
Visual field height or width does not fulfill driving vision requirements *	X	OcuMap mono	X
Slightly lower than normal visual field sensitivity / Minor central visual field defect *	X	24-2 mono	
Local variation *	X	24-2 mono	
Moderate or significant visual field defect *	X	24-2 mono	

Reaction Time Field as a Screening Test

- Screening
 - Accuracy of eye movements (can you find the arrow at the location marked by a flash)
 - The speed of visual decision making (Reaction time, Perception speed, PS)
 - Attentive capabilities during the test (sustaining, dividing, shifting)
 - Pattern recognition (the arrow is composed of dots)
 - Visual field (see the flashes)

Reaction time field: Ocusweep results requiring further actions based on report findings

Statement or finding	Repeat measurement	Further testing	Consult eye doctor
Reliability < 80% (FP high → guessing, FN high → doesn't answer)	X		
Black rectangles (slow reaction time) in central visual field (30°)	X	24-2 mono	X
Black rectangles (slow reaction time) in peripheral visual field (> 30°)	X	OcuMap mono	X
The person can't do the test	X	General screening	