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Bioptic Driving: Overview, Update, and Basic Readiness

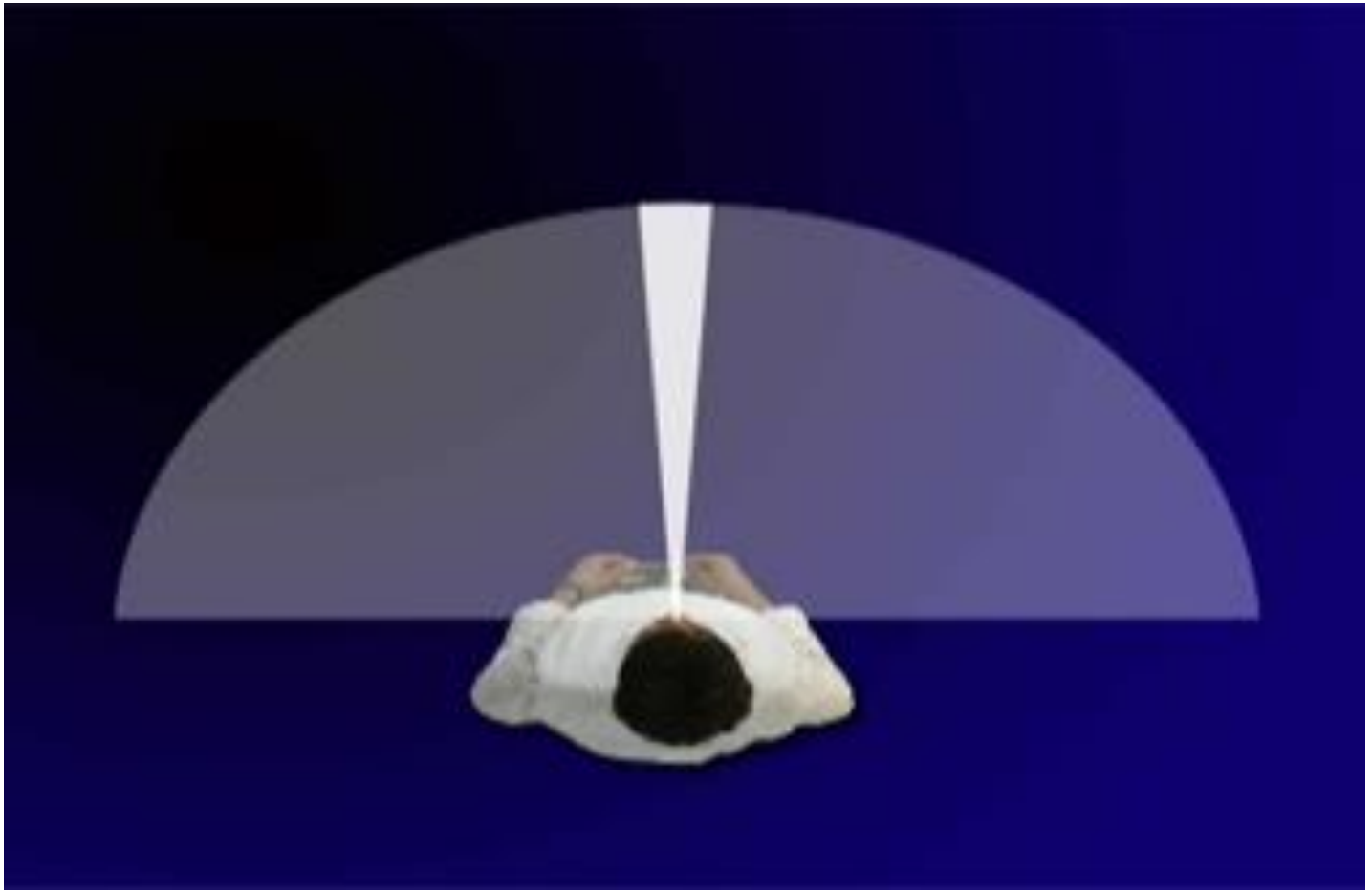
Objectives

- Definition of bioptics & bioptic driving
- Basics types and characteristics of bioptics
- Basic bioptic usage and benefit during driving
- Candidacy and status of bioptic driving
- Role of COMS – basic pre-driver readiness
- Time for Q & A
- Mobility challenges of persons with vision impairment

Bioptic telescopic lens system?

- More commonly known as a “bioptic” or “BTLS”
- Combination carrier and telescopic lens unit system
- Prescription in nature

Central vs. side vision



Source: BiopticDrivingUSA.com

Bioptic driving?

- Answer: Operation of a private motor vehicle by a person who uses a duo optical lens system* to accommodate for known central vision loss

* Lynne Noon, O.D., F.A.A.O., Diplomate in Low Vision Rehabilitation

Bioptic telescopic lens systems

Galilean Lens Systems

Keplerian Lens Systems

Bioptic telescopic lens systems

Galilean lens systems

- Fixed -focus
- Smaller in size
- Lighter in weight
- Smaller field of view
- Brighter image due to only 4 lens surfaces
- Made up to 4X

* Source: Dr. Lynne P. Noon, O.D., FAAO, noon@ViewFinderLowVision.com

Keplerian lens systems

- Variable-focus
- Longer in size
- Heavier in weight
- Larger field of view
- Less bright image due to 8-10 lens surfaces
- Made up to 14X

- Sources: Dr. Lynne P. Noon, O.D., FAAO, noon@ViewFinderLowVision.com
- Dr. Laura S. Miller, O.D., Northwest Hills Eye Care, www.nwhillseyecare.com

Common misconception re size and strength of miniature telescopes

- The telescopic unit associated with a typical bioptic telescopic lens system can vary is size and field of view but still offer the same X-power strength.

Sampling: telescopic fields of view

Manufacturer **Monocular field of view (°)**

Designs For Vision, Inc.

- 2.2X WA, 2.2X BIO I, 2.2X BIO II Galilean …….16°, 12°, 11°
- 3.0X WA BIO I; 3X BIO I, 4X BIO I Galilean 11, 8, 6

Ocutech, Inc.

- 1.7X, 2.2X Sight Scope Flip ……26°, 18°
- 3.0X VES Mini ……15°
- 4X VES – K ……12.5°

Conforma

- 4X ½ BITA ……8.5°

Keplerian systems (5.0 X or greater)?

- Ocutech 5.0 X VES (upper left)
- DVI 5.0 X EFP (upper right)
- Beecher Mirage 5.5X (lower left)
- Fields of view: 10.5°, 8.0°,and 12.0° respectively

Sampling: telescopic fields of view (°)

Manufacturer **Monocular field of view** (°, degrees)

Ocutech, Inc.

- 5.0X, 6.0X VES Sport II ..... 10.5°, 9.6°
- 5.5X VES Falcon ..... 9.5°

Designs For Vision, Inc. (DVI)

- 5.0X, 6.0X EFP Keplarian ..... 8.0°, 6.5°

Conforma

- 5.0X, 6.0X ½ BITA ..... 7.0°, 6.5°

Beecher Optical

- 5.5X, 7X, 8X Beecher Mirage ..... 12°, 9°, 8°

Higher power bioptic concerns:

- **Jack in-the-box effect** …… sudden and unexpected appearance of objects or forms in magnified field of view …… nearness illusion ….. sudden and unexpected braking … rear end accident
- **More of a challenge to visually locate smaller-in-size targets** (i.e., traffic light, no turn on red sign, etc.) as user gets closer to intersection

Major BTLS manufacturers & vendors:

- **Designs For Vision, Inc., (DVI)**
  - Jody Klager, jody@dvimail.com
  - 1-800-345-4009
- **Ocutech, Inc. (VES)**
  - Dawn Jarvis, d.jarvis@ocutech.com
  - 1-800-326-6460, info@ocutech.com
- **Conforma contact lens (BITA)**
  - Teri S. Mackley, tmackley@conforma.com
  - 1-757-321-0186

Basic usage during driving

Carrier lens viewing (97%)

Telescopic lens viewing (3%)

What benefit does a person with low vision derive from using a bioptic telescopic lens system while driving?

Answer: increases user's "margin of safety"!

- A bioptic lens system allows the user to increase their "***margin of safety***"; that is the time or linear distance equivalent to detect, identify, predict and decide, whether a change in speed or lane position is needed, as they approach a critical object or condition.

How many critical objects/forms or conditions can you detect and identify out to the nearest traffic light-controlled intersection?

What driving maneuver can not be undertaken legally at the approaching traffic light- controlled intersection and why?

How is traffic controlled at the second intersection ahead?

What two (2) basic driving skills must a driver incorporate to follow the instructed hand & arm signals and avoid collision with first responders positioned at the intersection ahead?

Candidacy for bioptic driving?

- Stable, long standing eye condition
- Best corrected visual acuity (BCVA) between 20/70-20/200 inclusive
- Field of view of 120° H, 80° V
- Enhanced acuity to 20/60 or better through scope
- Color awareness to differentiate color change on traffic lights, lane markings, road signs, brake lights, turn signals and emergency vehicles
- Participation & completion of driver's training

First set of vision standards for a limited driver's license*

- As proposed by the American Medical Association's Committee on Vision Standards for Drivers of Motor Vehicles, Oct. '37:
  - Best corrected visual acuity (BCVA) of 20/65 in the better eye
  - Field of view extending to 125° horizontally in one eye
  - Absence of diplopia

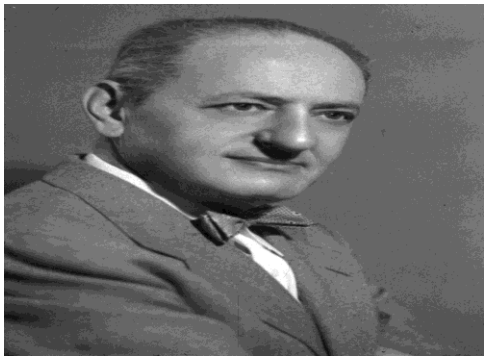
*Johnson & Wilkinson: *J Neuro-Ophthalmology 2010; 30:170-176 (Vision standards should not be arbitrarily set; because driver safety is also dependent on factors such as: driver's aptitude, driving experience and general mental and physical fitness). Pictured 1937 Chevrolet Coupe*

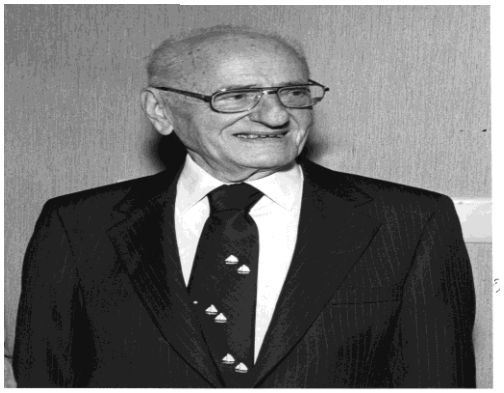
William A. Feinbloom, OD, FAAO (1/10/04 -1/21/85)

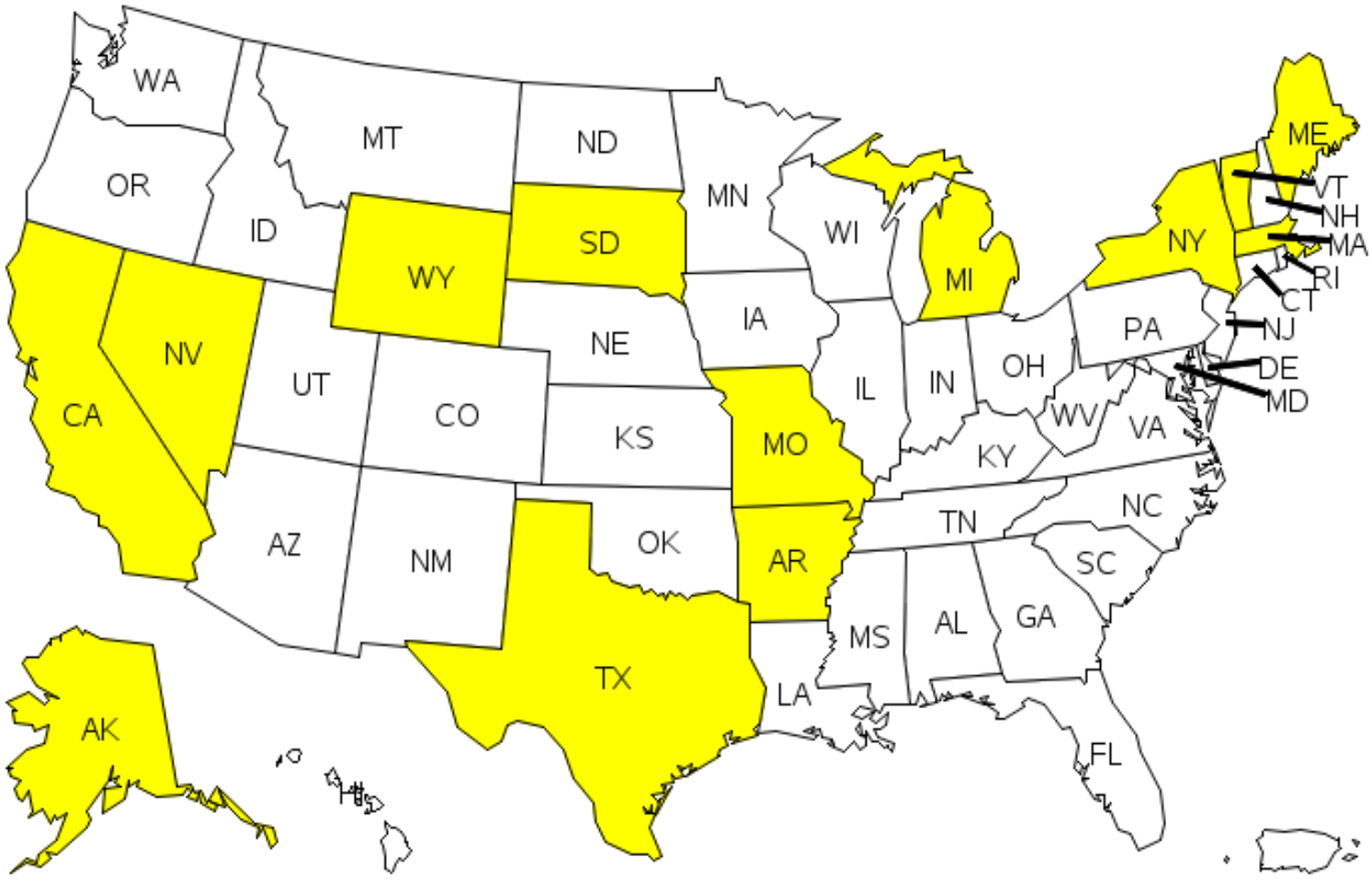
- Evaluated, fitted and dispensed the first prescription bioptic telescopic lens system to one of his low vision patients in ***1959*** (22 years after the first set of vision standards were proposed for a restricted type of driver's license).

- ***"Each failure taught me a new need ….. until somehow it gave birth to a new development"*** - William Feinbloom, Inventor and Pioneer in bioptic driving (A Historical View - www.BiopticDrivingUSA.com)

- Photographed: 1959 Cadillac Convertible

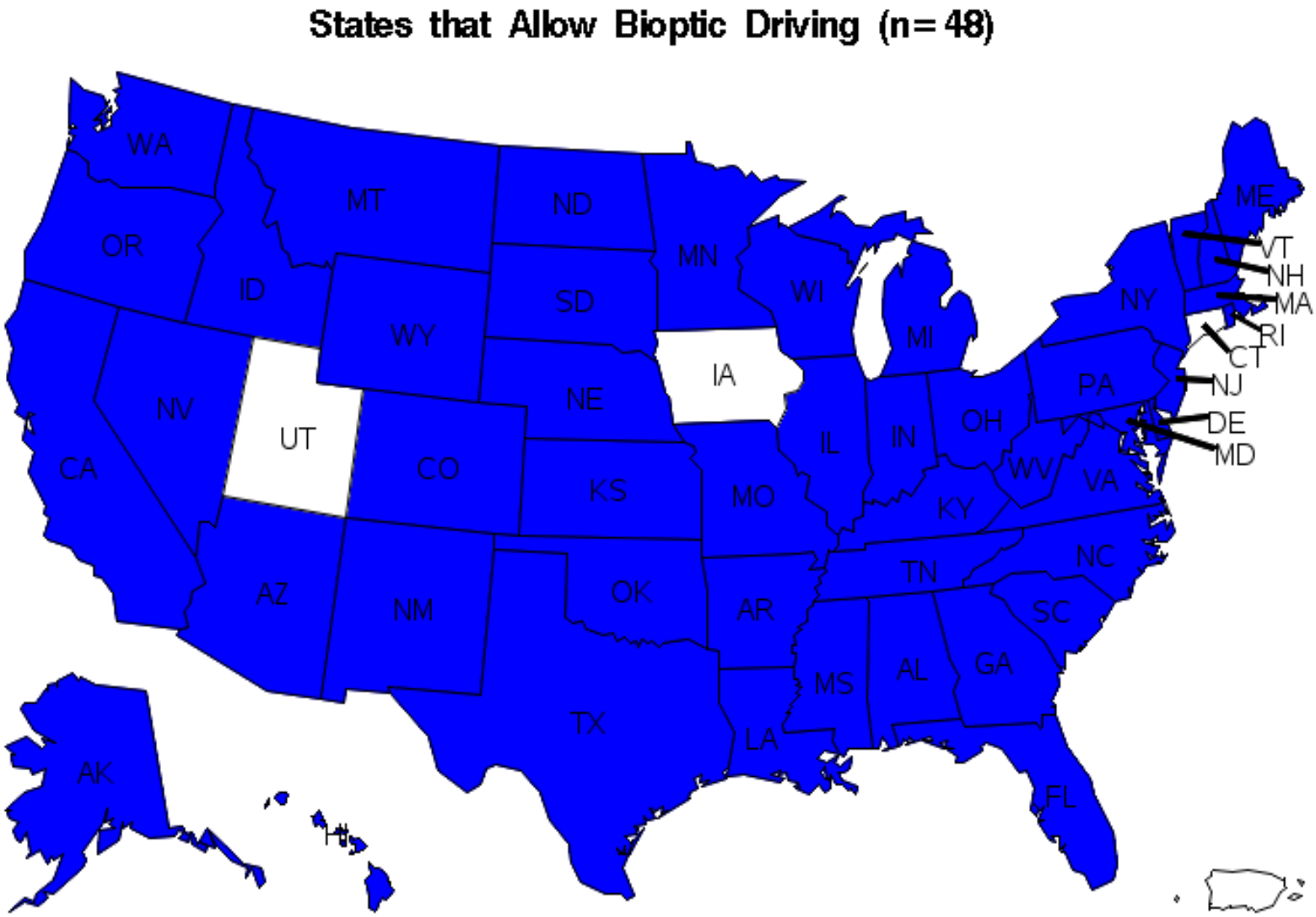





1983 CA DMV Survey of States
that Allow Bioptic Driving (n= 13)
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MS
MI
IN
KY
TN
AL
OH
WV
GA
FL
SC
NC
VA
PA
NY
ME
VT
NH
MA
RI
CT
NJ
DE
MD
AK

Sampling of proliferation or amendment re allowance of bioptic driving:

- New York - 1977
- Kansas- 1985
- Virginia -1986
- Indiana - 1986
- Illinois - 1989
- Tennessee -1990
- Ohio - 1991
- Maryland - 1991
- Georgia - 1992
- Mississippi - 1998
- Kentucky – 2001
- Oregon - 2003
- Alabama - 2005
- Arizona - 2006
- Louisiana - 2007
- West Virginia - 2009
- Oklahoma - 2012
- North Carolina – 2013
- Maine -2014
- South Carolina 2017
- Pennsylvania – 2020
- Texas – 2021
- Connecticut -2022


States that Allow Bioptic Driving (n=48)
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MI
IN
OH
KY
TN
MS
AL
GA
FL
SC
NC
VA
WV
PA
NY
ME
VT
NH
MA
RI
CT
NJ
DE
MD
AK

Driver licensure – state regulated function

- Some states are conservative, others are more liberal
- Some states allow for the use of the miniature telescope to meet the visual acuity standards for restrictive driving privileges
- Some states do not have carrier lens cut-off limits but impose limits re the X strength of attached miniature telescopes; or the level of improved acuity a low vision driver must be able to obtain through the miniature telescope.
- However, ***all states*** must abide by allowing its drivers licensed in one state to travel into and out of other states (employment, recreation, visitation or general travel purposes, etc.) unless restricted by their home state of residence. The latter protection is offered by the US. Constitution, Article IV, Sec.1 "***full faith and credit clause***".

LIST OF STATES BY CARRIER LENS ACUITY LEVEL FOR RESTRICTED DRIVING PRIVILEGES

- 20/40 … HI, NE*, VT* (3)
- 20/50 … DE, NJ* (2)
- 20/60 … AR, ID, SD*, (3)
- 20/70 … CO*, DC, FL, MI*
  NH, OH* (6)
- 20/80 …. MN, NM (2)
- 20/100 … AK, IL, MD, MA, ME,
  MT, NY, OK, RI, **UT**,
  WS, WY (12)
- 20/120 … NV, WA, SC (3)
- 20/130 … ND (1)
- 20/160 … MO, TX (2)
- 20/199 …. CA, **IA**, CT (3)
- 20/200 … AL, AZ, GA, IN,
  KS, KY, LA, MS
  NC, OR, PA, TN
  VA, WV (14)

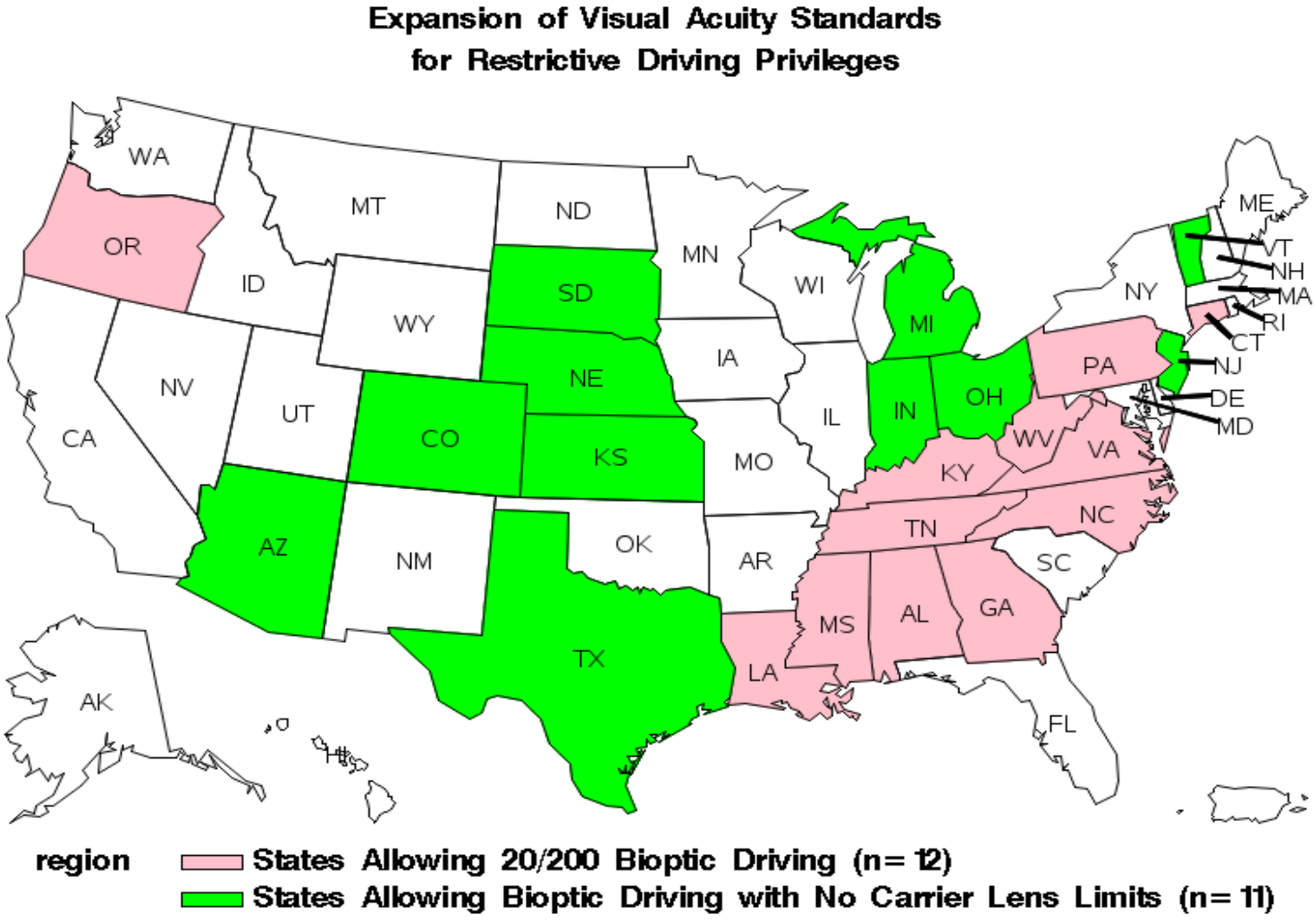
*** 7/13% of states allow the use of the miniature telescope to reach BCVA standards for limited driving privileges**
**** 43/84% of states currently allow restricted driving privileges below visual acuity standards proposed in 1937.**

LIST OF STATES BY CARRIER LENS ACUITY LEVEL FOR RESTRICTED DRIVING PRIVILEGES

- 20/40 … HI, **NE***, VT* (3)
- 20/50 … DE, NJ* (2)
- 20/60 … AR, ID, **SD***, (3)
- 20/70 … CO*, DC, FL, MI* NH, OH* (6)
- 20/80 …. **MN**, NM (2)
- 20/100 … AK, IL, MD, MA, ME, **MT**, NY, OK, RI, UT, **WS**, **WY** (12)
- 20/120 … NV, WA, SC (3)
- 20/130 … **ND** (1)
- 20/160 … MO, TX (2)
- 20/199 …. CA, **IA**, CT (3)
- 20/200 … AL, AZ, GA, IN KS, KY, LA, MS, NC, OR, PA, TN VA, WV (14)

- States highlighted in **bold red** represent states which might have AER members attending this conference.

Expansion of visual acuity standards for restrictive driving privileges



Given time and resources, how can we best prepare young novice candidates for entrance to "formalized programs of bioptic driver training"?

Answer: assuring that such students are pre-driver ready!

Pre-driver readiness?

Defined simply as - knowledge and travel skills needed to transition safely, confidently and effectively from: pedestrian to active passenger-in-car to motor vehicle operator

Two (2) basic types:

- Basic pedestrian (on-foot) related travel skills

- Advanced/active, right front seat passenger-in-car (PIC) travel skills

Basic pedestrian (on-foot) low vision orientation & mobility (O&M) programs should:

- Be conducted under the direction of a certified O&M Specialist (COMS)
- Starting in middle school through high school
- Initial interview, then screening conducted on foot, on a one-on-one basis

ACVREP
Academy for Certification of Vision Rehabilitation & Education Professionals

COMS
CERTIFIED ORIENTATION AND MOBILITY SPECIALIST

Emphasis of instruction:

- Residential through small metropolitan travel, if available
- Simple straight line, L & U-shaped, then around-the-block shaped routes of travel
- More complex multi-block, multi-directional routes of foot travel (rote & self-planned), including reverse and alternate routes

Emphasis of instruction (cont'd)

- Analyzing & crossing stop sign & traffic light-controlled intersections
- Transverse and longitudinal roadway pavement markings, regulatory & general warning signs
- Use of large print maps & global positioning systems (GPS) *
- Concepts of compass directions, directionality, laterality, position, block distance, street continuity, street marker and sun clues

- Craig Phillips, COMS, cleep1700@att.net, TEL: (913) 645-8262

Emphasis of instruction(cont'd)

- Distance optical low vision aids (hand-held monocular vs. head borne/bioptic lens systems)
- Ancillary distance optical and non-optical low vison aids (i.e., sun ware/filters, brimmed hats, visors)
- Public or other alternate means of transportation (city bus, taxi, Uber)

- Top right photo: young male using a hand-held monocular distance low vision device
- Lower right photo; display showing an assortment of monocular and binocular distance low vision devices (hand-held, clip-on, and head born)

By training's end, a trained low vision traveler should at the very least be able to:

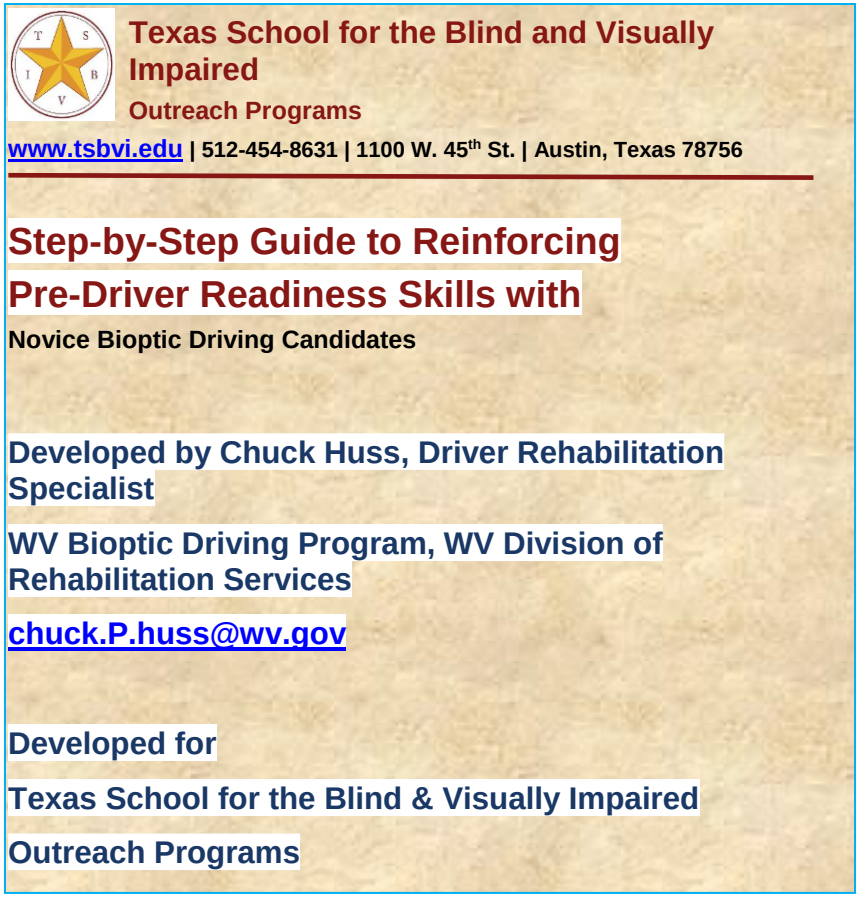
- Take in, remember and follow route instructions
- Travel and reverse a route of travel
- Detect, identify and react in time to critical objects
- Cross stop sign and traffic light-controlled intersections

* Major finding - WV Pilot Low Vision Driving Study, '85-'98, those clients found to be pre-driver ready were able to perform these basic pre-driver readiness skills.

Step-by Step Guide to Pre-Driver Readiness

- Free standard and large print size copies available
- Includes instructional material re:
  - Distance viewing skills
  - Critical object awareness skills
  - Basic bioptic usage skills
  - Hazard perception skills
- Contact Chuck Huss, COMS at:

  chuck_huss@hotmail.com



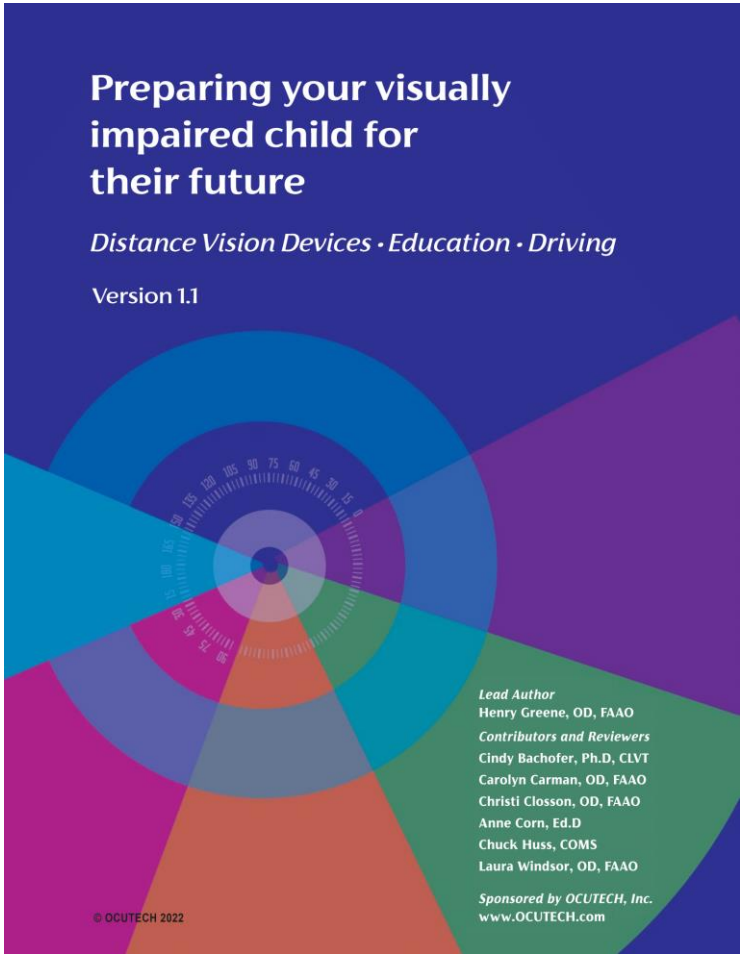
How can parents & classroom teachers take an active lead on helping their child or younger-in-age VI students enhance their distance vision? At what age?

Pediatric Telescope Initiative ‘22

Sections

- Introduction: Dear Parent
- What You Need to Know
- Part 1: about monocular telescopes
- Part 2: Encouraging your child to use a monocular telescope
- Part 3: Learning to use a monocular telescope
- Part 4: About bioptic telescopes
- Part 5: Introducing your child to driving
- Additional resources

* Free copies: chuck_huss@hotmail.com



Contact sources for updated bioptic driving related information & articles

- **Cynthia Owsley Ph.D.,** UAB et al., bioptic driving research, (owsley@uab.edu)
- **Gang Lou Ph.D.** et al, Schepens Research Institute, naturalistic bioptic driving practices, (Gang_Luo@MEEI.HARVARD.EDU)
- **Amy Doherty, OTR/L, CLVT** et al (hazard detection with monocular bioptic lens systems) (Amy_Doherty@meei.harvard.edu)
- **Bart Dankers, OD** et al, Netherlands bioptic driving program, (bartmelis@vision.org)
- **Vincent Moore, OD, FAAO**, et al, Quebec, CAN bioptic driving program (vincent.moore.inlb@ssss.gouv.qc)
- **Brad Dougherty OD** et al, OSU, Columbus, OH, BTLS research (bdoughherty@optometry.osu.edu)
- **Cindy Bachofer, Ph,D.,** CLVT, TSBVI, Austin, TX ***In the Driver's Seat: Low Vision Driving*** Workshops, (bachoferc@tsbvi.edu)
- **Paul Freeman, OD, PEN DOT MAB,** new PA bioptic driving programs & law, (freemankp@aol.com)
- **Laura Windsor, OD, FAAO,** Indianapolis, IN (evaluating, fitting and Rx of BTLS), (drlaura@eyeassociates.com)
- **Joanne M. Wood, Ph.D.** Queensland, AUS, On-road, nighttime bioptic driving research, (j.wood@qut.edu.au)
- **Moya E. McClure, UK, BS,** Bioptics article, (me.mcclure@ulster.ac.uk)
- **Belinda O'Connor,** Founder, Bioptic Driving Australia , (beloconnor@hotmail.com)
- **Penny Rosenblum Ph.D**. & **Terrie Terlau Ph.D.,** *Staying in the Driver's Seat: When You No Longer Drive*, www.aph.org,'07
- **Alex Bowers Ph.D.**et al, Harvard U., LV driving research, (alex_bowers@meei.harvard.edu)
- **Maria Cucuras, OD** et al (GPS research) (mcucur@Midwestern.edu)
- **Robert Chun, OD** (Current perspectives - bioptic driving) (rchun@midwestern.edu)
- **Chuck Huss, COMS** (pre-driver readiness, I&R, consultations, workshops/in-services) (chuck_huss@hotmail.com)
- **Karen Bly, Exec. Director,** (NOAH, Biennial Low Vision Conferences) kbly@albinism.org)
- **Ike Presley, TVI** (AFB e-learning re bioptic driving) (ipresley@afb.net)
- **Anne Corn, EdD** (academia – low vision, consumer advocacy, Finding Wheels – '19, '20) (anne123c@gmail.com)
- **Steven Landry, Outreach Training Specialist,** TSBVI, bioptic driving e-learning, (landrys@tsbvi.edu)
- **Henry Greene, OD** (North Carolina, Pediatric Telescope Initiative, hg@ocutech.com)
- **Mark Wilkinson, OD** & **Dan McGehee, PhD,** University of Iowa, Iowa City, IA (GPS & BTLS Research) (wilkinsonme@uiowa.edu),(Daniel-McGehee@uiowa.edu)

Final Q & A

- For more information:

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- ***Happy Motoring everyone!***