College of Optometry
Advanced Practice Fellowship (APF)
in Low Vision Rehabilitation

A two year program that combines advanced clinical experience
with graduate studies resulting in a master’s degree in Vision Science.

Application Deadline with GRE Scores: December 31 for start the next summer

The following pages contain:

Advanced Practice Fellowships: Overview

Low Vision Rehabilitation Service
- Clinical faculty
- Patient ages and diagnoses
- Alumni magazine featuring clinic renovations

Graduate Program in Vision Science
- Graduate faculty
- Sample research posters
  - Bradley Dougherty, OD, PhD
  - Deyue (Dion) Yu, PhD

For more information, please contact us:
Roanne E. Flom, OD, Clinical Advisor to Advanced Practice Fellows in Low Vision Rehabilitation at flom.3@osu.edu and 614-688-3337.
Jeffrey Walline, OD, PhD, Associate Dean for Research and Graduate Education at walline.1@osu.edu and 614-247-6840.
Advanced Practice Fellowship

Description

The Ohio State University College of Optometry offers a two-year advanced clinical fellowship in one of four areas:

- Cornea and contact lenses
- Binocular vision and pediatrics
- Vision rehabilitation
- Community outreach

List of FAQs

A list of Frequently Asked Questions from The Ohio State University Graduate and Professional Admissions can be found here.

Prerequisites

- All students must have a cumulative GPA equivalent of at least 3.0 on a 4.0 scale in all prior undergraduate and graduate work.
- Must be an optometrist eligible for licensure in Ohio.

Application Procedures

- Must apply to the graduate school.
- Must have application and all documentation submitted by December 31st for admission in autumn semester. Off cycle applications will be considered on a case-by-case basis.

Application Requirements

- Statement of Purpose: A brief autobiographical statement describing the applicant’s educational and professional objectives.
- Curriculum vitae (CV): A written overview of academic, research, and work experiences and other qualifications.
- Must have testing agency report Graduate Record Examination (GRE) test scores to The Ohio State University (ETS institution code #1592). There is no minimum GRE score requirement for admission. However, your scores will be used to compare you to other applicants. All GRE scores must be received by December 31st. To be valid, the GRE test must have been taken in the past five years.
- Letters of Recommendation: You must provide three letters. These should be written by close colleagues, instructors, or others who are familiar with your work, classroom performance, and/or research experience. Letters of Recommendation will not be accepted from family or friends. You must complete page 1 of The Ohio State University Graduate School Reference Form before sending it to your recommenders. Each recommender must then complete the second page and submit this, along with the recommendation letter on letterhead to the Graduate School. The applicant cannot submit the letters.
Official Transcripts: Submit copies (front and back) of official transcripts from ALL institutions attended where college credit was earned – even if you attended while in high school – to GP Admissions. These can be uploaded with your other documents. Transcripts you submit from your personal official copies will be considered unofficial by GP Admissions, but will be accepted for application review purposes. If you are admitted to the program, you will need to have official transcripts submitted.

Official transcripts are those submitted directly from one institution to another. Institutions should send transcripts to OSU electronically at gpadocs@osu.edu or by US Mail to: The Ohio State University, PO Box 182004, Columbus, OH 43218-2646.

Degree Requirements

In consultation with their advisor, students select coursework according to their interests. However, coursework must include:

- 30 graduate credit hours; no more than 10 credit hours of Vision Science 8999 (research credits) count toward the degree
- Two 8000-level courses in vision science; at least one must be from Vision Science 8001, 8002, 8003 or 8004
- Vision Science 7960 (Research in Ethics)
- Vision Science 7980 (Statistics in Clinical Research)
- Completion of an independent research project and thesis is required
- Specific training and experience aspects to each specialty:
  - Cornea and Contact Lenses
    - The first summer semester of the program is typically spent full-time in contact lens clinic and possibly other clinical settings, providing direct patient care to sharpen clinical skills before the academic program formally begins in autumn semester
    - VS 8001 Anatomy and Physiology of the Visual System
  - Binocular Vision and Pediatrics
    - The first summer semester of the program is typically spent full-time in binocular vision/pediatrics clinic and possibly other clinical settings, providing direct patient care to sharpen clinical skills before the academic program formally begins in autumn semester
    - VS 8002 Ocular Motility and Binocular Vision
  - Vision Rehabilitation
    - In addition to examining patients within the Low Vision Rehabilitation Service at the College of Optometry, the fellow may have opportunities to work in multidisciplinary vision rehabilitation settings. The initial semester in the program will be spent in full-time direct patient care in a variety of clinical settings (Low Vision Rehabilitation, Primary Vision Care, and Disease Evaluation)
    - VS 8004 Optics of the Eye and Specification of the Visual Stimulus
  - Community Outreach
    - The first summer semester of the program is typically spent full-time at Lower Lights and Faith Mission clinics (local eye care outreach centers) and possibly other clinical settings, providing direct patient care to sharpen clinical skills before the academic program formally begins in autumn semester

Stipend

The stipend is $43,000 per year.
Low Vision Rehabilitation Service
Clinical Faculty

Roanne E. Flom, OD is Professor of Clinical Optometry, Chief of the OSU Low Vision Rehabilitation Service, and Clinical Advisor to Advanced Practice Fellows in Low Vision Rehabilitation. She teaches the Low Vision Rehabilitation and Gerontology course, supervises low vision training of interns and fellows, and oversees clinical care of over 800 visually impaired patients each year. Her main research interests are in visual performance of people with impaired vision especially related to contrast vision, reading, and driving. Dr. Flom received her AB from Stanford University and her OD degree and post-graduate training in low vision and binocular vision at the UC Berkeley School of Optometry. She taught in clinic at UC Berkeley and served on faculty at Johns Hopkins University School of Medicine, where she co-founded the Johns Hopkins Low Vision Consultation Service and trained low vision fellows. She is a fellow of the American Academy of Optometry and a diplomate of its Low Vision Section. She served as chair of the Academy’s Low Vision Diplomate Program and its Low Vision Section, and co-founded the Low Vision Educator’s Special Interest Group of the Association of Schools and Colleges of Optometry.

Bradley E. Dougherty, OD, PhD is Assistant Professor of Optometry. His research seeks to improve the lives of people with permanent vision loss and low vision. This broad goal has resulted in exploration of several specific research paths. He has worked in the area of visual assessment of patients with low vision, specifically visual acuity and letter contrast sensitivity testing, as well as working on the analysis of patient-reported outcome measures to assess the impact of low vision. He has studied the outcomes of low vision rehabilitation, and his dissertation work was on the use of biotic telescopic spectacles for driving in people with central vision impairment. Dr. Dougherty is also studying the effects of stress and depression on inflammation and outcomes of treatment for age-related macular degeneration. He teaches the optometric neurology course, advises graduate students, and serves as a clinical attending in the Low Vision Rehabilitation Service at the College. He received a BS from Ohio University and OD, MS, and PhD degrees from the Ohio State University. He is a fellow of the American Academy of Optometry and was twice awarded the William C. Ezell Fellowship from the American Optometric Foundation. His research has been supported by the National Institutes of Health and the Ohio Lions Eye Research Foundation.

Greg Hopkins, OD, MS is Clinical Assistant Professor of Optometry. His interests are in low vision practice, education, and research, with special interest in quality of life enhancement for persons with impaired vision through new advances and exciting breakthroughs. He serves as a clinical attending in the Low Vision Rehabilitation and Primary Care Services at the College, and in the pediatric low vision service at the Ohio State School for the Blind. He also serves as a staff optometrist for the Eye Clinic at the Chalmer P Wylie Veterans Administration Ambulatory Care Center where he supervises residents and has refined the clinic’s specialized low vision exam procedures, testing equipment, and device inventory. He has served on the national Veterans Administration low vision exam template design committee and as a module leader for a COPE-accredited online continuing education course on low vision device prescription. His research has focused on contrast vision testing in children. At Ohio State University, he received his BS, OD, and MS degrees and completed the Advanced Practice Fellowship in Low Vision Rehabilitation. He is a fellow of the American Academy of Optometry, a diplomate candidate in the Academy’s Low Vision Section, and a winner of the Jack T. Keith Young Optometrist of the Year Award by the Ohio Optometric Association.
OSU Low Vision Rehabilitation Service:
Patient Ages and Diagnoses-Summer 2015

**Patient Ages (SU ‘15)**

![Bar chart showing patient ages distribution](chart)

**Vision Disorders (SU ‘15)**

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age related macular degeneration</td>
<td>44</td>
<td>24%</td>
</tr>
<tr>
<td>Optic nerve</td>
<td>19</td>
<td>10%</td>
</tr>
<tr>
<td>Albinism</td>
<td>15</td>
<td>8%</td>
</tr>
<tr>
<td>Diabetic retinopathy</td>
<td>14</td>
<td>8%</td>
</tr>
<tr>
<td>Stargardt disease</td>
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<td>6%</td>
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<tr>
<td>Macular dystrophy</td>
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<td>5%</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>7</td>
<td>4%</td>
</tr>
<tr>
<td>Corneal</td>
<td>7</td>
<td>4%</td>
</tr>
<tr>
<td>CVA/TBI</td>
<td>7</td>
<td>4%</td>
</tr>
<tr>
<td>Congenital nystagmus</td>
<td>7</td>
<td>4%</td>
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<tr>
<td>Other</td>
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<td>4%</td>
</tr>
<tr>
<td>Retinitis pigmentosa</td>
<td>6</td>
<td>3%</td>
</tr>
<tr>
<td>Myopic maculopathy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congenital cataract &amp; cataract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retinal histoplasmosis</td>
<td>5</td>
<td>3%</td>
</tr>
<tr>
<td>Retinal detachment</td>
<td>5</td>
<td>3%</td>
</tr>
<tr>
<td>Achromatopsia</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>Retinoschisis</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>Retinopathy of prematurity</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Central serous retinopathy</td>
<td>1</td>
<td>1%</td>
</tr>
</tbody>
</table>

10/27/2016
RENOVATIONS COMPLETE!
Tour the New BV/Peds and LVR Clinics

spring 2016

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Thank you to M&A Architects for providing the photos for this story.

RENOVATIONS COMPLETE!
A Visual Tour of the new Binocular Vision/Pediatrics and Low Vision Rehabilitation Clinics

"Wow, we love your new digs," is commonly heard when patients enter the new BV/Peds and LVR Clinics.

Patients have remarked that the new reception area is welcoming and inviting.
Clearly defined areas for BV/Peds and LVR patients provide a professional, personalized experience.

Prior to the renovation, the BV/Peds and LVR Clinics did not have a sub-waiting area. Now, family members, friends, drivers, etc. can stay close by as patients attend their appointments.

Low Vision Rehabilitation exam lanes contain the latest equipment in an environment that puts patients at ease.

Special touches define exam lane doorways in the Low Vision Rehabilitation Clinic, including lighting over the doors, as well as contrasting paint and carpet colors.
Children and patients with traumatic brain injury have remarked that they enjoy the fresh design in our new BV/Peds exam lanes.

The consistent design in the BV/Peds exam lanes is carried through the clinic.

A different animal (illustrated by Graphic Designer Kerri McTigue) graces each exam lane door in the BV/Peds Clinic.
THANK YOU
to all who made this a reality!

New spaces for vision therapy allow us to continue our tradition of offering the best care.

A modern consult room allows attendings and interns to prepare and discuss cases.

Patients leave the BV/Peds and LVR clinics confident they’ve received the best care.
Dr. Don Mutti’s research is to understand the optical and structural development of the eye in order to learn the causes of refractive errors like myopia and hyperopia. Genetic and traditional risk research approaches in two of Dr. Mutti’s large, longitudinal studies point to hereditary, accommodative, and environmental influences on refractive development. The goal for his future research is to harness these influences as therapeutic interventions for infants and children.

Dr. Teng Leng Ooi uses psychophysical methods to study how surface, contour and top-down processing influence the sensorimotor mechanisms of stereopsis, binocular rivalry and space perception. The knowledge gained is used to advance clinical care of low and binocular vision patients. Ongoing research seeks to reduce eye-dominance and improve stereopsis in adult amblyopes and people with vocational needs using a Push-Pull vision training protocol that capitalizes on basic understanding of cortical plasticity and inhibitory-and-excitatory balance.

A major goal of Dr. Timothy (TJ) Plageman’s research is to elucidate how embryonic eye tissues shape themselves during development at a cellular and molecular level and how disruptions in these mechanisms lead to ocular malformations. To accomplish this goal, embryonic development of the eye is studied in both the mouse and chicken model systems and a variety of techniques are utilized that include live fluorescence microscopy, histology, and molecular biology.

Dr. Dean VanNasdale’s primary research focus is advanced retinal imaging, with an emphasis on normal aging changes and pathological changes associated with diabetic retinopathy and age-related macular degeneration. Changes to the normally well-ordered retinal structure can be highlighted by emphasizing specific light/tissue interactions. The goal of the lab is to distinguish normal aging changes from sight-threatening pathology and detect retinal damage earlier in the disease process using both commercially available and laboratory-based instruments.

Research in Dr. Jeffrey Walline’s laboratory focuses on clinical questions in the area of pediatric contact lenses and refractive error. Past research includes comparison of contact lens wear between children and teenagers, attempts to slow myopia progression with alignment-fitted gas permeable contact lenses, children’s perceptions of other children wearing glasses, and the effects of contact lens wear on children’s self-perceptions. Current research focuses on slowing myopia progression with soft bifocal contact lenses.

Dr. Deyue (Dion) Yu’s research focuses on visual and tactile perception, and perceptual learning in normal and low vision. More specifically, she studies how the visual system recognizes objects, how visual processing is influenced by tactile information, and how the visual system is modified through abnormal visual input and/or perceptual learning. The ultimate goal is to apply the research findings to vision rehabilitation and to improve the quality of life among patients with impaired vision.

Research in Dr. Thomas Raasch’s research activities concentrate on issues in low vision, visual performance, and visual optics. He uses adaptive optics and wavefront sensor techniques to evaluate the optical characteristics of the eye, and of novel optical elements. Interests include the design, fabrication, and measurement of optical systems for evaluation of the refractive state of the eye, and for the correction of refractive error and prebyopia.
Dr. Marjean Kulp’s research focuses on the development and treatment of pediatric cataracts. Her primary research interest is in understanding the mechanisms by which cataracts form and how they relate to myopia, accommodative function, and academic achievement. She is also working to develop and commercialize new devices that will allow healthcare providers to make more accurate eye measurements and improve access to vision care for patients around the world.

While Dr. Heather Chandler’s primary research focus examines the mechanisms by which cataracts and secondary cataracts form, there are several ongoing projects in her laboratory that pertain to protein regulation in the cornea. Research opportunities include: reducing secondary cataract formation through surgical or pharmacologic intervention and improving corneal wound healing. While Dr. Chandler’s research is laboratory-based, the overall goal of her lab is to take bench research findings and clinically apply them to the chairside.

Dr. Angela Brown studies color vision and infant visual development. She collaborates with Dr. Delwin Lindsey in a study of the perception and naming of colors by the Somali people who live in Columbus, Ohio. Recently, Dr. Brown was the first person ever to measure the contrast sensitivity of newborn and premature infants, and she is working to develop her visual acuity and contrast sensitivity test for use in clinical infant vision testing worldwide.

Dr. Stacey Choi’s research interest is the application of adaptive optics (AO) retinal imaging systems to enhance our understanding of disease mechanisms of various retinal and optic nerve diseases. The AO technology allows us to visualize cellular structures in the retina and optic nerve head in living eyes of patients. We are particularly interested in identifying early biomarkers of these diseases from our in vivo images for earlier diagnosis, hence leading to better prognosis for the patients.

Dr. Nathan Dobie’s research interest is the design, construction, and use of high resolution retinal imaging systems to study the structure and function of the human eye. This is achieved through the use of adaptive optics to overcome the ocular aberration allowing for the ability to observe single cells in-vivo. The overall aim is to use cell based measures of retinal health to predict disease at a much earlier stage than is currently possible clinically.

In Dr. Nick Fogt’s laboratory, eye movements and head movements are monitored with a variety of devices. The eye movement studies are focused in two main areas. The first area of study involves eye and head coordination in sports. The second area of study looks at the neural pathways involved in coordination of the two eyes. Problems with eye movement coordination are common clinically.

Signals travel from the eye to the brain via retinal ganglion cells (RGCs), and the anatomy and physiology of these neurons are the focus of Dr. Andy Hartwick’s research investigations. He is particularly interested in studying the function of a subset of RGCs that capture light and directly convert it into an electrical signal. In addition, he directs clinical studies that examine the effect of conditions such as glaucoma and traumatic brain injury on RGC photoreception.

Dr. Heather Chandler conducts research to better our understanding of the impact of vision impairment and to evaluate rehabilitation approaches for patients with low vision. He is currently conducting a study in collaboration with the Department of Ophthalmology of the relationships among stress and depression, inflammation, and treatment outcomes in macular degeneration. Another research focus is road safety in drivers with low vision who use biopic telescopic spectacles.

In Dr. Bradley Dougherty’s laboratory, eye movements and head movements are monitored with a variety of devices. The eye movement studies are focused in two main areas. The first area of study involves eye and head coordination in sports. The second area of study looks at the neural pathways involved in coordination of the two eyes. Problems with eye movement coordination are common clinically.

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The Relationship between Perceived Stress and Self-reported Visual Functioning in Patients with Neovascular Age-related Macular Degeneration (AMD)

Bradley E. Dougherty,1 San-San L. Cooley,1 Frederick H. Davidorf 2

1 The Ohio State University College of Optometry, Columbus, OH  2 The Ohio State University Department of Ophthalmology, Columbus, OH

PURPOSE

Age-related macular degeneration (AMD) is associated with increased rates of depression and decreased quality of life.1-4 Patients with neovascular AMD may be experiencing sudden vision loss, the prospect of long-term permanent vision loss, and a treatment (intraocular injections) that may be stressful. Previous studies have shown that depression may predict a portion of self-reported visual functioning (e.g. NEI-VFQ scores) independent of visual acuity.5,6 We have found previously that visual acuity was not predictive of perceived stress levels. The purpose of this study was to determine whether there is a relationship between self-reported visual functioning and perceived stress using the Perceived Stress Scale (PSS)7 and the Impact of Vision Impairment Scale (IVI)8 in patients being treated for neovascular AMD.

METHODS

Patients with a history of neovascular AMD were enrolled during visits to a retina specialist (FHD) for evaluation of the need for treatment with intraocular anti-VEGF injection. Visual acuity was assessed using a backlit ETDRS chart and by-letter scoring. The ten-item PSS and the reading and accessing information subscale of the IVI were administered to all participants. Participants completed large-print paper versions of the surveys when possible, and the surveys were read aloud to patients who were unable to complete them for visual reasons. Rasch analysis of survey responses was performed using Winsteps with the Andrich rating scale model. Item fit was assessed using infit mean square statistics. Scores were rescaled to a 0 – 100 scale. The Spearman correlation coefficient was used to evaluate the relationships among PSS and IVI score and visual acuity.

RESULTS

Fifty-nine participants (29 male) completed both the PSS and IVI. Mean age ± SD was 81 ± 8 years. Mean ± SD ETDRS letter score visual acuity (better eye) with habitual correction was 62 ± 19 (approximately 20/50).

Response category functioning (measurement precision) was good for the IVI and borderline for the PSS (Table 1).

There was a significant relationship between IVI score and better-eye visual acuity (P < 0.001).

Perceived stress was not correlated with visual acuity (P = 0.893).

Perceived stress was associated with self-reported visual functioning on the IVI reading and accessing information subscale (rho = −0.31, P = 0.016). This association remained significant after adjusting for visual acuity.

CONCLUSIONS

There was a significant inverse correlation between self-reported visual functioning as reported on the IVI reading and accessing information subscale (but not visual acuity) and perceived stress in this group of patients with macular degeneration.

These findings are consistent with research on depression in people with eye disease in which depression is related to visual functioning independent of eye disease severity.

This finding has implications for vision rehabilitation programs and outcomes studies for patients with AMD.

ACKNOWLEDGMENTS

This work was supported by grants from the National Institutes of Health K23 EY020490-01 and IT1TR00091-05. The authors acknowledge Ellen Cilnes OD, Tatnail Movsisyan, Alicia Green, and Jeff Perry for help with data collection.

REFERENCES

The Effect of Bioptic Telescopic Spectacle Use on Road Sign Recognition in Drivers with Central Vision Impairment

Bradley E. Dougherty,1 Amber R. Mathias,1 Roanne E. Flom,1 Thomas Kerwin,2 Thomas W. Raasch1
1The Ohio State University College of Optometry 2The Ohio State University Driving Simulation Laboratory

INTRODUCTION

People with central vision impairment may be licensed to drive with bioptic telescopic spectacles (BTS) in most US states. However, questions remain about whether BTS should be required for licensure, and whether their use improves driving performance.

METHODS

Bioptic drivers and controls were recruited from the College of Optometry at the Ohio State University. ETDRS visual acuity and Mars chart contrast sensitivity were measured. The driving portion of the study was performed on a six degree-of-freedom driving simulator with a 260° curved front screen, side mirror LCD displays and a screen seen through the rear-view mirror. The course was a straight four-lane highway with light traffic and a 45mph speed limit. Subjects completed two ~30-minute courses (for bioptic drivers, one with the BTS and one with the telescope occluded), and were instructed to press a button on the steering wheel when able to confidently identify signs with a target city name or route number among distractor signs. T-tests were used to analyze differences in mean recognition distances.

RESULTS

- Eleven experienced, licensed bioptic drivers and 6 controls participated. Means±SD age was 53±18 years for bioptic drivers and 52±9 for controls.
- Mean logMAR VA OU for bioptic drivers was 0.82±0.16 (20/132) and mean log CS was 1.63±0.15.
- Mean VA with telescope was 0.23±0.09 (20/34).
- Participants encountered 40 signs per run, 10 of which were target signs.
- There was a significant increase in distance at sign recognition with BTS use (mean 144±69 m vs. 51±36 m, p<0.001) that was moderately well predicted by level of telescope magnification.
- Control driver recognition distances (239±58 m) were higher than for bioptic drivers with BTS (p<0.003).
- Rates of sign recognition failure were: control = 0.9%, bioptic driver with BTS = 2.7%, bioptic driver without BTS = 6.4%.

CONCLUSIONS

- The distance at which road signs could be identified increased with use of BTS, though there was considerable variation in effectiveness of BTS use between drivers.
- Bioptic drivers’ recognition distances were less than those of control drivers.
- There were few sign recognition failures overall, and fewer sign recognition failures with use of BTS in bioptic drivers.
- Further work should explore the effect of BTS use on other driving tasks and in more complex situations, as well as the relationship between simulator performance and driving safety.

ACKNOWLEDGEMENTS

NIH K23 EY022940
NIH T35 EY007151
The authors would like to acknowledge the help of the staff at the Ohio State University Driving Simulation Laboratory and the College of Optometry Low Vision Rehabilitation Service.

BIBLIOGRAPHY

The Role of Age and Visual Factors in Predicting the Driving Patterns of Bioptic Drivers

Ellen E. Segerstrom OD, Alicia M. Powers OD MS, Roanne E. Flom OD, Thomas W. Raasch OD PhD, Bradley E. Dougherty OD PhD
The Ohio State University College of Optometry, Columbus, OH

PURPOSE

Bioptic telescopic spectacles (BTS) allow people with central vision impairment to obtain a driver’s license in 43 U.S. states (Fig. 1).1 We have previously found that age and visual acuity do not predict the number of collisions per year. However, this analysis did not account for exposure (miles driven per year).2 Little is known about the driving habits of bioptic drivers. Data on driving exposure, including the frequency and distance of driving, may be critical for determining predictors of motor vehicle collisions.3

The purpose of this study was to determine whether age, driving experience, or visual factors predict:
- the frequency of driving
- the number of unique locations visited
- the maximum distance from home that bioptic drivers report

METHODS

- Licensed bioptic drivers provided an estimation of their yearly miles driven, destinations, and miles traveled during a typical week using a modified version of the Driving Habits Questionnaire (Fig. 2).4
- Year of initial licensure, age, visual acuity (logMAR), and contrast sensitivity (Pelli-Robson or Mars) were recorded from patient clinical records.
- Spearman correlations were used to compare age, vision, and years of licensure with the total number of typical destinations reported, total number of weekly trips, and the furthest distance traveled from home.

RESULTS

<table>
<thead>
<tr>
<th>Participant Demographics, n=74</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean ± SD)</td>
</tr>
<tr>
<td>51 ± 16 years</td>
</tr>
</tbody>
</table>

- Increasing age (rho = -0.28, p = 0.18), poorer visual acuity (rho = -0.25, p = 0.03), and poorer contrast sensitivity (rho = 0.42, p < 0.001) were inversely correlated with the farthest distance traveled from home.
- Age, vision, and contrast sensitivity did not correlate with the number of weekly trips (Fig 3).
- Years of licensure was not related to any measure of driving exposure.

CONCLUSIONS

Older age and poorer vision were associated with reduced distance traveled from home, but not with fewer trips or locations visited.

These data indicate that, while older bioptic drivers and those with poorer vision may alter their driving habits with regard to distance, bioptic licensure may still be useful for completing valued activities.

Future research will use driving exposure data to further investigate the relationships among vision, demography, and crash risk.

ACKNOWLEDGMENTS

National Institutes of Health K23-EY022940, Prevent Blindness Ohio

REFERENCES

Trade-offs between tactile and visual function

INTRODUCTION

To compensate for vision loss, low-vision patients often utilize information gathered by other senses such as touch to facilitate object recognition. Understanding the relationship between visual and tactile functions is therefore important to the visual rehabilitation of these patients. The present study investigates the relationships between tactile performance and basic visual functions.

METHODS

There were 2 sessions. 22 normally-sighted young adults participated Session 1. 15 returned for Session 2.

Measurements:
1. Near visual acuity measured with ETDRS charts.
2. Distance visual acuities measured with Bailey-Lovie Acuity Charts (high and low contrast).
3. Contrast sensitivity measured with Mars Letter Contrast Sensitivity Test (Session 2).
4. Tactile acuity measured using three-dot patterns (Legge et al., 2008).
5. Tactile object recognition performance assessed with 2 types of raised line-drawing objects.

RESULTS

Both tasks require integrating local features of the object to form a global representation, with the main difference being the stimulus familiarity.

1. Despite little variation in visual acuity across subjects, we found a negative correlation between tactile acuity and distance visual acuity ($r^2 = 0.22; p = 0.026$).
2. Consistently, we also found negative relationships between tactile performance in both object tasks and visual acuities ($r^2 = 0.18$ to $0.41; p = 0.001$ to 0.096). In general, subjects with worse visual acuity exhibited superior tactile performance—better tactile acuity, and higher accuracy for identifying everyday objects and discriminating possible/impossible objects.
3. A positive and significant correlation was found between tactile acuity and object identification accuracy but not between tactile acuity and object discrimination accuracy.

CONCLUSION

This study demonstrates an interesting trade-off relationship between visual function, specifically visual acuity, and tactile functions such as tactile acuity and tactile object recognition.

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REFERENCES

**INTRODUCTION**

Reading speed in peripheral vision can be improved through perceptual learning. Perceptual learning paradigms typically require practicing a demanding task hundreds of trials per day, which can be an impediment to compliance from patients. To minimize training effort, Yu (ARVO 2013) developed a non-task-based training procedure utilizing stimulus exposure and identity priming.

The goal of this study is to identify the factor(s) that determine the effectiveness of non-task-based learning in improving peripheral reading speed.

**METHODS**

35 normally-sighted young adults were randomly assigned to a no-training control group or one of four training groups that differed with respect to the inclusion of 3 different design components.

Three design components:
- visual exposure to crowded letter (target letter flanked by two other letters on the left and right)
- visual exposure to uncrowded letter (target letter alone)
- identity priming (pre-informing subject about target letter identity of an upcoming block)

Training, occurred at 10° below fixation, consisted of 5 sessions. Each session has 26 blocks (one for each letter) and 55 trials/block. Letter stimuli were presented across 11 letter positions (-5 to 5). Subjects were instructed to indicate with a button press whether they saw the target letter clearly.

**RESULTS**

1. Groups A, B and D showed significant improvement in the trained lower visual field (increased by 1.2 to 1.4 letters; all p<0.0005).
2. There was partial transfer of training to the untrained upper visual field (0.7 to 0.8 letters; all ps<0.004).
3. No improvement in Group C.

Only the groups that received visual exposure to crowded letters showed increase in visual-span size.

**CONCLUSION**

Non-task-based training can greatly reduce learning effort. Incorporating crowding and identity priming in the training paradigm is the prerequisite for effective non-task-based learning in improving peripheral reading speed.

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Improving reading speed in the periphery: training on words vs. letters

Deyue (Dion) Yu

INTRODUCTION

Training on reading words across multiple exposure durations is more effective in improving peripheral reading speed than training on recognizing letters at a fixed duration (Yu et al., 2010). The basis of the improvement in word training is unclear. In this study, we ask whether words are superior to letters as training stimuli in improving peripheral reading speed.

METHODS

19 normally-sighted young adults.
3 groups: no-training control group, letter training group, and word training group.
Both training groups:
– a non-task-based training procedure utilizing stimulus exposure and identity priming.
– a stimulus duration of 106 ms.
– trained at 10° in the lower visual field.
– 5 daily sessions, 26 blocks, 55 trials per block.

RESULTS

As training stimuli, words are not superior to letters in improving peripheral reading speed. Different types of training stimuli may lead to learning on different levels of information processing in reading. It is possible that training is more beneficial using a combination of letter and word stimuli.

CONCLUSION

As training stimuli, words are not superior to letters in improving peripheral reading speed. Different types of training stimuli may lead to learning on different levels of information processing in reading. It is possible that training is more beneficial using a combination of letter and word stimuli.

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