Harvard Medical School
Curriculum Vitae

Date Prepared: **August 31, 2018**
Name: **Tobias Elze**

Education

2003	Diplom	Psychology	Leipzig University
2011	PhD	Computer Science	Max Planck Institute for Mathematics in the Sciences

Postdoctoral Training

04/2011-02/2014	Research Fellow	Ophthalmology	Schepens Eye Research Institute (SERI)

Faculty Academic Appointments

Month/Year(s)	Academic Title	Department	Academic Institution
11/2017-	Assistant Professor	Ophthalmology	Harvard Medical School (HMS)
10/2013-10/2017	Instructor	Ophthalmology	Harvard Medical School (HMS)
04/2011-	N/A (unpaid, non-voting)	N/A	Max Planck Institute for Mathematics in the Sciences (non-voting)

Appointments at Hospitals/Affiliated Institutions

02/2014-	Investigator	Ophthalmology	SERI

Professional Societies

2013-	Association for Research in Vision and Ophthalmology (ARVO)	Member

Grant Review Activities

2017	Austrian Science Foundation (FWF)	Reviewer
2018	Israeli Ministry of Health	Reviewer

Editorial Activities

Ad hoc reviewer for the following journals:

- *Behavior Research Methods*
- *British Journal of Ophthalmology*
- *Experimental Eye Research*
- *Investigative Ophthalmology and Visual Science*
  - *Ranked as "Exceptionally Good Review"*
- *Journal of Display Technology*
- *Journal of the Society for Information Displays*

- *Journal of Modern Optics*
- *Perception*
- *PLoS ONE*
- *Scientific Reports*
- *Translational Vision Science and Technology*
  - *Ranked as "Exceptionally Good Review"*

Honors and Prizes

1997-2004	Stipend	German National Merit Foundation	Academic performance
2013	Award for best clinical poster	Annual Meeting of the HMS Department of Ophthalmology	ARVO poster

Report of Funded and Unfunded Projects
Funding Information
Past

July 1, 2015 - June 30, 2016
A Novel Method for Diagnosing Initial Onset of Glaucomatous Vision Loss
Role: PI
Total direct costs: $60,000
Source: Massachusetts Lions Foundation
Description: In this project, we applied bioinformatical methods to detect and analyze the spatial configuration of early glaucomatous vision loss and accompanying optical coherence tomography retinal nerve fiber layer thickness estimations around the optic nerve head.

July 1, 2016 – June 30, 2017
Diagnosing Glaucoma in the Presence of Myopia
Role: PI
Total direct costs: $55,000
Source: Massachusetts Lions Foundation
Description: Myopia has been identified as a confounder for glaucoma diagnosis. In this project, we combine large data sets of optical coherence tomography retinal nerve fiber layer (RNFL) thickness measurements and visual fields and develop statistical models to improve the detection of true glaucomatous vision loss and true glaucomatous RNFL thinning in the presence of myopia.

July 1, 2016 – June 30, 2017
A Novel Staging System for Dry Age-related Macular Degeneration
Role: PI
Total direct costs: $60,000
Source: Grimshaw-Gudewicz Foundation
Description: In this project, we aim improve the clinical grading of nonexudative age-related macular degeneration (dry AMD). First, we aim to re-segment retinal layers on B-scans of macular spectral-domain optical coherence tomography (SD-OCT) measurements of dry AMD patients by a novel, customized 3-D active contour method in order to improve the detection drusen and geographic atrophy (GA) compared to conventional methods, and second, we will apply our novel drusen/GA detection scheme to a large longitudinal data set of SD-OCT scans of dry AMD patients, invoke statistical learning procedures to transform the data into a lower-dimensional space, and finally develop a novel staging scheme based on our improved drusen/GA definitions using the transformed data.

Jan 1, 2017 – Dec. 31, 2017
Association between retinal structure and age-related impairments
Role: PI
Total direct costs: $38,333
Source: Research to Prevent Blindness
Description: In this project, we develop methods to use eye imaging in order to detect impairments associated with age related diseases, such as glaucoma and AMD, at earlier

stages than currently possible, ideally even prior to the manifestation of the respective impairment.

Current

March 1, 2017 – Feb. 28, 2019
Impact of Peripheral Islands in the Visual Field on Functional Ability in Patients with Retinitis Pigmentosa (PI: Russell Woods)
R21 EY027882-01
Role: Investigator
Source: National Institutes of Health/National Eye Institute
Description: Retinitis pigmentosa causes progressive loss of vision, and often, eventually blindness, with, at an intermediate stage, residual “islands” of vision out to the sides (periphery) that patients often report help them. As there have been no studies that have investigated the role of these islands in daily activities, we use data from multiple previous studies to create an exceptionally large set of data, that includes people with Usher syndrome, and will allow us to examine the effects of having islands of peripheral vision on the ability to function, doing daily activities.

July 1, 2017 – June 30, 2019
Computational Investigation of Glaucoma Progression
Role: PI
Total direct costs: $150,000
Source: BrightFocus
Description: In this project, we identify defect classes of glaucomatous visual field loss progression and their relationship to retinal structure. We apply machine learning techniques to a data set of over 480,000 visual fields to identify representative patterns of vision loss progression and relate them to optical coherence tomography measurements and fundus images.

July 1, 2018 – June 30, 2019
Retinal Biomarkers for Cognitive Performance
Role: PI
Total Direct costs: $30,000
Source: Alice Adler Fellowship
Description: This pilot grant supports a project to determine the precise and location specific association between retinal nerve fiber layer thickness and human cognitive performance. The decline of cognitive function is an important diagnostic marker for neurodegenerative impairments like Alzheimer's disease. Therefore, this project might contribute to an earlier diagnosis of neurodegenerative diseases by ocular imaging.

Projects submitted for funding

April 1, 2019 – June 30, 2021
A hybrid artificial intelligence framework for glaucoma monitoring
Role: Co-PI (together with Siamak Yousefi)
Total direct costs: $275,000
Source: NIH
Status: review pending
Description: We develop a novel machine learning approach to detect and monitor glaucoma progression over time.

Current Unfunded Projects

2014-
The Impact of Individual Eye Anatomy on Glaucomatous Vision Loss (in collaboration with New York University)
Role: Investigator, Site-PI
I provide computational analyses to Optical Coherence Tomography measurements of glaucoma patients.

2017-
Development of a Normative Data Set of Optic Nerve Head and Macular Parameters (in

collaboration with the population based LIFE study)
Role: Investigator, Site-PI
We analyze an eye imaging data set of ~10,000 participants of a population based study to develop a normative data set for diagnostic purposes.

Report of Local Teaching and Training

Laboratory and Other Research Supervisory and Training Responsibilities

Supervision of post-doctoral research fellows and medical students/ SERI	One hour lab meeting per week and 1:1 supervision of (in total) eight hours per week

Estimated total hours of teaching related to research supervision: *450 hours in the past year*

Formally Mentored Harvard Medical, Dental and Graduate Students:

2014-15 Qinying Jin, PhD (postdoc).
Project: Optical Coherence Tomography Imaging of Glaucoma
Outcomes: (co-)authored 6 peer-reviewed articles and 8 conference abstracts

2015-16 Hui Wang, PhD (postdoc).
Project: Retinal Imaging of Visual Impairments
Outcomes: (co-)authored 13 peer-reviewed articles and 14 conference abstracts

2015- Mengyu Wang, PhD (postdoc)
Project: Structure and Function of Ophthalmic Diseases
Outcomes: (co-)authored 13 peer-reviewed articles and 17 conference abstracts

2016-2017 Neda Baniasadi, MD, PhD (postdoc)
Project: Retinal Nerve Fiber Layer Thickness and its Role in Ocular Diseases
Outcomes: (co-)authored 13 peer-reviewed articles and 15 conference abstracts

2017- Thuzar Thein, PhD (medical student at HMS)
Currently working as a research internship on the impact of myopia on glaucoma
Outcomes: (co-)authored 1 conference abstract

Other Mentored Trainees and Faculty:

2017- Dian Li (research internship)
Project: Association between Retinal Layers and Visual Function
Outcomes: (co-)authored 4 peer-reviewed articles and 10 conference abstracts

2018- Jorryt Tichelaar (research internship)
Project: Machine Learning Applications to Glaucoma Progression
No outcomes yet.

Local Invited Presentations
No presentations below were sponsored by outside entities

2012 Glaucoma Focus Group, Massachusetts Eye and Ear (MEE)
2017 Harvard Glaucoma Joint Lab Meeting, SERI + MEE

Report of Regional, National and International Invited Teaching and Presentations

Regional

No presentations below were sponsored by outside entities

2017 Neda Baniasadi, Ph.D.
Co-Supervision of Ph.D. thesis in Biomedical Engineering at University of Massachusetts, Lowell, MA

Invited Presentations and Courses

Regional

No presentations below were sponsored by outside entities

2009 Lecture series on "Vision and Perception" at Max Planck Institute for Mathematics in the Sciences, Leipzig

National

No presentations below were sponsored by outside entities

2007 Invited lecture, Max Planck Institute for Biological Cybernetics, Tuebingen
Title: Chinese Characters and the Role of Objects in Visual Masking

2008 Colloquium "Perception, Cognition, Knowledge", Technical University Kaiserslautern
Title: Early visual processing interpreted as Bayesian inference

International

No presentations below were sponsored by outside entities

2007 Teaching course on "Performing Psychophysical Experiments", Computational Neurobiology Spring School, Institute for Computational Biology (CAS, MPG), Shanghai, China

2008 Teaching course on "Mathematical Modeling in Theoretical Neuroscience and Cognitive Science", Fall School on Basic Knowledge of Neuroscience and Mathematics, Fudan University, Shanghai, China

2010 SERI Lectures, Schepens Eye Research Institute, Boston, MA
Title: Temporal Properties of LCD Monitors from a Vision Science Perspective

2014 Invited lecture, University Hamburg, Hamburg, Germany
Title: Display Technology in Vision Science

2017 Invited lecture, Max Planck Institute for Cognitive and Brain Sciences, Leipzig, Germany
Title: Age, Life Style, and Retinal Nerve Fiber Layer Thickness

2018 Invited lecture, Max Planck Institute for Cognitive and Brain Sciences, Leipzig, Germany
Title: Mapping Cognitive Domains to Retinal Nerve Fiber Layer Thickness

Report of Technological and Other Scientific Innovations

2015 Patent: United States PCT/US2014/052414. "Spatial Modeling of Visual Fields"
Together with Philipp Benner and Peter Bex, I invented a novel probabilistic spatial representation of visual fields with special applications to glaucoma diagnostics.

2016 Patent: United States PCT/US2016/037880. "Optimal Adaptive Scheduling of Clinical Assessments".
Together with John Ackermann and Peter Bex, I invented an optimal procedure to schedule clinical assessments.

2018 Provisional Patent: United States Provisional Patent No. 62/641,785. "Predicting Result Reversals of Glaucoma Hemifield Tests".
Together with Mengyu Wang, Louis Pasquale, and Lucy Shen, I invented a computational procedure to predict the reversal of Glaucoma Hemifield Test

results.

2018 Provisional Patent: United States Provisional Patent No. 62/637,181. “Visual Field Progression”.
Together with Mengyu Wang, Louis Pasquale, and Lucy Shen, I invented a machine learning based procedure to detect the progression of glaucomatous visual field loss.

Report of Scholarship
Publications
Peer reviewed publications in print or other media

Research investigations:

1. **Tobias Elze** and Thomas G. Tanner. Liquid crystal display response time estimation for medical applications. *Medical Physics*, 36(11):4984-4990, 2009.
2. Rainer Stollhoff, Jürgen Jost, **Tobias Elze**, and Ingo Kennerknecht. The early time course of compensatory face processing in congenital prosopagnosia. *PLoS ONE*, 5(7):e11482, 2010.
3. **Tobias Elze**. Achieving precise display timing in visual neuroscience experiments. *Journal of Neuroscience Methods*, 191(2):171-179, 2010.
4. **Tobias Elze**. Misspecifications of stimulus presentation durations in experimental psychology: A systematic review of the psychophysics literature. *PLoS ONE*, 5(9):e12792, 2010.
5. Rainer Stollhoff, Jürgen Jost, **Tobias Elze**, and Ingo Kennerknecht. Deficits in long-term recognition memory reveal dissociated subtypes in congenital prosopagnosia. *PloS ONE*, 6(1):e15702, 2011.
6. **Tobias Elze**, Chen Song, Rainer Stollhoff, and Jürgen Jost. Chinese characters reveal impacts of prior experience on very early stages of perception. *BMC Neuroscience*, 12:14, 2011.
7. Rainer Stollhoff, Ingo Kennerknecht, **Tobias Elze**, and Jürgen Jost. A computational model of dysfunctional facial encoding in congenital prosopagnosia. *Neural Networks*, 24:652-664, 2011.
8. **Tobias Elze** and Thomas G. Tanner. Temporal properties of liquid crystal displays: Implications for vision science experiments. *PloS ONE*, 7(9):e44048, 2012.
9. Stephan Poppe, Philipp Benner, and **Tobias Elze**. A predictive approach to nonparametric inference for adaptive sequential sampling of psychophysical experiments. *Journal of Mathematical Psychology*, 56(3):179-195, 2012.
10. **Tobias Elze**, Christopher Taylor, and Peter J. Bex. An evaluation of organic light emitting diode monitors for medical applications: Great timing, but luminance artifacts. *Medical Physics*, 40(9):092701, 2013.
11. **Tobias Elze**, Louis R. Pasquale, Lucy Q. Shen, Teresa C. Chen, Janey L. Wiggs, and Peter J. Bex. Patterns of functional vision loss in glaucoma determined with archetypal analysis. *Journal of the Royal Society Interface*, 12(103):20141118, 2015.
12. N. Baniasadi**, E. Paschalis, M. Haghzadeh, P. Ojha, **T. Elze**, M. Mahd, and T. C. Chen. Patterns of Retinal Nerve Fiber Layer Loss in Different Subtypes of Open Angle Glaucoma Using Spectral Domain Optical Coherence Tomography. *Journal of Glaucoma*, 25(10): 865-872, 2016
13. N. Baniasadi**, M. Wang, H. Wang, Q. Jin, and **T. Elze**. Ametropia, retinal anatomy, and OCT abnormality patterns in glaucoma. 2. Impacts of optic nerve head parameters. *Journal of Biomedical Optics*, 22(12):1-9, 2017
14. N. Baniasadi**, M. Wang, H. Wang, Q. Jin, M. Mahd, and **T. Elze**. Impact of Anatomical Parameters on Optical Coherence Tomography Retinal Nerve Fiber Layer Thickness Abnormality Patterns. *SPIE Ophthalmic Technologies*, XXVII:100450P, 2017
15. N. Baniasadi**, M. Wang, H. Wang, M. Mahd, and **T. Elze**. Associations between optic nerve head–related anatomical parameters and refractive error over the full range of glaucoma severity. *Translational Vision Science & Technology*, 6(4):9, 2017.
16. S. Cai, **T. Elze**, P. J. Bex, J. L. Wiggs, L. R. Pasquale, and L. Q. Shen. Clinical Correlates of Computationally Derived Visual Field Defect Archetypes in Patients from a Glaucoma Clinic.

Current Eye Research, 42(4):568-574, 2017

17. M. Dorr, L. A. Lesmes, **T. Elze**, H. Wang, Z. Lu, and P. J. Bex. Evaluation of the precision of contrast sensitivity function assessment on a tablet device. *Scientific Reports*, 7:46706, 2017.
18. **T. Elze**, N. Baniasadi, Q. Jin, H. Wang, and M. Wang. Ametropia, retinal anatomy, and OCT abnormality patterns in glaucoma. 1. Impacts of refractive error and interartery angle. *Journal of Biomedical Optics*, 22(12):1-11, 2017
19. H. Wang**, M. Wang, N. Baniasadi, Q. Jin, and **T. Elze**. Combining Retinal Nerve Fiber Layer Thickness with Individual Retinal Blood Vessel Locations Allows Modeling of Central Vision Loss in Glaucoma. *SPIE Ophthalmic Technologies*, XXVII:100451M, 2017
20. M. Wang**, H. Wang, L. R. Pasquale, N. Baniasadi, L. Q. Shen, P. J. Bex, and **T. Elze**. Relationship between Central Retinal Vessel Trunk Location and Visual Field Loss in Glaucoma. *American Journal of Ophthalmology*, 176:53-60, 2017
21. M. Wang**, H. Wang, N. Baniasadi, and **T. Elze**. The relationship between 3D morphology of optic disc and spatial patterns of visual field loss in glaucoma. *SPIE Ophthalmic Technologies*, XXVII:100451W, 2017
22. M. Wang**, *, **T. Elze***, D. Li, N. Baniasadi, K. Wirkner, T. Kirsten, J. Thiery, M. Loeffler, C. Engel, and F. G. Rauscher. Age, ocular magnification, and circumpapillary retinal nerve fiber layer thickness. *Journal of Biomedical Optics*, 22(12):1-19, 2017
23. M. Wang**, L. R. Pasquale, L. Q. Shen, M. V. Boland, S. Wellik, G. de Moraes, J. Myers, P. J. Bex, and **T. Elze**. Impact of natural blind spot location on perimetry. *Scientific Reports*, 7:6143, 2017.
24. M. Dorr, **T. Elze**, H. Wang, Z. Lu, P. J. Bex, and L. A. Lesmes. New precision metrics for contrast sensitivity testing. *Journal of Biomedical and Health Informatics*, 22(3):919-925, 2018
25. M. M. Mauschitz, P. W. M. Bonnemaije, K. Diers, F. G. Rauscher, **T. Elze**, C. Engel, M. Loeffler, J. M. Colijn, M. A. Ikram, J. R. Vingerling, K. M. Williams, C. J. Hammond, C. Creuzot-Garcher, A. M. Bron, R. Silva, S. Nunes, C. Delcourt, A. Cougnard-Grégoire, F. G. Holz, C. C. W. Klaver, M. M. B. Breteler, R. P. Finger. Systemic and Ocular Determinants of Peripapillary Retinal Nerve Fiber Layer Thickness Measurements in the European Eye Epidemiology (E3) Population. *Ophthalmology*, accepted
26. M. Wang**, Q. Jin, H. Wang, D. Li, N. Baniasadi, **T. Elze**. The Interrelationship between Refractive Error, Blood Vessel Anatomy, and Glaucomatous Visual Field Loss. *Translational Vision Science & Technology*, 18;7(1):4, 2018
27. M. Wang**, Q. Jin, H. Wang, N. Baniasadi, **T. Elze**. Quantifying positional variation of retinal blood vessels in glaucoma. PLoS One, 15;13(3):e0193555, 2018
28. M. Wang**, L. R. Pasquale, L. Q. Shen, M. V. Boland, S. R. Wellik, C. G. De Moraes, J. S. Myers, H. Wang, N. Baniasadi, D. Li, R. N. E Silva, P. J. Bex, **T. Elze**. Predicting Reversal of the Glaucoma Hemifield Test to Normal after Two Consecutive Abnormal Results. *Ophthalmology*, 125(3):352-360, 2018
29. M. Wang**, L. R. Pasquale, L. Q. Shen, M. V. Boland, S. R. Wellik, C. G. De Moraes, J. S. Myers, H. Wang, N. Baniasadi, D. Li, R. N. E Silva, P. J. Bex, **T. Elze**. Reply to Grassi et al. *Ophthalmology*, 125(9):e66-e67, 2018

* Co-First authors
** First-authored by mentee

Non-peer reviewed scientific or medical publications/materials in print or other media

Reviews, chapters, monographs and editorials:

1. Kennerknecht I, Kischka C, Stemper C, **Elze T**, Stollhoff R (2011) Heritability in face recognition. In Tudor Barbu (ed.) *Face Analysis, Modeling and Recognition Systems*, Rijeka: InTech, p163-188

Thesis

Tobias Elze. *Accurate and Precise Visual Stimulation in Neuroscience and Psychophysics Experiments*. Doctoral Thesis, Leipzig University, Leipzig, Germany, 2011

Abstracts, Poster Presentations and Exhibits Presented at Professional Meetings (selected)

1. Neda Baniasadi, Franziska Rauscher, Mengyu Wang, Dian Li, Hui Wang, Kerstin Wirkner, Matthias Nuechter, Joachim Thiery, Markus Loeffler, Christoph Engel, and **Tobias Elze**. Age and location-specific norms of interocular retinal nerve fiber layer thickness asymmetry. *ARVO Meeting Abstracts*, 2018.
2. **Tobias Elze**, Mengyu Wang, Neda Baniasadi, Hui Wang, Dian Li, Kerstin Wirkner, Toralf Kirsten, Cornelia Enzenbach, Matthias Nuechter, Joachim Thiery, Markus Loeffler, Christoph Engel, and Franziska Rauscher. Zones of circumpapillary retinal never fiber layer thickness (cpRNFLT) (in-)vulnerability to aging and life style. *ARVO Meeting Abstracts*, 2018.
3. Qingying Jin, Thuzar Thein, Louis Pasquale, Lucy Shen, Michael Boland, Sarah Wellik, C Gustavo De Moraes, Jonathan Myers, Peter Bex, Neda Baniasadi, Dian Li, Hui Wang, Mengyu Wang, and **Tobias Elze**. Effect modification of refractive error on visual field pattern deviation in glaucoma. *ARVO Meeting Abstracts*, 2018.
4. Mengyu Wang, Louis Pasquale, Lucy Shen, Michael Boland, Sarah Wellik, C Gustavo De Moraes, Jonathan Myers, Neda Baniasadi, Dian Li, Hui Wang, Peter Bex, and **Tobias Elze**. Predicting functional progression in glaucoma from baseline visual fields. *ARVO Meeting Abstracts*, 2018.
5. Russell Woods, Michael Sandberg, Carol Weigel-DiFranco, and **Tobias Elze**. Visual field patterns in a large sample of people with retinitis pigmentosa. ARVO Meeting Abstracts, 2018.
6. Neda Baniasadi, Mengyu Wang, Hui Wang, Qingying Jin, Mufeed Mahd, Lucy Q Shen, Louis R Pasquale, **Tobias Elze**. The Effects of Refractive Error and Related Optic Nerve Head (ONH) Anatomical Parameters on Optical Coherence Tomography (OCT) Retinal Nerve Fiber Layer (RNFL) Deviation Map. *IOVS*, 58(8):3991, 2017
7. Neda Baniasadi, Franziska Rauscher, Mengyu Wang, Dian Li, Kerstin Wirkner, Matthias Nuechter, Joachim Thiery, Markus Loeffler, Christoph Engel, Peter Wiedemann, **Tobias Elze**. Retinal nerve fiber layer thickness (RNFLT) and inter-eye symmetry in a population-based study. *ARVO Imaging Conference Abstracts*, 2017
8. **Tobias Elze**, Hui Wang, Neda Baniasadi, Dian Li, Qingying Jin, and Mengyu Wang. A personalized macular vulnerability zone based on individual retinal anatomy improves structure-function modeling of glaucomatous central vision loss (ARVO Imaging Meeting, platform presentation) *ARVO Imaging Conference Abstracts*, 2017
9. Osamah Saeedi, Michael Boland, Loris D'Acunto, Vikram Hegde, Surabhi Gupta, Amin Venjara, Jonathan Meyers, Sarah Wellik, Gustavo DeMoraes, **Tobias Elze**. Comparison of Six Visual Field Progression Algorithms. *American Academy of Ophthalmology Meeting Abstracts,* 2017, accepted
10. Osamah Saeedi, Michael Boland, Loris D'Acunto, Vikram Hegde, Surabhi Gupta, Amin Venjara, Jonathan Meyers, Sarah Wellik, Gustavo DeMoraes, **Tobias Elze**. Development of a Machine Learning Algorithm to Determine of Visual Field Progression. *American Academy of Ophthalmology Meeting Abstracts,* 2017, accepted (platform presentation)
11. Hui Wang, Neda Baniasadi, Qingying Jin, Mengyu Wang, Lucy Q Shen, Louis R Pasquale, **Tobias Elze**. Glaucoma structure-function modeling improves by combining retinal nerve fiber layer thickness (RNFLT) with neuro-retinal rim thickness (NRRT) measurements. *IOVS*, 58(8):5813, 2017
12. Mengyu Wang, Louis R Pasquale, Lucy Q Shen, Michael V Boland, Sarah R Wellik, Carlos

Gustavo De Moraes, Jonathan S Myers, Hui Wang, Neda Baniasadi, Peter J Bex, **Tobias Elze**. Predicting False-Positive Glaucoma Hemifield Test Results by Representative Glaucomatous Visual Field Patterns. *IOVS*, 58(8):2849, 2017

13. Neda Baniasadi, Qingying Jin, Hui Wang, Mengyu Wang, Lucy Shen, Louis Pasquale, Peter Bex, Hiroshi Ishikawa, Joel Schuman, Gadi Wollstein, and **Tobias Elze**. The effect of optic nerve head torsion and position of retinal blood vessels on optical coherence tomography retinal nerve fiber layer abnormality patterns in myopic glaucoma patients. *ARVO Imaging Conference Abstracts*, pages 225–226, 2016.
14. **Tobias Elze**, Lucy Q. Shen, Mengyu Wang, Michael V. Boland, Sarah Wellik, Gustavo de Moraes, Jonathan Myers, Peter J. Bex, and Louis Pasquale. The effect of ametropia on glaucomatous visual field loss (ARVO Meeting, platform presentation) *IOVS*, 57(12), 2016
15. Mengyu Wang, Louis R. Pasquale, Lucy Q. Shen, Michael V. Boland, Sarah Wellik, C. Gustavo De Moraes, Jonathan S. Myers, Peter J. Bex, and **Tobias Elze**. Impact of natural blind spot location on perimetry. *IOVS*, 57(12):630, 2016.
16. Mengyu Wang, Qingying Jin, Hui Wang, Neda Baniasadi, and **Tobias Elze**. Quantifying positional variation of retinal blood vessels in glaucoma. *ARVO Imaging Conference Abstracts*, pages 221–223, 2016.
17. **Tobias Elze**, Lucy Q. Shen, Janey L. Wiggs, Michael V. Boland, Sarah Wellik, Peter J. Bex, and Louis Pasquale. Patterns of early glaucomatous visual field loss and their evolution over time. (ARVO Meeting, platform presentation) *IOVS*, 56(7):3178, 2015
18. **T. Elze**, Q. Jin, P. Bex, and G. Wollstein. The impact of blood vessel locations on abnormality profiles of Spectral-Domain Optical Coherence Tomography measurements. *ARVO Imaging Conference Abstracts*, pages 118–119, 2015.
19. Qingying Jin, Gadi Wollstein, Louis Pasquale, Lucy Shen, Peter Bex, and **Tobias Elze**. Motion artifacts and missing data in cirrus spectral-domain optical coherence tomography measurements. *ARVO Imaging Conference Abstracts*, pages 125–126, 2015.

Narrative Report

I am an investigator in ophthalmology whose major interest is the scientific combination of computational statistics and bioinformatics with applied research in the life sciences. My main affiliation is to Schepens Eye Research Institute (SERI) of Mass Eye and Ear (MEE); I am externally affiliated to the Max Planck Institute for Mathematics in the Sciences in Leipzig, Germany. I devote myself to the development of novel methods and applications in the field of basic and clinical vision research and have gained expertise in the areas of visual psychophysics, visual neuroscience, and deficiencies of functional vision due to eye diseases, particularly glaucoma. My computational approaches are mainly based in machine learning applied to large data sets, which frequently occur in clinical practice and which particularly challenge many investigators in clinical research. Very few researchers have expertise in that combination of areas, while the increasing availability of functional and structural data, especially in the field of eye imaging, makes approaches like mine more and more relevant in ophthalmology. The majority of my work is dedicated to research, but a substantial part of my effort is devoted to teaching as well: in the past year, I supervised a PhD thesis in biomedical engineering and mentored two postdoctoral fellows in my laboratory.

My main academic achievements are divided between basic scientific methodology and applications to clinical research. I am co-inventor of two patents: “Spatial Modeling of Visual Fields” (United States PCT/US2014/052414, 2015), which includes a computational model for the representation of visual field measurements with special focus on glaucomatous functional vision defects; and “Optimal Adaptive Scheduling of Clinical Assessments” (United States PCT/US2016/037880, provisional 2016), which describes how to efficiently arrange clinical assessments of patients. In close collaboration with clinicians from MEE, Johns Hopkins University, and Bascom Palmer Eye Institute, I developed a novel mathematical classification scheme of glaucomatous visual field loss and a model for the early onset of glaucomatous visual field loss. I am studying the effects of retinal structure and of individual eye anatomy

on the course and the diagnosis of glaucoma in collaboration with a team from New York University.

My additional academic work focuses on display technology and its application in vision science and clinical vision testing. I gained expertise in the three major display technologies (cathode ray tubes, liquid crystal displays, and organic light emitting diodes) and have assessed them for applications in psychophysics and medicine, reflected in a number of publications over the past few years.

My combined background in computational sciences and life sciences has enabled me to contribute most notably to studying relationships between retinal structure and visual function related to eye diseases.