

# JOHANNES BURGE

November 1, 2022

Goddard Labs Rm 426 • 3710 Hamilton Walk • University of Pennsylvania • Philadelphia PA 19104 • jburge@upenn.edu

## Academic Positions

Associate Professor of Psychology	University of Pennsylvania	2021-present
Assistant Professor of Psychology	University of Pennsylvania	2014-2021
Post-doctoral Fellow	University of Texas at Austin	2009-2014
Post-doctoral Researcher	University of California, Berkeley	2008-2009

## Education

PhD, Vision Science	University of California, Berkeley	2008
BA: Psychology;	Stanford University	2000
Minor: Mathematics		

## Funding

NIH-R01, EY028571  
PI: **Johannes Burge** “Estimating and discriminating motion and depth in natural scenes” 2018-2023  
UPenn: Total Direct Costs: \$1,250,000 Total Indirect Costs: \$762,500

UPenn VRC Seed Grant  
Co-PI: **Johannes Burge** “Complex cells revisited: Cellular and synaptic population recordings and normative modeling with etiological visual input” 2021-2023  
Co-PI: Benjamin Scholl  
UPenn: Total Direct Costs: \$20,000 Total Indirect Costs: \$0

I-LINK+ Collaboration Grant  
PI: Carlos Dorransoro  
Co-PI: **Johannes Burge** “Understanding depth misperceptions in ophthalmic corrections” 2019-2021  
Co-PI: Lawrence Cormack  
IO-CSIC Total Direct Costs: €24,000 Total Indirect Costs: €0  
UPenn (Total Direct Costs to be shared as needed amongst PIs)  
UT Austin (Funding for travel, lodging, meetings, and research stays)

NIH-R01, EY011747  
PI: Wilson S. Geisler  
Co-Investigator: **Johannes Burge** “Detection and estimation of local properties in natural scenes” 2016-2020  
UT Austin: Direct Costs: \$760,000 Indirect Costs: \$429,400  
UPenn: Direct Costs: \$240,000 Indirect Costs: \$146,400  
Total Direct Costs: \$1,000,000 Total Indirect Costs: \$575,800

Oculus Research Grant  
PI: **Johannes Burge** “Optimal & human focus error estimation from individual images” 2017-2018  
UPenn: Total Direct Costs: \$25,000; Total Indirect Costs: \$0

## Awards

NSF CAREER Award	University of Pennsylvania (declined; overlap w. NIH-R01, EY028571)	2018
NIH Institutional Training Grant	University of Texas at Austin	2012-2014
Best Paper Award	SPIE, Digital Photography VIII; Canon USA, Inc.	2012
Postdoctoral Travel Award	Computational and Systems Neuroscience	2012
William C. Ezell Fellowship	American Optometric Foundation (AOF)	2006
NIH Institutional Training Grant	University of California, Berkeley	2002-2004

## U.S. Patents

- Burge J**, Rodriguez-Lopez V, Dorransoro C. “Anti-Pulfrich monovision ophthalmic correction”. U.S. Patent Application No. 17/425,144. International Application No.: PCT/US2020/016232. International Classes: A61F2/16; A61F2/14; G02C7/02. Filing date: January 31, 2020. Publication date: March 24, 2022.
- Burge J**, Geisler WS. “Focus error estimation in images”. U.S. Patent Application No. 13/965,758. Reference No.: 5934 US. File No.: 93331-001910US-882167. Filing date: August 13, 2013. Publication date: December 12, 2013.

## Research Articles

### Submitted ( \* indicates peer-reviewed publication )

1. Doi T, **Burge J** (submitted). "Spatial averaging in human vision. I. Experiments and linear observer models".
2. **Burge J**, Cormack LK (submitted). "Target tracking reveals the time course of visual processing with millisecond-scale precision". Preprint posted at: *bioRxiv*, 238642, 1-27. doi: <https://www.biorxiv.org/content/10.1101/2020.08.05.238642v2> \*

### Published and In Press ( \* peer-reviewed journal publication; † peer-reviewed conference publication )

1. Chin BM, **Burge J** (2022). "Perceptual consequences of interocular differences in the duration of temporal integration". *Journal of Vision*. 22(12):12, 1-17, doi: <https://doi.org/10.1167/jov.22.12.12> \*
2. Herrera D, **Burge J** (2022). "Image-computable Bayesian model for 3D motion estimation with natural stimuli explains human biases." In *SVRHM 2022 Conference Workshop @ NeurIPS*. New Orleans, LA †
3. **Burge J**, Burge T (2022). "Shape, perspective, and what is and is not perceived: Comment on Morales, Bax, and Firestone (2020)". *Psychological Review*. doi: <https://doi.org/10.1037/rev0000363>. Preprint posted at: *PsyArXiv*, February 25, 1-27. doi: [10.31234/osf.io/svq39](https://doi.org/10.31234/osf.io/svq39) \*

Published as a Theoretical Note in criticism of:

Morales J, Bax A, Firestone C (2020). "Sustained representation of perspectival shape". *Proceedings of the National Academy of Sciences*. 117(26), 14873-14882.

4. Oluk C, Bonnen K, **Burge J**, Cormack LK, Geisler WS (2022). "Stereo slant discrimination of planar 3D surfaces: Frontoparallel versus planar matching". *Journal of Vision*. 22(5):6, 1-26. <https://doi.org/10.1167/jov.22.5.6> \*
5. Singh V, **Burge J**, Brainard DH (2022). "Equivalent noise characterization of human lightness constancy". *Journal of Vision*. 25(5):2, 1-27. doi: <https://doi.org/10.1167/jov.22.5.2> \*
6. **Burge J** (2021). Introduction to Tillyer Award Lecture: 2020 Awardee—Wilson S. Geisler. *Optica Fall Vision Meeting*. Seattle, WA. November, 18, 2021
7. Rodriguez-Lopez V, Dorransoro C, **Burge J** (2020). "Contact lenses, the reverse Pulfrich effect, and anti-Pulfrich monovision corrections". *Nature Scientific Reports*. 10:16086, doi: <https://doi.org/10.1038/s41598-020-71395-y> \*
8. **Burge J** (2020). "Image-computable ideal observers for tasks with natural images". *Annual Review of Vision Science*. 6: 491-517. doi: <https://doi.org/10.1146/annurev-vision-030320-041134> \*
9. Chin BM, **Burge J** (2020). "Predicting the partition of behavioral variability in speed perception with naturalistic stimuli". *Journal of Neuroscience*. 40 (4), 864-879. doi: <https://doi.org/10.1523/jneurosci.1904-19.2019> \*
10. Kim S, **Burge J** (2020). "Natural scene statistics predict how humans pool information across space in surface tilt estimation". *PLoS Computational Biology*. 16 (6), e1007947. doi: <https://doi.org/10.1371/journal.pcbi.1007947> \*
11. Basgoze ZA, White DN, **Burge J**, Cooper EA (2020). "Natural statistics of depth edges modulate perceptual stability". *Journal of Vision*. 20(8): 10, 1-21. doi: <https://doi.org/10.1167/jov.20.8.10> \*
12. **Burge J**, Rodriguez-Lopez V, Dorransoro C (2019). "Monovision and the misperception of motion". *Current Biology*, 29(15), 2586-2592. doi: <https://doi.org/10.1016/j.cub.2019.06.070> \*

Dispatch: Read JCA (2019). "Visual perception: Monovision can bias the apparent depth of moving objects" *Current Biology*, 29 (15), R738-R761.

Faculty of 1000 (F1000Prime) entry by Pascal Mamassian: <https://f1000.com/prime/736286496>

13. Iyer AV, **Burge J** (2019). "The statistics of how natural images drive the responses of neurons". *Journal of Vision*. 19(13): 4, 1-25. doi: <https://doi.org/10.1167/19.13.4> \*
14. Kim S, **Burge J** (2018). "The lawful imprecision of human surface tilt estimation in natural scenes". *eLife*. 7:31448. doi: <https://doi.org/10.7554/eLife.31448> \*
15. Iyer AV, **Burge J** (2018). "Depth variation and stereo processing tasks in natural scenes". *Journal of Vision*, 18(6): 4, 1-22. doi: <https://doi.org/10.1167/18.6.4> \*
16. Singh V, Cottaris NP, Heasley BS, Brainard DH, **Burge J** (2018). "Computational luminance constancy from naturalistic images". *Journal of Vision*. 18(13): 19, 1-17. doi: <https://doi.org/10.1167/18.13.19> \*
17. **Burge J**, Jaini P (2017). "Accuracy maximization analysis for sensory-perceptual tasks: Computational improvements, filter robustness, and coding advantages for scaled additive noise". *PLoS Computational Biology*. 13(2):e1005281. doi: <https://doi.org/10.1371/journal.pcbi.1005281> \*
18. Jaini P, **Burge J** (2017). "Linking normative models of natural tasks and descriptive models of neural response". *Journal of Vision*. 17(12): 16, 1-26. doi: <https://doi.org/10.1167/17.12.16> \*
19. **Burge J** (2017). "Accurate image-based estimates of focus error in the human eye and in a smartphone camera". *Information Display*. 33(1), 18-23. doi: <https://doi.org/10.1002/j.2637-496X.2017.tb00964.x>
20. **Burge J**, McCann BC, Geisler WS (2016). "Estimating 3D tilt from local image cues in natural scenes". *Journal of Vision*. 16(13): 2, 1–25. doi: <https://doi.org/10.1167/16.13.2> \*
21. **Burge J**, Geisler WS (2015). "Optimal speed estimation in natural image movies predicts human performance". *Nature Communications*. 6:7900, 1-11. doi: <https://doi.org/10.1038/ncomms8900> \*
22. Sebastian S†, **Burge J**†, Geisler WS (2015). "Defocus blur discrimination in natural images with natural optics". *Journal of Vision*, 5(15):16, 1-17. doi: <https://doi.org/10.1167/15.5.16> †Joint first-authorship \*
23. Bonnen K, **Burge J**, Yates J, Pillow JW, Cormack LK (2015). "Continuous psychophysics: Target-tracking to measure visual sensitivity". *Journal of Vision*, 15:3(14), 1-16. doi: <https://doi.org/10.1167/15.3.14>
24. **Burge J**, Geisler WS (2014). "Optimal disparity estimation in natural stereo-images" *Journal of Vision*. 14:2(1), 1-18. doi: <https://doi.org/10.1167/14.2.1> \*
25. Scholl B, **Burge J**, Priebe NJ (2013). "Binocular integration and disparity selectivity in mouse primary visual cortex". *Journal of Neurophysiology*, 109, 3013-3024. doi: <https://doi.org/10.1152/jn.01021.2012> \*
26. **Burge J**, Geisler WS (2012). "Optimal defocus estimates from individual images for autofocusing a digital camera". In: *Proceedings of the SPIE 8299, Digital Photography VIII*, January: Burlingame, CA. (Best Paper Award)
27. **Burge J**, Geisler WS (2011). "Optimal defocus estimation in individual natural images". *Proceedings of the National Academy of Sciences*, 108 (40): 16849-16854. doi: <https://doi.org/10.1073/pnas.1108491108> \*
28. Cooper EA, **Burge J**, Banks MS (2011). "The vertical horopter is not adaptable but it may be adaptive". *Journal of Vision*, 11(3) 20: 1-19. doi: <https://doi.org/10.1167/11.3.20> \*
29. **Burge J**, Fowlkes CC, Banks MS (2010). "Natural scene statistics predict how the figure-ground cue of convexity affects human depth perception". *Journal of Neuroscience*, 30(21): 7269-7280. doi: <https://doi.org/10.1523/JNEUROSCI.5551-09.2010> \*
30. **Burge J**, Girshick AR, Banks MS (2010). "Visual-haptic adaptation is determined by relative reliability". *Journal of Neuroscience*, 30(22): 7714-7721. doi: <https://doi.org/10.1523/JNEUROSCI.6427-09.2010> \*

Faculty of 1000 (F1000Prime) entry by Dora Angelaki: <https://f1000.com/prime/7043956>

31. **Burge J**, Ernst MO, Banks MS (2008). "The statistical determinants of adaptation rate in human reaching". *Journal of Vision*, 8(4) 20: 1-19. doi: <https://doi.org/10.1167/8.4.20> \*
32. **Burge J**, Peterson MA, & Palmer SE (2005). "Ordinal configural cues combine with metric disparity in depth perception." *Journal of Vision*, 5(6), 534-542. doi: <https://doi.org/10.1167/5.6.5> \*
33. Gepshtein S, **Burge J**, Ernst MO, & Banks MS (2005). "The combination of vision and touch depends on spatial proximity." *Journal of Vision*, 5(11), 1013-1023. doi: <https://doi.org/10.1167/5.11.7> \*
34. Cowings PS, Kellar MA, Folen RA, Toscano WB, **Burge J** (2001). "Autogenic feedback training exercise and pilot performance: enhanced functioning under search-and-rescue flying conditions". *The International Journal of Aviation Psychology*, 11(3), 303-315. doi: [https://doi.org/10.1207/S15327108IJAP1103\\_04](https://doi.org/10.1207/S15327108IJAP1103_04) \*

### **Book Chapters & Miscellaneous Publications ( \* indicates peer-reviewed publication )**

35. Introduction for 2020 Tillyer Award Recipient Wilson S. Geisler. Optical Society of America. Fall Vision Meeting. November 18, 20221.
36. Green JD, **Burge J**, Stansberry JA, Meinke B (2016). "Cameras a Million Miles Apart: Stereoscopic Imaging Potential with Hubble and James Webb Space Telescopes". *arXiv:1610.0748*
37. Geisler WS, **Burge J**, Michel MM, D'Antona AD (2014). Characterizing the effects of stimulus and neural variability on perceptual performance. In: Gazzinga & Mangun (Eds.). *The Cognitive Neurosciences*, 5th Edition, 363-374. Cambridge: MIT Press. \*
38. **Burge J** & Geisler WS (2014). Optimal focus error estimation performance in individual images of a popular smart phone. Technical Document, University of Texas at Austin.
39. **Burge J**, Geisler WS (2013). Simulation of mouse vision appearing in a news feature by Monya Baker. "Through the eyes of a mouse", *Nature*, 502, 156-158.
40. Banks MS, **Burge J**, & Held R (2011). "The statistical relationship between depth, visual cues, and human perception". In: *Sensory Cue Integration*. Ed: Landy, M. Oxford University Press. \*
41. **Burge J**, Geisler WS (2011). "Optimal image-based defocus estimates from individual natural images". *Proceedings of the Optical Society of America: Imaging Systems and Applications*, July: Toronto, Canada. <https://doi.org/10.1364/ISA.2011.IMC2>

### **In Preparation**

1. Ni L, **Burge J** (in prep). "The statistics of how image variability and depth variation in natural scenes drive the responses of binocular neurons".
2. White DN, **Burge J** (in prep). "The impact of image variability and depth variation in natural scenes on human stereopsis".
3. **Burge J** (in prep). "A new principle for complex-cell design optimizes signal-to-noise for latent variable encoding in natural scenes".
4. Doi T, **Burge J** (in prep). "Spatial averaging in human vision. II. Non-linear observer models and natural scene statistics".
5. Rodriguez-Lopez V, Chin BM, Dorrnsoro C, **Burge J** (in prep). "The effect of overall light-level on the reverse Pulfrich effect".
6. Rodriguez-Lopez V, Dorrnsoro C, **Burge J** (in prep). "Prevalence of the reverse Pulfrich effect in the general population".
7. Dyer C, **Burge J** (in prep). "Eccentricity strongly modulates the impact of image differences on interocular delays".

### **Professional & University Service**

Official Advisor Computational Neuroscience Minor, University of Pennsylvania

2015-present

Member	Undergraduate Education Executive Committee Graduate Executive and Admissions Committee	2022-present 2021-2022
Editorial Board	Neurons, Behavior, Data analysis, and Theory (NBDT) Scientific Reports	2018-present 2016-present
Guest Editor	eLife	2019
Organizer	Vision Sciences Society Symposium: "Continuous Psychophysics" CoSyNe Program Committee Member Vision Seminar, U Penn (Chair) MindCORE Education Committee, U Penn Interdisciplinary Mind-Brain Colloquium Series, U Penn (Chair) Interdisciplinary Mind-Brain Colloquium Series, U Penn CoSyNe Workshop: "Joint Encoding/Decoding in Specific Sensory-Perceptual Tasks" CoSyNe Program Committee Member Department of Psychology Colloquium Series	2023 2015, 2016 2019-present 2019-2021 2017-2018 2016-2017 2017 2015, 2016 2015-16
Lecturer	NYU Grad Seminar in Motion and Depth Perception: Guest Lecturer NYU Grad Seminar in Motion and Depth Perception: Guest Lecturer Comp. Neuroscience Summer Course at Cold Spring Harbor Comp. Neuroscience Summer Course at Cold Spring Harbor (canceled; COVID-19) Comp. Neuroscience Summer Course at Cold Spring Harbor (canceled; COVID-19) Summer Workshop on Natural scene statistics, Ludwig Maximilian Universität	2022, November 2022, October 2022, July 2021, July 2020, July 2011, July
Reviewer	Advances in Neural and Information Processing Systems, Cerebral Cortex, Cognition, Current Biology, eLife, Frontiers in Perception Science, Frontiers in Psychology, IEEE-Transactions on Image Processing, IEEE-Pattern Analysis and Machine Intelligence, Investigative Ophthalmology and Visual Science, Journal of Computational Neuroscience, Journal of Neuroscience, Journal of Neurophysiology, Journal of Vision, Nature Neuroscience, Neural Computation, Neuron, PLoS Computational Biology, PLoS One, Proceedings of the National Academy of Sciences, Royal Society Open Science, Scientific Reports, Scientific Advances, Transactions on Haptics, Vision Research	
Panelist	MindCore Grant Writing Workshop (U Penn) Interdisciplinary Mind-Brain (iMB) Job Interview Workshop (U Penn)	2018 2017

### Trainee Awards

Benjamin Chin	University of Pennsylvania: Dean's Scholar Award	2018
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### Talks

2023, March	York University	(accepted) Toronto, CA
2022, February	Ann. Interdisciplinary Conference: 3D Vision: Modeling & Psychophysics	Jackson, WY
2022, November	Dept. of Psychology & Neuroscience, New York University	New York, NY
2022, November	University of Wisconsin-Madison	Madison, WI
2022, October	Dept. of Psychology & Neuroscience, New York University	New York, NY
2022, August	Center for Machine Perception, Technical Univ. in Prague	Prague, Czech Republic
2022, July	Computational Neuroscience Summer Course	Cold Spring Harbor, NY
2022, June	Undergraduate Summer School Research Presentation (UPenn)	Philadelphia, PA
2022, May	Vision Journal Club, New York University	New York, NY
2022, February	University of Wisconsin-Madison	(canceled; COVID-19) Madison, WI
2021, December	L.V. Prasad Eye Institute, Optometry & Vision Science	(virtual) Hyderabad, India
2021, November	Introduction for Tillyer Award—Recipient: Bill Geisler	(virtual) Seattle, WA
2021, October	Optica Fall Vision Meeting	(virtual) Seattle, WA
2021, July	Computational Neuroscience Summer Course (canceled; COVID-19)	Cold Spring Harbor, NY
2021, April	Center for Perceptual Systems, Univ. of Texas at Austin	(virtual) Austin, TX
2021, February	Stanford University	(virtual) Stanford, CA
2020, July	Computational Neuroscience Summer Course (canceled; COVID-19)	Cold Spring Harbor, NY

2020, April	York University	(canceled; COVID-19) Toronto, Canada
2020, January	British Machine Vision Association: Keynote Lecture "3D worlds from 2D images in humans and machines."	London, England
2019, November	University of Minnesota	Minneapolis, MN
2019, October	Department of Psychology Retreat (UPenn)	Philadelphia, PA
2019, October	Theory Interest Group (UPenn)	Philadelphia, PA
2019, July	Princeton University	Princeton, NJ
2019, May	Vision Sciences Society	St. Petersburg, FL
2019, May	Massachusetts Institute of Technology	Boston, MA
2019, April	Theory Interest Group (UPenn)	Philadelphia, PA
2019, March	Institute of Optics, Spanish National Research Council	Madrid, Spain
2019, February	Annual Interdisciplinary Conference	Jackson Hole, WY
2018, September	Fall Vision Meeting, Optical Society of America	Reno, NV
2018, April	King's Court English House (UPenn)	Philadelphia, PA
2018, March	University of Ulm	Ulm, Germany
2017, May	University of Nevada at Reno	Reno, NV
2017, April	Rochester Institute of Technology	Rochester, NY
2017, March	State University of New York: College of Optometry	New York, NY
2017, February	Cosyne Workshop "Joint Encoding and Decoding in Specific Sensory-Perceptual Tasks"	Salt Lake City, UT
2017, January	Annual Interdisciplinary Conference	Breckenridge, CO
2016, October	PRISM 6 "Perceptual representation of illumination, shape, and materials"	Geissen, Germany
2016, September	Rank Prize Lectures "Seeing the World from More than One Perspective"	Grasmere, England
2016, May	Vision Sciences Society: Symposium "Artifice versus realism as an experimental methodology"	St. Petersburg, FL
2016, April	Princeton University	Princeton, NJ
2015, August	Stanford University Workshop	Stanford, CA
2015, June	Systems & Integrative Vision Training Grants Retreat (UPenn)	Philadelphia, PA
2015, May	Vision Sciences Society	St. Petersburg, FL
2014, November	Rutgers University	New Brunswick, NJ
2014, May	Vision Sciences Society	St. Petersburg, FL
2014, February	Annual Interdisciplinary Conference	Jackson Hole, WY
2013, May	Vision Sciences Society	Naples, FL
2013, January	University of Pennsylvania	Philadelphia, PA
2012, June	"Perception, Representation, & Objectivity: Themes from Tyler Burge"	St. Petersburg, Russia
2012, February	Computational and Systems Neurosciences	Salt Lake City, UT
2012, January	IS&T/SPIE Conference on Electronic Imaging	Burlingame, CA
2012, January	Stanford University	Stanford, CA
2011, July	Optical Society of America, Imaging Systems	Toronto, Canada
2011, May	Vision Sciences Society	Naples, FL
2011, February	Ohio State University	Columbus, OH
2010, September	Redwood Center for Theoretical Neuroscience	Berkeley, CA
2010, May	Vision Sciences Society	Naples, FL
2010, March	Italian Institute of Technology	Genoa, Italy
2010, March	Computational and Systems Neurosciences	Salt Lake City, UT
2008, May	Vision Sciences Society	Naples, FL
2007, August	European Conference on Visual Perception	Arezzo, Italy
2005, August	European Conference on Visual Perception	La Coruna, Spain
2005, July	MPI for Biological Cybernetics	Tubingen, Germany

## Teaching

2022, Fall	Psych : Introduction to Perception	University of Pennsylvania
2022, Fall	BE 899: Independent Study in Computational Methods	University of Pennsylvania
2022, Summer	Summer Course; Computational Neuroscience: Vision	Cold Spring Harbor Univ.
2022, Spring	Psych 311: Classic & Modern Research in Perception Science	University of Pennsylvania
2021, Fall	Psych 111: Introduction to Perception	University of Pennsylvania

2021, Fall	Psych 600: Pro-seminar in Perception	University of Pennsylvania
2020, Fall	Psych 111: Introduction to Perception	University of Pennsylvania
2020, Spring	Psych 600: Pro-seminar in Perception	University of Pennsylvania
2019, Fall	Psych 111: Introduction to Perception	University of Pennsylvania
2018, Fall	Psych 111: Introduction to Perception	University of Pennsylvania
2017, Fall	Psych 111: Introduction to Perception	University of Pennsylvania
2016, Fall	Psych 111: Introduction to Perception	University of Pennsylvania
2016, Fall	Psych 600: Pro-seminar in Perception	University of Pennsylvania
2016, Spring	Psych 511: Fundamentals of Vision	University of Pennsylvania
2015, Fall	Psych 111: Introduction to Perception	University of Pennsylvania
2015, Spring	Psych 111: Introduction to Perception	University of Pennsylvania
2011, July	Summer Workshop: Natural scene statistics	Ludwig Maximilian Universität
2003	Perception & Psychophysics	UC, Berkeley
2003	Perception & Psychophysics	UC, Berkeley

## Mentoring

<i>Research Scientists:</i>	Takahiro Doi, Ph.D.	(2017-2021)
<i>Post-doctoral Fellows:</i>	Daniel Herrera, Ph.D.	(2022-present)
	Vijay Singh, Ph.D.	(2016-2019; jointly advised with David Brainard)
	Seha Kim, Ph.D.	(2015-2020)
	Arvind Iyer, Ph.D.	(2015-2018)
<i>PhD students:</i>	David White	Neuroscience (2016-present)
	Long Ni	Psychology (2020-present)
	Anthony LoPrete	Bioengineering (2021-present)
<i>Graduated PhD students:</i>	Benjamin Chin	Psychology (2015-2022)
<i>Rotation students:</i>	Lingqi Zhang	Psychology (2018)
	David White	Neuroscience (2016)
	Benjamin Chin	Psychology (2015)
<i>Undergrad researchers:</i>	Callista Dyer	Psychology (2022-present)
	Heather Schneps	Psychology (2020-2021)
<i>Visiting students:</i>	Victor Rodriguez-Lopez	Spanish National Research Council-CSIC, Optics M.S. student, Primary Advisor: Carlos Dorronsoro (2018-present).
	Priyank Jaini	University of Waterloo, Computer Science Ph.D. student, Primary Advisor: Pascal Poupart (2015-2017).
<i>Exam Committees:</i>	Lingqi Zhang	Psychology, 2019-present, Qualifying & Thesis Committee (Chair) Advisors: David Brainard & Alan Stocker
	Ron Ditullio	Neuroscience, 2019-present, Thesis Committee (Chair) Advisors: Yale Cohen & Vijay Balasubramanian
	Kara McGaughey	Neuroscience, 2019-present, Qualifying Committee Advisor: Josh Gold
	Michael Barnett,	Psychology, 2018-present, Qualifying & Thesis Committee (Chair) Advisors: David Brainard & Geoff Aguirre
	Kyra Schapiro	Neuroscience, 2018-2022, Thesis Committee Advisors: Josh Gold
	Ann Sizemore,	Bioengineering, 2018, Qualifying Committee Advisor: Danielle Basset
	Jennifer Stiso,	Neuroscience, 2018, Qualifying Committee Advisors: Danielle Bassett & Timothy Lucas
	Colin Xu,	Psychology, 2016, 699 Exam Committee Advisor: Rob DeRubeis
	Yunshu Fan,	Neuroscience, 2015-2019, Qualifying & Thesis Committees Advisors: Long Ding & Josh Gold

Andrew Jaegle,	Neuroscience, 2015-2018, Qualifying & Thesis Committees Advisors: Diego Contreras & Kostas Daniilidis
Alex Burka,	Bioengineering, 2015-2018, Qualifying & Thesis Committees Advisor: Katherine Kuchenbecker
Manuel Spitschan,	Psychology, 2014-2016, Thesis Committee Advisors: David Brainard & Geoff Aguirre

## Media

Monovision contact lenses raise risk for traffic accidents	Medscape, May 22, 2020
The illusion of safety	Scientific American, Aug. 9, 2019
Instead of bifocals, some try monovision... but depth perception can suffer	Philadelphia Inquirer, Jul. 30, 2019
When a fix for one vision problem causes another	Penn Today, Jul. 25, 2019
Imaging the solar system in 3-D with Hubble & Webb	America Space, Nov. 15, 2016
Space telescope duo will showcase the solar system in 3D	New Scientist, Oct. 31, 2016
Predicting how humans estimate speed	NeuroscienceNews.com, Sept. 4, 2015
Autofocus and the importance of 'defocusing'	The Guardian Observer, Jan. 14, 2015
Giving cameras the best autofocus possible, autofocus from the human eye	Scientific American, Nov. 4, 2011
Psychologists decipher brain's clever autofocus software	Wired Magazine, Oct. 10, 2011
Deciphering the brain's autofocus mechanism	Science Magazine, Oct. 7, 2011
Researchers develop optimal algorithm for determining focus error in eyes and cameras	Fast Company, Sept 26, 2011

## Conference Talks & Abstracts

Barnett MA, Chin BM, Aguirre GK, **Burge J**, Brainard DH (2022). "Temporal dynamics of color processing measured using a continuous tracking task". 26<sup>th</sup> Symposium of the International Colour Vision Society, Crete, GR

Barnett MA, Chin BM, Aguirre GK, Brainard DH, **Burge J** (2022). "Temporal dynamics of color processing measured using a continuous tracking task". Vision Sciences Society, St. Petersburg, FL.

Ni L, **Burge J** (2022). "Encoding fidelity of binocular receptive fields with internal noise in the presence of external variability from natural scenes". Vision Sciences Society, St. Petersburg, FL.

Chin BM, **Burge J** (2022). "Interocular differences in temporal integration drive anomalous Pulfrich percepts". Vision Sciences Society, St. Petersburg, FL.

Rodriguez-Lopez V, Dorronsoro C, **Burge J** (2022). "The impact of light level on the Classic and Reverse Pulfrich Effects". Vision Sciences Society, St. Petersburg, FL.

Barnett M, Chin BM, Aguirre GK, Brainard DH, **Burge J** (2022). "Temporal dynamics of color processing measured using a continuous tracking task". Vision Sciences Society, St. Petersburg, FL.

Chin BM, **Burge J** (2021). "Perceptual consequences of interocular differences in temporal processing". Optica Fall Vision Meeting, Seattle, WA. (virtual, COVID-19)

**Burge J**, Cormack LK (2021). "Target tracking shows millisecond-scale visual delays are faithfully preserved in the movement of the hand". Optica Fall Vision Meeting, Seattle, WA. (virtual, COVID-19)

Doi T, **Burge J** (2020). "Suboptimal visual averaging reveals compulsory nonlinear mechanisms in human vision". Vision Sciences Society, St. Petersburg, FL. (virtual, COVID-19)

Kim S, **Burge J** (2020). "Pooling model of tilt estimation based on surface tilt statistics in natural scenes". Vision Sciences Society, St. Petersburg, FL. (virtual, COVID-19)

Rodriguez-Lopez V, Serrano-Pedraza I, **Burge J**, Dorronsoro C (2020). "Measuring the Reverse Pulfrich effect in the general population". Vision Sciences Society, St. Petersburg, FL. (virtual, COVID-19)

Singh, V, **Burge J**, Brainard D (2020). "Equivalent noise characterization of human lightness constancy". Vision Sciences Society, St. Petersburg, FL. (virtual, COVID-19)



**Burge J**, Cormack LK (2020, accepted but withdrawn: COVID-19). "3D target tracking rapidly reveals millisecond-scale interocular differences in temporal processing". Vision Sciences Society, St. Petersburg, FL.

Chin BM, **Burge J** (2020, accepted but withdrawn: COVID-19). "Towards an understanding of the spatial frequency binding problem". Vision Sciences Society, St. Petersburg, FL.

White DN, **Burge J** (2020, accepted but withdrawn: COVID-19). "Natural scene statistics and depth estimation errors in half-occluded zones in natural scenes". Vision Sciences Society, St. Petersburg, FL.

Rodriguez-Lopez V, **Burge J**, Dorronsoro C (2020). "The Reverse Pulfrich effect with contact lenses". The Association for Research in Vision and Ophthalmology, Fort Lauderdale, FL.

Doi T, **Burge J** (2020). "Suboptimal evidence integration informs adaptive, nonlinear mechanisms in spatial vision". CoSyNe, Denver, CO.

Green JD, Meinke B, Stansberry J, **Burge J** (2020). "Depth Vision: Stereoscopic potential with the Hubble and James Webb Space Telescopes". American Astronomical Society Meeting, 426.01, #235. Honolulu, HI

**Burge J**, Rodriguez-Lopez V, Dorronsoro C (2019). "Monovision and the misperception of motion". Vision Sciences Society, St. Petersburg, FL. (TALK)

Rodriguez-Lopez V, **Burge J**, Dorronsoro C (2019). "The reverse Pulfrich effect: Misperception of motion in depth". 8<sup>th</sup> Iberian Conference on Visual Perception, El Escorial, Spain. (TALK)

Doi T, **Burge J** (2019). "Local variability causes adaptive spatial integration". Vision Sciences Society, St. Petersburg, FL. (TALK)

Kim S, **Burge J** (2019). "Optimal spatial integration: How to pool local estimates into a global percept". Vision Sciences Society, St. Petersburg, FL.

Chin BM, **Burge J** (2019). "Human sensitivity to task-relevant features in speed discrimination". Vision Sciences Society, St. Petersburg, FL.

White D, **Burge J** (2019). "Depth estimates in half-occluded zones in natural scenes". Vision Sciences Society, St. Petersburg, FL.

Basgoze Z, White DN, **Burge J**, Cooper EA (2019). "Effects of context on the visual stability of depth edges in natural scenes". Vision Sciences Society, St. Petersburg, FL.

**Burge J** (2019). "The Reverse Pulfrich effect". Annual Interdisciplinary Conference, Jackson Hole, WY. (TALK)

**Burge J** (2018). "Inferring the shape of the decision variable distributions from psychometric functions". Vision Sciences Society, St. Petersburg, FL.

Kim S, **Burge J** (2018). "Spatial pooling of local Bayes-optimal estimates predicts human 3D tilt estimation in natural scenes". Vision Sciences Society, St. Petersburg, FL.

Chin B, **Burge J** (2018). "A model grounded in natural scene statistics predicts human performance with both natural and artificial stimuli". Vision Sciences Society, St. Petersburg, FL.

Iyer A, **Burge J** (2018). "Optimal binocular disparity estimation in the presence of natural depth variation". Vision Sciences Society, St. Petersburg, FL.

Doi T, **Burge J** (2018). "Adaptive spatial re-weighting in stereoscopic depth perception revealed by disparity reverse correlation". Vision Sciences Society, St. Petersburg, FL.

White D, **Burge J** (2018). "Human binocular disparity estimation with natural stereo-images". Vision Sciences Society, St. Petersburg, FL.

Oluk C, Bonnen K, **Burge J**, Cormack LK, Geisler WS (2018). "Stereo slant estimation of planar surfaces: Standard cross-correlation vs. planar-correlation". Vision Sciences Society, St. Petersburg, FL.

Kim S, **Burge J** (2018). "Global estimation of signed 3D surface tilt from natural images". ModVis: Computational and Mathematical Models in Vision, St. Petersburg, FL. (TALK)

Meinke B, Green J, **Burge J**, Stansbury JA, May B (2018). "Solar System Stereoscapy with Hubble and James Webb Space Telescopes". XXXth General Assembly of the International Astronomical Union. Vienna, Austria.

Singh V, Heasly B, Cottaris N, Brainard DH, **Burge J** (2017). "A supervised approach to understanding color constancy". Society for Neuroscience, Washington D.C.

Singh V, Heasly B, Cottaris N, Brainard DH, **Burge J** (2017). "A supervised approach to understanding color constancy". Cognitive Computational Neuroscience, New York, NY

Green JD, Stansberry JA, **Burge J**, Meinke B (2017). "Potential and Challenges for Stereo 3D Imaging with the Hubble and James Webb Space Telescopes". 49th Annual Division for Planetary Sciences Meeting, Provo, UT

Chin B, **Burge J** (2017). "Predicting human performance in a natural task with strongly constrained models of noise". Vision Sciences Society, St. Petersburg, FL (TALK)

Kim S, **Burge J** (2017). "Human surface tilt estimation in natural and artificial 3D scenes". Vision Sciences Society, St. Petersburg, FL (TALK)

Iyer AV, **Burge J** (2017). "Predicting natural depth variation and its effect on binocular disparity estimation". Vision Sciences Society, St. Petersburg, FL

**Burge J**, Jaini P (2017). "Linking Normative Models of Natural Tasks and Descriptive Models of Neural Response". Vision Sciences Society, St. Petersburg, FL

**Burge J**, Jaini P (2017). "Linking Normative Models and Methods for Neural Systems Identification". Cosyne, Salt Lake City, UT

**Burge J** (2017). "Depth variation, binocular contrast differences, and disparity estimation in natural scenes". Annual Interdisciplinary Conference, Breckenridge, CO (INVITED TALK).

**Burge J** (2016). "Predicting human performance in fundamental visual tasks with natural stimuli". Vision Sciences Society Symposium: "Artifice versus realism as an experimental methodology". St. Petersburg, FL (INVITED TALK)

**Burge J** (2016). "Local cues for half-occlusion detection in stereo-images of natural scenes". Vision Sciences Society, St. Petersburg, FL

Geisler WS, **Burge J** (2016). "Local Estimation of Global Surface Orientation from Texture and Disparity". Vision Sciences Society, St. Petersburg, FL.

Kim S, **Burge J** (2016). "Human tilt estimation in local patches of natural stereo images". Vision Sciences Society, St. Petersburg, FL

Chin B, **Burge J** (2016). "External vs. internal determinants of human speed discrimination with natural image movies". Vision Sciences Society, St. Petersburg, FL

**Burge J**, Jaini P (2016). "Accuracy Maximization Analysis for Sensory-Perceptual Tasks: Computational Improvements, Priors, and Coding Advantages for Multiplicative Noise". NETI Workshop, Austin, TX

- Burge J** (2016). "Optimal motion-in-depth estimation from natural stereo image movies". COSYNE, Salt Lake City, UT
- Iyer AV, **Burge J** (2016). "Weber's Law in disparity discrimination is predicted by the statistics of natural stereo-images." COSYNE, Salt Lake City, UT
- Burge J**, Geisler WS (2015). "Optimal speed estimation in natural image movies predicts human performance". Vision Sciences Society, St. Petersburg, FL (TALK)
- Burge J**, Geisler WS (2014). "3D surface tilt estimation in natural scenes from image cue gradients". Vision Sciences Society, St. Petersburg, FL (TALK)
- Bonnen K, **Burge J**, Yates JL, Pillow JW, Cormack LK (2014). "A general behavioral tracking paradigm for estimating visual sensitivity using dynamic internal models". COSYNE, Salt Lake City, UT
- Burge J**, Geisler WS (2014). "3D surface tilt estimation in natural scenes from image cue gradients". COSYNE, Salt Lake City, UT
- Burge J**, Geisler WS (2014). "Using natural image movies to determine optimal processing for speed estimation". Annual Interdisciplinary Conference, Jackson Hole, WY
- Burge J**, Geisler WS (2013). "Optimal retinal speed estimation in natural image movies". Vision Sciences Society, Naples, FL
- Burge J**, Geisler WS (2013). "Optimal speed estimation in natural image movies". COSYNE, Salt Lake City, UT
- Burge J**, Geisler WS (2012). "Linear and non-linear receptive fields for optimal disparity estimation in natural stereo-images". COSYNE, Salt Lake City, UT (TALK)
- Burge J**, Geisler WS (2012). "Optimal defocus estimates from individual images for autofocusing a digital camera". IS&T/SPIE Conference on Electronic Imaging: Digital Photography, Burlingame, CA (TALK)
- Sebastian S, **Burge J**, Geisler WS (2011). "Human discrimination of defocus blur in natural images". Society for Neuroscience, Washington, D.C.
- Burge J**, Geisler WS (2011). "Optimal receptive fields for disparity estimation in natural images". Society for Neuroscience, Washington, D.C.
- Burge J**, Geisler WS (2011) "Optimal image-based defocus estimates from individual natural images". Optical Society of America: Imaging Systems and Applications. Toronto, Canada. (TALK)
- Burge J**, Geisler WS (2011) "Optimal disparity estimation in natural stereo-images". Vision Sciences Society, Naples, Florida. (TALK)
- Burge J**, Geisler WS (2010) "Optimal defocus detection and estimation in natural images". Vision Sciences Society, Naples, Florida. (TALK)
- Burge J**, Geisler WS (2010) "Detection and estimation of defocus in natural images". COSYNE, Salt Lake City, Utah (TALK)
- Burge J**, Held R, Banks MS (2008) "Blur and accommodation are metric depth cues." Vision Sciences Society, Sarasota, Florida (TALK)
- Girshick AR, **Burge J**, Banks MS (2008). "Prior expectations in slant perception: has the visual system internalized natural scene geometry". Vision Sciences Society, Sarasota, Florida (TALK)

**Burge J**, Fowlkes, CC, Banks, MS (2007) "Configural cues, disparity, and depth perception: the internalization of natural scene statistics". European Conference on Visual Perception, A Coruna, Spain (TALK)

**Burge J**, Girshick AR, Banks MS (2007) "Visuo-haptic adaptation: the role of relative reliability" Vision Science Society, Sarasota, Florida

**Burge J**, Ernst MO, Banks MS (2006) "Modeling visuo-motor adaptation behavior with a Kalman Filter" Computational workshop: bridging the gap between sensation and perception, Karlsruhe, Germany

**Burge J**, Peterson MA, Palmer SE, & Banks MS (2005) "Configural cues combine with disparity in depth perception", European Conference on Visual Perception (TALK)

Ernst MO, **Burge J**, Banks MS (2005). "Using a Kalman Filter to predict visuomotor adaptation behavior". European Conference on Visual Perception

Banks MS, **Burge J**, & Schlerf, JE (2005). "Disparity and texture gradients are combined in a weighted sum and a subtraction" European Conference on Visual Perception

Ernst MO, **Burge J**, Banks MS (2005). "Resolving visual-tactual incongruity depends on sensory reliability". International Multisensory Research Forum, Dublin, Ireland

**Burge J**, Hillis JM., Landy MS, & Banks MS (2003) "Disparity and texture gradients are combined in two ways." Vision Sciences Society