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DEPARTMENT OF PSYCHOLOGY
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UPDATED 6/2020

RESEARCH POSITIONS

- Assistant Professor, *Department of Psychology, Cognitive & Brain Sciences, University of Nevada, Reno*, January 2017 - Present
- Research Group Leader, *German Center for Vertigo and Balance Disorders, Ludwig-Maximilians University Hospital of Munich*, April 2010-September 2016
 - Principal investigator, *Bernstein Center for Computational Neuroscience, Munich*, Sept. 2013-Present
 - Associated faculty, *Graduate School of Systemic Neurosciences*, May 2015-Present
- Postdoc, *Anatomy & Neurobiology, Washington University in St. Louis, Medical School*, February 2007-March 2010.

EDUCATION

- PhD, *Vision Science, University of California, Berkeley*. May 2007.
- BA, *Biological Anthropology and Psychology, Harvard University*. June 1996.

CURRENT FUNDING

- “R11 Track-2 FEC: The Visual Experience Database: A Large-Scale Point-of-View Video Database for Vision Research”, NSF, \$3,974,003, Co-PI, Aug. 2019-July 2023
- “CHS: Small: Towards Accommodating Gender Differences in Virtual Reality Sickness”, NSF, \$499,785, Co-PI, Sept. 2019-Aug. 2022
- “Role of motor signals for perception during self-motion”, NIH COBRE, project leader, \$639,000. June 2017-May 2020

PRIOR FUNDING & AWARDS

- “Understanding Gender Differences in Visual/Vestibular Conflict during Virtual Locomotion”, Google Research, \$44,044. Jan. 2018-Dec. 2018
- “Efficient vestibular coding”, Research grant D-T1, with Martin Kleinstueber, BMBF through BCCN Munich. €129.180, May 2015-May 2018
- “Moving heads, stable worlds”, Research grant MA 6233/1-1, sole applicant, DFG, €220.813, May 2015-May 2018
- “Underwater VR for extra-vehicular activity training”, Nevada NASA space grant consortium, NASA NNX15AI02H and NSHE, \$30,000, July 2017-April 2018
- “Dependence of heading biases on statistics of gaze and heading behavior”, NIH COBRE pilot project, \$142,000. January 2017-December 2017
- “Analyzing patient behavior as optimal adaptation”, Research grant TRFII-7, with Stefan Glasauer, BMBF through DSGZ. €411.500, Nov. 2014-Nov. 2017
- “Proprioceptive stabilization of the auditory world”, Research grant B-T3, with Lutz Wiegrebe, Uwe Firzlaff, BMBF through BCCN Munich. €132.293, September 2013-September 2015
- “Probabilistic analysis of visual-vestibular perception”, Young scientist grant YSG-5, sole applicant, BMBF through DSGZ. €593.555, April 2010-October 2014
- Marie Curie postdoctoral fellowship – declined - from ERC through Royal Holloway, £75.000, Nov. 2009

- Postdoctoral fellowship, NIH training grant through Washington Univ. Ophthalmology, \$54,000, Feb. 2009-Feb. 2010
- Postdoctoral fellowship, sole applicant, NASA and *National Space Biomedical Research Institute*, \$108,000, February 2007-January 2009.
- Graduate student competition winner, *International Multisensory Research Forum*, June 2006.
- BA Honors, Magna cum laude, *Harvard University*, June 1996.

PUBLICATIONS

- MacNeilage (in press) *Characterizations of natural head movements in humans and animals*. In: Fritsch (Ed.) *The Senses*. Elsevier
- Glasauer, MacNeilage (in press) *Computational rules for integrating vestibular and multi-modal motion signals in the central nervous system*. In: Fritsch (Ed.) *The Senses*. Elsevier
- Hausamann, Sinnott, MacNeilage (2020). *Positional head-eye tracking outside the lab: an open-source solution*. In *Symposium on Eye Tracking Research and Applications* (pp. 1-5).
- Adhanom, Lee, Folmer, MacNeilage (2020) *GazeMetrics: An Open-Source Tool for Measuring the Data Quality of HMD-based Eye Trackers*. In *Symposium on Eye Tracking Research and Applications* (pp. 1-5).
- Adhanom, Griffin, MacNeilage, Folmer (2020) *The Effect of a Foveated Field-of-view Restrictor on VR Sickness*. In *2020 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)* (pp. 645-652)
- Dietrich, Heidger, Schniepp, MacNeilage, Glasauer, Wuehr (2020) *Head motion predictability explains activity-dependent suppression of vestibular balance control*. *Scientific Reports*, 10(1), 1-10.
- Sinnott, Liu, Matera, Halow, Jones, Moroz, Mulligan, Crognale, Folmer, MacNeilage (2019) *Underwater Virtual Reality System for Neutral Buoyancy Training: Development and Evaluation*. In *25th ACM Symposium on Virtual Reality Software and Technology* (pp. 1-9).
- Moroz, Garzorz, Folmer, MacNeilage (2019) *Sensitivity to visual speed modulation in head-mounted displays depends on fixation*. *Displays*, 58, 12-19.
- Al Zayer, Adhanom, MacNeilage, Folmer (2019) *The effect of field-of-view restriction on sex bias in VR sickness and spatial navigation performance*. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (pp. 1-12).
- Hausamann, Daumer, MacNeilage, Glasauer (2019) *Ecological momentary assessment of head motion: Towards normative data of head stabilization*. *Frontiers in human neuroscience*, 13, 179.
- Garzorz, MacNeilage (2019) *Towards dynamic modeling of visual-vestibular conflict detection*. *Progress in brain research*, 248, 277-284.
- Ramaioli, Cuturi, Ramat, Lehnen, MacNeilage (2019) *Vestibulo-Ocular Responses and Dynamic Visual Acuity During Horizontal Rotation and Translation*. *Frontiers in neurology*, 10.
- Al Zayer, MacNeilage, Folmer (2018). *Virtual locomotion: a survey*. *IEEE transactions on visualization and computer graphics*.
- Garzorz, Freeman, Ernst, MacNeilage (2018) *Insufficient compensation for self-motion during perception of object speed: The vestibular Aubert-Fleischl phenomenon*. *Journal of vision*, 18(13), 9-9.
- MacNeilage, Glasauer (2018) *Gravity perception: The role of the cerebellum*. *Current Biology*, 28(22), R1296-R1298.
- Bhandari, MacNeilage, Folmer (2018). *Teleportation without spatial disorientation using optical flow cues*. In *Proceedings of Graphics Interface (Vol. 2018)*.
- Genzel, Schutte, Brimijoin, MacNeilage, Wiegrefe (2018) *Psychophysical evidence for auditory motion parallax*. *Proceedings of the National Academy of Sciences* 115 (16), 4264-4269
- Holten, MacNeilage (2018) *Optic flow detection is not influenced by visual-vestibular congruency*. *PloS one* 13 (1), e0191693
- Garzorz, MacNeilage (2017) *Visual-Vestibular Conflict Detection Depends on Fixation*. *Curr Biol*. Sep 25;27(18):2856-2861.e4.

- MacNeilage, Glasauer (2017) *Quantification of Head Movement Predictability and Implications for Suppression of Vestibular Input during Locomotion*. Front Comput Neurosci. Jun 7;11:47.
- Clemens, Selen, Pomante, MacNeilage, Medendorp (2017) *Eye movements in darkness modulate self-motion perception*. eNeuro. 2017 Jan 25;4(1).
- Genzel, Firzlaff, Wiegrebe, MacNeilage (2016) *Dependence of auditory spatial updating on vestibular, proprioceptive, and efference copy signals*. J Neurophysiol 1;116(2):765-75.
- Hummel, Cuturi, MacNeilage, Flanagan (2016) *The effect of supine body position on human heading perception*. J Vis.;16(3):19
- Bremova, Caushaj, Ertl, Strob, Böttcher, Strupp, MacNeilage (2016). *Comparison of linear motion perception thresholds in vestibular migraine and Menière's disease*. Eur Arch Otorhinolaryngol. Oct;273(10):2931-9.
- Dokka*, MacNeilage*, DeAngelis, Angelaki (2015) *Multisensory self-motion compensation during object trajectory judgments*. Cereb Cortex. 2015 Mar;25(3):619-30. Epub 2013.
- Cuturi, MacNeilage (2014) *Optic flow induces non-visual self-motion aftereffects*. Current Biology, 24(23):2817-2821.
- Nesti, Barnett-Cowan, MacNeilage, Bühlhoff (2014) *Human sensitivity to vertical self-motion*. Exp Brain Res. 232(1):303-14.
- Nesti, Beykirch, MacNeilage, Barnett-Cowan, & Bühlhoff (2014) *The importance of stimulus noise analysis for self-motion studies*. PLoS one, 9(4), e94570.
- Chang, Hiss, Sanders, Olomu, MacNeilage, Uchanski, & Hullar (2014) *Vestibular perception and the vestibulo-ocular reflex in young and older adults*. Ear and hearing, 35(5), 565-570.
- Agrawal, Bremova, Kremmyda, Strupp, MacNeilage (2013) *Clinical testing of otolith function: perceptual thresholds and myogenic potentials*. J Assoc Res Otolaryngol. 14(6):905-15.
- Cuturi, MacNeilage (2013) *Systematic biases in human heading estimation*. PLoS One 8(2):e56862.
- MacNeilage, Zhang, DeAngelis, Angelaki (2012) *Vestibular facilitation of optic flow parsing*. PLoS One 7(7).
- Dokka*, MacNeilage*, DeAngelis, Angelaki (2011) *Estimating distance during self-motion: A role for visual-vestibular interactions*. J Vis 11(13): 2.
- MacNeilage, Banks, DeAngelis, Angelaki (2010) *Vestibular heading discrimination and sensitivity to linear acceleration in head and world coordinates*. J Neurosci 30(27):9084-9094.
- MacNeilage, Turner, Angelaki (2010) *Canal-otolith interactions and detection thresholds of linear and angular components during curved-path self-motion*. J Neurophysiol. Aug;104(2):765-73.
- MacNeilage, Ganesan, Angelaki (2008) *Computational approaches to spatial orientation: from transfer functions to dynamic Bayesian inference*. J Neurophysiol 100: 2981-2996.
- MacNeilage, Banks, Berger, Buelthoff (2007) *A Bayesian model of the disambiguation of gravito-inertial force by visual cues*. Exp Brain Res 179:263-90.
- Hauser, MacNeilage, Ware (1996) *Numerical representations in primates*. Proc Natl Acad Sci U S A. Feb 20;93(4):1514-7.

*indicates equal author contributions

CONFERENCE TALKS

- MacNeilage (2020) Perception of a stable visual environment during head motion depends on motor signals. Human vision and electronic imaging, San Francisco.
- Sinnott, Liu, Matera, Halow, Jones, Moroz, Mulligan, Crognale, Folmer, MacNeilage (2019) Underwater virtual reality for neutral buoyancy training: development and evaluation. Virtual reality systems technology, Paramatta, Australia.
- MacNeilage, Sinnott, Hausamann (2019) Characterization of natural head and eye movements driving retinal flow. Western IDEA conference, Las Vegas.
- MacNeilage, Halow, Liu (2019) Visual-vestibular conflict detection is modulated by motor signals. European conference on visual perception. Leuven, Belgium.

- MacNeilage, Sinnott, Hausamann (2019) Characterization of natural head and eye movements driving retinal flow. European conference on eye movements. Alicante, Spain.
- MacNeilage, Moroz, Garzorz, Folmer (2018) Visual-vestibular conflict detection is better during active than passive head movement. Society for neuroscience annual meeting. San Diego.
- MacNeilage, Folmer (2017) Underwater VR for extra-vehicular activity training. Nevada NASA space grant consortium meeting, Las Vegas.
- Garzorz, MacNeilage (2017) Visual-vestibular conflict detection depends on fixation. European conference on eye movements, Wuppertal, Germany
- MacNeilage, Garzorz (2016) Visual-vestibular conflict detection depends on temporal synchrony and eye fixation. St. Pete's Beach. Vision Sciences Society Meeting
- MacNeilage (2015) Self-motion in virtual reality. Seattle. Workshop: Challenges in virtual reality. International conference for robotics and automation.
- MacNeilage (2015) Linear motion thresholds in vestibular migraine and Meniere's disease. Prague. Congress of European ORL-HNS.
- MacNeilage (2015) Vestibular-motor integration during self-motion perception. Pisa. International Multisensory Research Forum.
- Cuturi, MacNeilage (2015) Optic flow induces non-visual self-motion aftereffects. Pisa. International Multisensory Research Forum.
- MacNeilage (2014) Self-motion perception is modulated by eye fixation. Amsterdam, Vestibular processing in motor control. Satellite meeting of the Neural Control of Movement Conference.
- Cuturi, MacNeilage (2012) Similar systematic biases in visual and vestibular heading perception. Program No. 828.07. Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2012. Online.
- Dokka*, MacNeilage*, Deangelis, Angelaki (2012) Vestibular signals improve accuracy of object trajectory judgments in allocentric coordinates. Program No. 828.02. Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2012. Online.
- MacNeilage (2012) Vestibular Heading Discrimination and Sensitivity to Linear Acceleration in Head and World Coordinates. Program No. 571. San Diego, CA: Assoc. Res. Otolaryngology, 2012. Online.
- MacNeilage, Zhang, Angelaki (2009) Vestibular facilitation of optic flow parsing. Vision Sciences Society. J Vis August 5, 2009 9(8): 701; doi:10.1167/9.8.701
- MacNeilage, Angelaki (2008) Vestibular heading discrimination in humans is better for head-centric azimuth than elevation regardless of body orientation. Program No. 18.5. Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2008. Online.
- MacNeilage, Angelaki (2008) Visual and vestibular discrimination of heading azimuth and elevation for upright and side-down observers. Vision Sciences Society. J Vis May 10, 2008 8(6): 834; doi:10.1167/8.6.834
- MacNeilage, Angelaki (2008) Otolith sensitivity may not follow Weber's Law. Barany Society meeting, Kyoto, Japan.
- MacNeilage, Banks (2006) Bayesian model for the perception of body orientation. International Multisensory Research Forum. Dublin, Ireland.
- MacNeilage, Berger, Banks, Buelthoff (2004) Visual cues are used to interpret gravito-inertial force. Vision Sciences Society. J Vis August 13, 2004 4(8): 142; doi:10.1167/4.8.142

INVITED TALKS

- Bodian Lecture Series, Center for Mind and Brain, John Hopkins University, Feb. 2020
- Vision Lecture Series, Department of Psychology, Penn University, Feb. 2020
- Smith-Kettlewell eye research institute lecture Series, February 2020.
- Sensorimotor workshop, East China Normal University, NYU Shanghai, December 2019.
- University of Sydney psychology seminar, November 2019.

- Smith-Kettlewell eye research institute lecture Series, January 2019.
- Oculus research, Seattle, Washington, May 2018
- SFN Sierra Nevada chapter meeting, Univ. of Nevada Reno, October 2017
- Integrative neuroscience retreat, Univ. of Nevada Reno, September 2017
- Oculus research, Seattle, Washington, September 2016
- Psychology Dept., Univ. of Nevada Reno, February 2016
- Center for Perceptual Systems, Univ. of Texas at Austin, February 2016
- Psychology Dept., Ludwig-Maximilians University, Munich, Sept. 2015
- Zurich-Munich oculomotor meeting, January 2015
- Multisensory perception for action, IRTG 1901 spring school, Wildbad Kreuth, June 2014
- Oculus, Irvine, California, March 2014
- Cognitive Neuroscience Dept., Bielefeld Univ., January 2014
- Max-Planck Institute for Biological Cybernetics, Tuebingen, November 2013
- Donders Center for Cognition, Radboud Univ. Nijmegen, Netherlands. December 2012
- Psychology Dept., Bangor Univ. Bangor, Wales. November 2012
- Italian Institute of Technology, Genova, Italy. June 2010
- University Hospital of Munich, Munich, Germany. October 2009
- Aeronautics and Astronautics Dept., Massachusetts Institute of Technology. April 2009
- Physics of Man, Utrecht University. Utrecht, Netherlands. June 2006.
- Biophysics, Radboud University. Nijmegen, Netherlands. June 2006.

MENTORING

- Postdocs: Kamran Binaee UNR (Nov. 2019-present), Vivian Holten LMU (Oct. 2015-Oct. 2017), Daria Genzel, BCCN (Sept. 2013-Sept. 2015)
- PhD students: Brian Szekely, UNR Neuro (Jan. 2020-present); Savannah Halow, UNR Neuro (Jan. 2019-present), Bharath Shankar, UNR Neuro (Sept. 2018-present); Christian Sinnott, UNR Cog. Brain Science (Sept 2017-present); Peter Hausamann, TUM (June 2015-present); Isabelle Garzorz, GSN LMU (Oct. 2014-Oct. 2018); Luigi Cuturi, GSN LMU (Oct. 2010-May 2015); Alessandro Nesti, MPI Tuebingen (Oct. 2010-May 2015).
- PhD thesis committees: Michael Gomez UNR Neuro, Matthew Harrison UNR CBS, Adelle Cerrata UNR Neuro, Majed Al Zayer UNR CS, Siddhart Srivitsav UNR Neuro, Nadine Hummel LMU GSN, Saurabh Dhawan LMU GSN, Luigi Cuturi LMU GSN, Isabelle Garzorz LMU GSN
- Master's students: Matt Moroz, UNR Neuro (Sept. 2016-May 2018); Barbara Schorr, LMU NCP program (2011), Julia Rackerseder, Bioinformatics TUM-LMU (2013), David Scholz, Bioinformatics TUM-LMU (2014),
- Master's thesis committees: Nathan Navarro-Griffin UNR CS, Courtney Matera UNR Neuro, Isayas Adhanom UNR CS, James Liu UNR CS, Matthew Moroz UNR Neuro, Walker Spurgeon UNR CS, Hirav Parekh UNR CS, Jivan Bhandari UNR CS
- Bachelor students: Jax Skye, UNR (Sept 2018-May 2019); Sarah Botts, UNR (June 2017-Aug 2018); Amgen program 2010-15, six students, one per summer

TEACHING

- *NSF EPSCoR-funded Big Data Summer School, UNR, July 2020*
- *Psych 763: Oculomotor theory, physiology and methods, UNR, Fall 2019*
- *Psych 762: Self-motion processing, UNR, Fall 2017*
- *Psych/CS 484: Virtual reality, UNR, Spring 2019, Spring 2020*
- *Psych 499: Human-machine interaction in virtual reality, UNR, Spring 2017, Spring 2018*
- *Psych 301: Experimental Psychology, UNR, Spring 2017, Fall 2018*
- *Vestibular perception, Clinical neuroscience mastercourse, Munich, Fall 2015*
- *Computational neuroscience ringvorlesung, BCCN Munich, Summer 2015, Winter 2015*

- *Psychophysics*. GSN Munich. Winter 2014, Winter 2015
- *Bayesian Modeling*. Graduate seminar, GSN Munich. Spring 2011, Spring 2012.
- *Cognitive Neuroscience*. Psychology 127. Graduate student instructor, Fall 2005. UC Berkeley.
- *Perception*. Psychology 126. Guest lecturer. Fall 2004. UC Berkeley.
- *Anatomy and Physiology of the Eye Course*. Vision Science 106. Graduate student instructor, Fall 2001, Fall 2002. UC Berkeley.

CONFERENCES & SYMPOSIA ORGANIZED

- OSA fall vision meeting, Sept. 2018, Reno, Nevada. Organizing committee member.
- Role of eye movements in self-motion perception, Symposium, European Conference on Eye Movements, August 2017, Wuppertal, Germany. Co-organizers: Paul MacNeilage, Jonathan Matthis
- Challenges in virtual reality, Symposium, International Conference on Robotics and Automation, May 2015, Seattle, WA. Co-organizers: Steve LaValle, Ming Lin
- Vestibular processing in motor control, Satellite Meeting, Neural Control of Movement Conference, April 21st 2014, Amsterdam, Netherlands. Co-organizers: Pieter Medendorp, John van Opstal

REVIEWING & MEMBERSHIPS

- Grant reviewing: NASA HERO Crew Health, Sensorimotor Review Panel; Israel Science Foundation, Personal Research Grants; National Science Foundation, Collaborative Research in Computational Neuroscience; NASA Human Research Program, Sensory Stimulation and Augmentation; Swiss National Science Foundation, Division of Biology and Medicine; Research Grant Council of Hong Kong, Humanities & Social Sciences.
- Journal reviewing: Current Biology, Nature Communications, Journal of Neuroscience, Journal of Neurophysiology, Scientific Reports, Vision Research, Journal of Vision, Attention Perception and Psychophysics, Experimental Brain Research, PLoS One, Neuroscience Letters, Multisensory Research, Journal of the Association for Research in Otolaryngology, Ear and Hearing, Journal of the American Aging Association, Evolution and Human Behavior
- Memberships: Society for Neuroscience, Vision Sciences Society, Society for the Neural Control of Movement

LANGUAGES

- Conversational: German, Spanish
- Rusty: Italian, French