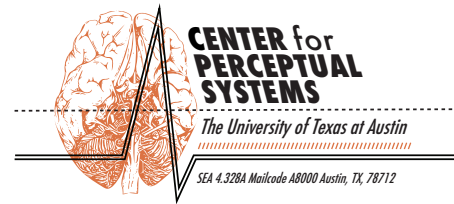


## ALEXANDER C. HUK

*Raymond Dickson Centennial Professor #2*  
*Director, Center for Perceptual Systems (2019-)*  
Department of Neuroscience &  
Department of Psychology  
Center for Perceptual Systems  
The University of Texas at Austin  
*Faculty Director, Polymathic Scholars Honors Program*



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### Education & training

**Senior Research Fellow (postdoc)**, Laboratory of Michael Shadlen. Howard Hughes Medical Institute, Department of Physiology & Biophysics, National Primate Research Center; University of Washington. June 2001-August 2004.

**Ph.D.**, Psychology, Neuroscience Area, Stanford University. 2001. Advisor: David Heeger.

**B.A.**, Psychology Major, Linguistics Minor, Swarthmore College. High Honors, External Examination Program. 1996.

### Grants

#### *Current*

- Active: “Neural circuit computations for visual motion during natural primate behaviors”, PIs: Huk / Hayhoe / Cormack (UT-Austin), Miller / Cauwenberghs (UCSD), Mitchell (U Rochester), Niell (U Oregon). BRAIN Initiative U01: Exploratory Team-Research BRAIN Circuit Programs – eTeamBCP, 2020-2023.
- Active: “Maximizing flexibility: Optimized neural probes and electronics for long term, high bandwidth recordings”, PIs: Xie (Rice), Luan (Rice), Frank (UCSF), Huk, et al. BRAIN Initiative U01: Optimization of Transformative Technologies for Large Scale Recording and Modulation in the Nervous System, 2020-2024.
- Active: “Motion perception with two eyes in three dimensions” (R01-EY020592), Multiple PIs: Huk (primary contact), Lawrence K. Cormack, Adam Kohn (Albert Einstein College of Medicine), R01 Research Project Grant, National Institutes of Health / National Eye Institute, 2011-2022.
- Active: “Cortical computations underlying binocular motion integration” (R01-EY027023), Multiple PIs: Wyeth Bair (University of Washington), Adam Kohn (Albert Einstein School of Medicine), Alex Huk (UT-Austin), National Institutes of Health / National Eye Institute, R01 Research Project Grant, 2017-2022.

- Active: “NCS-FO: Connecting spikes to cognitive algorithms”, Multiple PIs: I.M. Park & Huk, NSF Integrative Strategies for Understanding Neural and Cognitive Systems, 2018-2021.
- Active: “Visually-guided primate predation: Towards a computational neuroethology of primate vision and action”. PIs: Alex Huk (UT-Austin), Cory Miller (UCSD). Air Force Office of Sponsored Research, 2019-2022.
- Shared (active): “Center for Perceptual Systems Training Grant in Natural Systems”, T32 Training Grant, National Eye Institute, (PIs: Hayhoe, Geisler; Huk: member of Steering Committee). 2012-2022.
- Shared (active): “BD2K: Big Data to Knowledge”, T32 Predoctoral Training Grant, National Institutes of Health (Huk: member of Steering Committee). 2016-2021.

### *Recently completed*

- “Neural time-integration underlying higher cognitive function” (R01-EY017366), R01 Research Project Grant, National Institutes of Health / National Eye Institute (PI), 2008-2017.
- “Neural ensembles underlying natural tracking behavior”, Multiple PIs: N. Priebe, A. Huk, & I. Fiete, U01 (BRAIN Initiative), 9/30/2015-9/29/2018.
- “Dissecting the neural code for memory: bridging cellular and circuit mechanisms with nanoscale neural interfaces” (internal UT-Austin Catalyst Grant), Multiple PIs: Huk (Neuroscience) & Chong Xie (Biomedical Engineering), 2017-2018.
- “CRCNS: Detailed multi-neuron coding of decisions in parietal cortex”, (R01-MH099611), Multiple PIs: Huk & Jonathan Pillow, R01 Research Project Grant, Collaborative Research in Computational Neuroscience, 2012-2017.

### **Selected awards and extramural service**

- External Examiner, Honors Program, Dept of Biology, Swarthmore College, 2021.
- NIH BRAIN Initiative Marmoset Steering Committee, 2021-present.
- Visiting Scholar, University of California, San Diego, 2021-present.
- Reviewer, NIH Transformative Research Award (TRA), 2020.
- Lewis Endowment “Crucible Course” Professor, UT-Austin Plan II Honors Program, 2019.
- Permanent member, SPC / NBVP Study Section, National Eye Institute, 2018-2023 term.
- Temporary member, NINDS, Training program study section, 2017.
- Program Committee Member, Cosyne 2017 conference.
- Lecturer at Cold Spring Harbor Summer Course (Computational Neuroscience: Vision) for Summer 2016.
- Guest Editor, PLoS Computational Biology, 2016.
- Program Committee Member, Cosyne 2016 conference.
- Temporary Member, National Institutes of Health, CVP/SPC Study section, 2010, 2012, 2014.
- Temporary Member, National Institutes of Health, SMI Study section, 2015.

- Temporary Member, K99/R00 Review Study Section, National Eye Institute, 2013, 2014.
- NSF CAREER Award (5-year grant), 2008-2013.
- Ad hoc grant views for National Science Foundation, Natural Sciences and Engineering Research Council of Canada (NSERC), The Wellcome Trust, Alzheimer's Association
- Program Committee (reviewer), Computational & Systems Neuroscience conference 2014, 2015.
- Abstracts Review Committee, Vision Sciences Society, Annual Meeting 2012-2014.
- Elsevier / Vision Sciences Society (VSS) Young Investigator Award, 2011.
- Organizing Committee, Workshops Co-Chair, 2009 Computational and Systems Neuroscience (CoSyNe) conference (with Adam Kohn).
- Teaching Excellence Award, College of Natural Sciences, UT-Austin, 2008.

## Publications

### *In Process*

Huk, A.C., & Latimer, K.W. (*in press*). Superior colliculus activates new perspectives on decision making [News & Views]. *Nature Neuroscience*.

\* Levi, A.J., \* Zhao, Y., Park, I.M., & Huk, A.C. (*under review*). Sensory and choice responses in MT distinct from motion encoding.

Muthmann, J-O., Levi, A.J., Carney, H.C., & Huk, A.C. (*under revision*). “Supersessioning”: A hardware/software system for electrophysiology spanning multiple sessions in marmosets.

Whitner, J.A., Czuba, T.B., Cormack, L.K., & Huk, A.C. (*under review*). Spatiotemporal integration of isolated binocular 3D motion cues.

### *Published*

Hart, E., & Huk, A.C. (2020). Recurrent circuit dynamics underlie persistent activity in the macaque frontoparietal network. *eLife*, 9:e52460.

Levi, A.J., & Huk, A.C. (2020). Interpreting temporal dynamics during sensory decision-making. *Current Opinion in Physiology*, 16, 27-32.

Zhao, Y., Yates, J.L., Levi, A.J., Huk, A.C., Park, I.M. (2020). Stimulus-choice (mis)alignment in primate area MT. *PLoS Computational Biology*, 16 (5), e1007614.

Yates, J.L., Katz, L.N., Levi, A., Pillow, J.P., & Huk, A.C. (2020). A simple linear readout of MT supports motion direction-discrimination performance. *Journal of Neurophysiology*, 123(20): 682-694.

Bonnen, K., Czuba, T.B., Whritner, J.A., Kohn, A., Huk, A.C., & Cormack, L.K. (2020). Binocular viewing geometry shapes the neural representation of the dynamic three-dimensional environment. *Nature Neuroscience*, 23: 113–121.

Zoltowski, D.M., Latimer, K.W., Yates, J.L., Huk, A.C., & Pillow, J.W. (2019). Discrete stepping and nonlinear ramping dynamics underlie spiking responses of LIP neurons during decision-making. *Neuron*, 102(6), 1249-1258.

Joo, S.J., Greer, D.A., Cormack, L.K., & Huk, A.C. (2019). Eye-specific pattern motion signals support the perception of three-dimensional motion. *Journal of Vision*, 19, 27.  
doi:10.1167/19.4.27.

Huk, A.C., & Hart, E. (2019). Parsing signal and noise in the brain [Perspective]. *Science*, 364(6437), 236-237.

Knöll, J., Pillow, J.W., & Huk, A.C. (2018). Lawful tracking of visual motion in humans, macaques, and marmosets in a naturalistic, continuous, and untrained behavioral context. *Proceedings of the National Academy of Sciences*, 115 (44) E10486-E10494.

Levi, A., Yates, J.L., Huk, A.C., & Katz, L.N. (2018). Strategic and dynamic temporal weighting for perceptual decisions in humans and macaques. *eNeuro*, 5(5), e0169-18.2018 1–15.

Huk, A.C., Bonnen, K.T., He, B.J. (2018). Beyond trial-based paradigms: Continuous behavior, ongoing neural activity, and natural stimuli. *Journal of Neuroscience*, 38, 7551-7558.

Yates, J.L., Park, I.M., Katz, L.N., Pillow, J.P., & Huk, A.C. (2017). Functional dissection of signal and noise in MT and LIP during decision-making. *Nature Neuroscience*, 20, 1285–1292.

Bonnen, K., Huk, A.C., & Cormack L.K. (2017). Mechanisms of visually-guided 3D motion tracking. *Journal of Neurophysiology*, 118, 1515-1531.

Huk, A.C., Katz, L.N., Yates, J.L. (2017). Role of the lateral intraparietal cortex in (the study of) decision making. *Annual Review of Neuroscience*, 20, 1285–1292.

Cormack, L.K., Czuba, T.B., Knöll, J. & Huk, A.C. (2017). Neural and perceptual mechanisms of 3D motion processing. *Annual Review of Vision Science*. doi.org/10.1146/annurev-vision-102016-061259

Joo, S.J., Czuba, T.B., Cormack, L.K., & Huk, A.C. (2016). Separate perceptual and neural processing of velocity- and disparity-based 3D motion signals. *Journal of Neuroscience*, 36 (42) 10791-10802.

Greer, D.A., Bonnen, K., Huk, A.C., Cormack L.K. (2016). Speed discrimination in the far monocular periphery: A relative advantage for interocular comparisons consistent with self-motion. *Journal of Vision*, 16(10):7, 1-12.

Katz, L.N.\*, Yates, J.L.\*, Pillow, J.W., & Huk, A.C. (2016). Dissociated functional significance of decision-related activity in the primate dorsal stream. *Nature*, 535: 285–288.

Joo, S.J., Katz, L., & Huk, A.C. (2016). Decision-related perturbations of decision-irrelevant eye-movements. *Proceedings of the National Academy of Sciences*, 113 (7): 1925-1930.

Katz, L.N., Hennig, J., Cormack, L.K., & Huk, A.C. (2015). A distinct mechanism of temporal integration for motion through depth. *Journal of Neuroscience*, 35(28): 10212-10216.

Latimer, K.W., Yates, J.L., Meister, M.L.R., Huk, A.C., & Pillow, J.W. (2015). Single-trial spike trains in parietal cortex reveal discrete steps during decision-making. *Science*, 349(6244): 184-187. [see also, Response to Comment on "Single-trial spike trains in parietal cortex reveal discrete steps during decision-making." *Science* 351(6280): 1406]

Goonetilleke, S.C., Katz L.N., Wood, D.K., Gu, C., Huk, A.C., & Corneil, B.D. (2015). Cross-species comparison of anticipatory and stimulus-driven neck muscle activity well before saccadic gaze shifts in humans and non human primates. *Journal of Neurophysiology*, 114(2): 902-913.

Latimer, K.W., Huk, A.C., & Pillow, J. (2015). Bayesian inference for latent stepping and ramping models of spike train data. Chapter in *Advanced State Space Methods for Neural and Clinical Data*. Cambridge University Press.

Huk, A.C., Katz, L.N., & Yates, J.L. (2015). Accumulation of evidence in decision making [entry]. *Encyclopedia of Computational Neuroscience*. Springer.

Huk, A.C., & Joo, S.J. (2015). Motion perception [entry]. *Brain Mapping: An Encyclopedic Reference*. Toga, A.W., Mesulam, M.M., & Kastner, S., eds., Elsevier Press.

Czuba, T.B., Huk, A.C., Cormack, L.K. & Kohn, A. (2014). Area MT encodes three-dimensional motion. *Journal of Neuroscience*, 34 (47):15522–15533.

Park, I.M., Meister, M.L.R., Huk, A.C., & Pillow, J. (2014). Encoding and decoding in parietal cortex during sensorimotor decision-making. *Nature Neuroscience*, 17 (10): 1395–1403.

Knudson, K., Yates, J., Huk, A.C., & Pillow, J.W. (2014). Inferring sparse representations of continuous signals with continuous orthogonal matching pursuit. In *Advances in Neural Information Processing Systems*.

Meister, M.L.M., Hennig, J., & Huk, A.C. (2013). Signal multiplexing and single-neuron computations in lateral intraparietal area during decision making. *Journal of Neuroscience*, 33(6), 2254-2267.

Huk, A.C. & Meister, M.L.M. (2012). Neural correlates and neural computations in posterior parietal cortex during perceptual decision-making. *Frontiers in Integrative Neuroscience*. 6:86. doi: 10.3389/fnint.2012.00086

Huk, A.C. (2012). Multiplexing in the primate motion pathway. *Vision Research*, 62, 173-180.

Czuba, T.B., Rokers, B., Huk, A.C., & Cormack, L.K. (2012). To CD or not to CD: Is there a motion aftereffect from changing disparities? *Journal of Vision*, 12(4):7, 1-3.

Eastman, K.M., & Huk, A.C. (2012). PLDAPS: A hardware architecture and software toolbox for neurophysiology requiring complex visual stimuli and online behavioral control. *Frontiers in Neuroinformatics*, 6:11. doi: 10.3389/fninf.2012.00001

Czuba, T.B., Rokers, B., Guillet, K.W., Huk, A.C., & Cormack, L.K. (2011). Three-dimensional motion aftereffects reveal distinct direction-selective mechanisms for processing of motion through depth. *Journal of Vision*, 11(10), 18.

Rokers, B., Czuba, T.B., Cormack, L.K., & Huk, A.C. (2011). Seeing motion with two eyes in three dimensions. *Journal of Vision*, 11(2), 10.

Czuba, T.B., Rokers, B., Huk, A.C., & Cormack, L.K. (2010). Speed and eccentricity tuning reveal a central role for the velocity-based cue to 3D motion. *Journal of Neurophysiology*, 104: 2886-2899.

Winawer, J., Huk, A.C., & Boroditsky, L. (2010). A motion aftereffect from visual imagery of motion. *Cognition*, 114: 276-284.

Rokers, B., Cormack, L.K., & Huk, A.C. (2009). Disparity- and velocity- based signals for 3D motion perception in human MT+. *Nature Neuroscience*, 12 (8), 1050-1055.

- Ress, D., Thompson, J., Rokers, B., Khan, R., & Huk, A.C. (2009). Model for transient oxygen delivery in cerebral cortex. *Frontiers in Neuroenergetics*, 1:3. doi: 10.3389/neuro.14.003.2009
- Wong, K-F., & Huk, A.C. (2008). Temporal dynamics underlying perceptual decision-making: Insights from the interplay between an attractor model and parietal neurophysiology. *Frontiers in Neuroscience*, 2(2), 245-254.
- Kirson, D., Huk, A.C., & Cormack, L.K. (2008). Quantifying spatial uncertainty of visual area boundaries in neuroimaging data. *Journal of Vision*, 8(10):10, 1-15.
- Huk, A.C. (2008). Visual neuroscience: Retinotopy meets percept-otopy? [Dispatch]. *Current Biology*, 18, R1005-1007.
- Rokers, B., Cormack, L.K., & Huk, A.C. (2008). Strong percepts of motion through depth without strong percepts of position in depth. *Journal of Vision*, 8(4):6, 1-10.
- Winawer, J., Huk, A.C., & Boroditsky, L. (2008). A motion aftereffect from still photographs depicting motion. *Psychological Science*, 19(3), 276-283.
- Wong, K-F., Huk, A.C., Shadlen, M.N., & Wang, X-J. (2007). Neural circuit dynamics underlying accumulation of time-varying evidence during perceptual decision-making. *Frontiers in Computational Neuroscience*, 1:6. doi: 10.3389/neuro.10/006.2007
- Huk, A.C., & Shadlen, M.N. (2005). Neural activity in macaque parietal cortex reflects temporal integration of visual motion signals during perceptual decision-making. *Journal of Neuroscience*, 25(45), 10420-10436.
- Palmer, J., Huk, A.C., & Shadlen, M.N. (2005). The effects of stimulus strength on the speed and accuracy of a perceptual decision. *Journal of Vision*, 5(5):1, 376-404.
- Huk, A.C., Dougherty, R.F., & Heeger, D.J. (2002). Retinotopy and functional subdivision of human areas MT and MST. *Journal of Neuroscience*, 22(16), 7195-7205.
- Huk, A.C., & Heeger, D.J. (2002). Pattern-motion responses in human visual cortex. *Nature Neuroscience*, 5(1), 72-75.
- Huk, A.C., Ress, D., & Heeger, D.J. (2001). Neuronal basis of the motion aftereffect reconsidered. *Neuron*, 32(1), 161-172.
- Heeger, D.J., Gandhi, S.P., Huk, A.C., & Boynton, G.M. (2001). Neuronal correlates of attention in human visual cortex. In J. Braun, C. Koch, & J. Davis (Eds.), *Visual Attention and Cortical Circuits* (pp. 25-47). Cambridge, MA: MIT Press.

Heeger, D.J., Huk, A.C., Geisler, W.S., & Albrecht, D.G. (2000). Spikes versus BOLD: What does neuroimaging tell us about neuronal activity? [News & Views]. *Nature Neuroscience*, 3(7), 631-633.

Huk, A.C., & Heeger, D.J. (2000). Task-related modulation of visual cortex. *Journal of Neurophysiology*, 83(6), 3525-3536.

Wandell, B.A., Poirson, A.A., Baseler, H.A., Boynton, G.M., Huk, A.C., Gandhi, S.P., & Sharpe, L.T. (1999). Color signals in human motion-selective cortex. *Neuron*, 24, 901-909.

Durgin, F.H., & Huk, A.C. (1997). Texture density aftereffects in the perception of artificial and natural textures. *Vision Research*, 37, 3273-3282.

### **Invited talks and seminars (planned, plus last few years)**

- University of Pittsburgh, Dept of Optometry, Distinguished Speaker Series, planned Fall 2021.
- University of California San Diego, Fall 2020.
- University of Barcelona, Spring 2020 (virtual; Spring 2020, planned in person Spring 2021)
- Cold Spring Harbor Laboratory, Spring 2020 (reschedule pending).
- University of Houston, School of Optometry, 2019.
- Boynton Colloquium, Center for Vision Sciences, University of Rochester, 2018.
- Washington University St. Louis School of Medicine, 2018.
- AREADNE; Research into Encoding and Decoding of Neural Ensembles (Santorini, Greece), invited speaker, 2018.
- ARVO Minisymposium invited speaker, 2018.
- University of Chicago, 2018.
- Vanderbilt University, 2017.
- Rocky Mountain Regional Neuroscience Group, Regional Society for Neuroscience meeting, University of Colorado School of Medicine (featured guest / special seminar speaker, May 2017).
- Johns Hopkins University, 2017.
- Columbia University, 2016.
- University of Rochester Center for Vision Science symposium, 2016.
- Swarthmore College, 2016.
- Yale University School of Medicine, 2016.
- University of Washington School of Medicine, 2015.
- Society for Neuroscience Annual Meeting, minisymposium speaker, 2015.
- SUNY College of Optometry, 2015.
- University of Western Ontario, 2014.
- University of Aberdeen, 2014 (2 talks).
- Oxford University, 2014 (2 talks).



- University College London (Gatsby Computational Neuroscience Unit), 2014.
- Princeton University, 2014.
- Plexon Neurophysiology & Behavior Workshop, 2014.
- National Institutes of Health / National Eye Institute, 2014.
- Gulf Coast Consortium for Theoretical and Computational Neuroscience, 2014.
- University of Chicago, 2014.
- Computational and Systems Neuroscience (COSYNE) Conference Workshops, 2013, 2014.

*Ad hoc journal reviewer*

Nature, Nature Neuroscience, Neuron, eLife, Current Biology, Proceedings of the National Academy of Science (PNAS), Journal of Neuroscience, Journal of Neurophysiology, Journal of Vision, Public Library of Science (PLoS): Biology, Vision Research, European Journal of Neuroscience, Experimental Brain Research, Psychological Science, Brain, Neuroimage, Neuroreport, Cerebral Cortex, Perception, etc.

*Committees (last 5 years)*

- Standing Member, Institute for Neuroscience Executive Committee (2019-on).
- Standing Member, Animal Resource Center Advisory Committee (2017-on).
- Chair, Neuroscience Department Faculty Search, 2018-2019.
- Chair, Neuroscience Department Faculty Search, Spring 2016.
- Member, Neuroscience Department Chair Search, Fall 2015.
- Member, Neuroscience / Computer Science Joint Faculty Search, Fall 2015.
- Member, Center for Perceptual Systems Faculty Search, Fall 2015.
- Advisory Committee, NIH Shared Instrumentation Grant, Dept. of Chemistry, UT-Austin, 2015-present.
- Committee on Financial Aid to Students, UT-Austin, 2012.
- Member, UT-Austin Imaging Research Center Faculty Search Committee, 2010-2012.
- Lead, Psychology Department Web Page Committee, 2011-2013.
- Member, UT-Austin Center for Perceptual Systems Faculty Search Committee, 2010-2011.
- Head, Institute for Neuroscience Graduate Recruitment Committee, 2010-present.
- Member, UT-Austin Institutional Animal Care and Use Committee (IACUC), 2006-2010, 2012-2013.

## **Mentorship**

- Graduate students have acquired postdocs at NYU (Simoncelli lab), University of Rochester (Deangelis/Mitchell labs), NIH (Krauzlis lab), University of Washington (Buffalo lab), Albert Einstein (Kohn Lab).
- Postdocs have acquired tenure-track positions (Bas Rokers, University of Wisconsin - Madison, now Associate Professor; Sung Jun Joo, Pusan National Univ) and industry (Google, Microsoft, MapMyRide, etc).

- Research assistants have been admitted to graduate programs in Neuroscience at Carnegie Mellon, Stanford, Northwestern, NYU, etc.
- Lab tech was admitted to veterinary school (Tufts)

### **Previous academic, administrative, and service positions**

Director, Imaging Research Center, The University of Texas at Austin, 2016-2018. (Interim Director, 2014-2016).

Graduate Advisor, Institute for Neuroscience, 2013-2018.

Associate Professor (w/ tenure), 2010-2016. Departments of Neuroscience & Psychology, The University of Texas at Austin.

Assistant Professor, 2004-2010. Section of Neurobiology (0% appointment in Psychology), The University of Texas at Austin.