Dr. Hsin-Hao Yu

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http://hhyu.org

EDUCATION

1999 - 2007 **Ph.D. in Cognitive Science, University of California San Diego**

1994 - 1999 **B.A. in Applied Mathematics, National Chiao Tung University (Hsin-Chu, Taiwan)**

POSITIONS

2018 - 2021 **IBM Research Australia (Southbank, VIC, Australia)**

Research Scientist (Research Staff Member)

2018 - **Department of Physiology, Monash University (Clayton, VIC, Australia)**

Affiliate researcher

2017 - 2018 **Department of Physiology, Monash University (Clayton, VIC, Australia)**

Postdoctoral Research Fellow

2014 - 2016 **Department of Physiology, Monash University (Clayton, VIC, Australia)**

Australian Research Council Discovery Early Career Researcher Award (DECRA) Fellow

2007 - 2013 **Department of Physiology, Monash University (Clayton, VIC, Australia)**

Postdoctoral Research Fellow

AWARDS

2019 The Amanda Caples Award for Outstanding Alumnus from the ARC Centre of Excellence for Integrated Brain Function

2013 Australian Research Council Discovery Early Career Researcher Award (DECRA)

2013 Best Postdoctoral Oral Presentation Award, Bosch Institute Annual Scientific Meeting 2013

2010 School of Biomedical Sciences Travel Grant

PUBLICATIONS

- **Yu H-H**, Maetschke SR, Antony BJ, Ishikawa H, Wollstein G, Schuman JS, Garnavi R (*in press*) Estimating global visual field indices in glaucoma by combining macula and optic disc OCT scans using 3D convolutional neural networks. *Ophthalmology Glaucoma*.
- Feizpour A, Majka P, Chaplin TA, Rowley D, **Yu H-H**, Zavitz E, Price NSC, Rosa MGP, Hagan MA (*in press*) Visual responses in the dorsolateral frontal cortex of marmoset monkeys. *Journal of Neurophysiology*.
- **Yu H-H**, Rowley DP, Price NSC, Rosa MGP, Zavitz E (2020) A twisted visual field map in the primate dorsomedial cortex predicted by topographic continuity. *Science Advances* 6, eazz8673.
- Hadjidimitrakis K, Bakola S, Chaplin TA, **Yu H-H**, Alanazi O, Chan JA, Worthy KH, Rosa MGP (2019) Topographic organization of the 'third-tier' dorsomedial visual cortex in the macaque. *Journal of Neuroscience* 39, 5311-5325.
- **Yu H-H**, Atapour N, Chaplin TA, Worthy KH, Rosa MGP (2018) Robust visual responses and normal retinotopy in primate lateral geniculate nucleus following long-term lesions of striate cortex. *Journal of Neuroscience* 38, 3955-3970.
- Atapour N, Worthy KH, Lui LL, **Yu H-H**, Rosa MGP (2017) Neuronal degeneration in the dorsal lateral geniculate nucleus following lesions of primary visual cortex: comparison of young adult and geriatric marmoset monkeys. *Brain Structure Function* 222, 3283-3293..
- Knauer B, Majka P, Watkins KJ, Taylor AWR, Malamanova D, Paul B, **Yu H-H**, Bush AI, Hare DJ, Reser DH (2017) Whole-brain metallomic analysis of the common marmoset (*Callithrix jacchus*) *Metallomics* 9, 411-423.

- Chaplin TA, Rosa MGP, **Yu H-H** (2017) Scaling up the simian primate cortex: a conserved pattern of expansion across brain sizes. In *Evolution of Nervous Systems, Vol. 4: The Evolution of the Human Brain* (2nd Edition). Series editor Kaas, JH. Elsevier/Academic Press.
- Zavitz E, **Yu H-H**, Rowe E, Rosa MGP, Price NS (2016) Rapid adaptation induces persistent biases in population codes for visual motion. *Journal of Neuroscience* 36, 4579-4590.
- Majka P, Chaplin TA, **Yu H-H**, Tolpygo A, Mitra PP, Wojcik DK, Rosa MGP (2016) Towards a comprehensive atlas of cortical connections in a primate brain: Mapping tracer injection studies of the common marmoset into a reference digital template. *Journal of Comparative Neurology 524, 2161-2181*.
- Davies AJ, Chaplin TA, Rosa MGP, **Yu H-H** (2016) Natural motion trajectory enhances the coding of speed in primate extrastriate cortex. *Scientific Reports* 6, e19739.
- Burman KJ, Bakola S, Richardson KE, **Yu H-H**, Reser DH, Rosa MGP (2015) Cortical and thalamic projections to cytoarchitectural area 6Va and 8C of the marmoset monkey: connectionally distinct subdivisions of the lateral premotor cortex. *Journal of Comparative Neurology* 523, 1222-1247.
- **Yu H-H**, Chaplin TA, Rosa MGP (2015) Representation of central and peripheral vision in the primate cerebral cortex: Insights from studies of the marmoset brain. *Neuroscience Research* 93, 47-61.
- **Yu H-H** & Rosa MGP (2014) Uniformity and diversity of response properties of neurons in the primary visual cortex: selectivity for orientation, direction of motion and stimulus size from centre to far periphery. *Visual Neuroscience* 31, 85-98.
- **Yu H-H**, Chaplin TA, Egan GW, Reser DH, Worthy KH, Rosa MGP (2013) Visually evoked responses in extrastriate area MT after lesions of striate cortex in early life. *Journal of Neuroscience* 33, 12479-12489.
- Chaplin TA, **Yu H-H**, Soares JGM, Gattass R, Rosa MGP (2013) A conserved pattern of differential expansion of cortical areas in simian primates. *Journal of Neuroscience* 33, 15120-15125.
- Chaplin* TA, **Yu H-H*** & Rosa MGP (2013) Representation of the visual field in the primary visual area of the marmoset monkey: magnification factors, point-image size, and proportionality to retinal ganglion cell density. *Journal of Comparative Neurology* 521, 1001-1019. *Equal first authorship.
- Reser DH, Burman J, **Yu H-H**, Chaplin TA, Richardson KE, Worthy KH & Rosa MGP (2013) Contrasting patterns of cortical input to architectural subdivisions of the area 8 complex: a retrograde tracing study in marmoset monkeys. *Cerebral Cortex* 23, 1901-1922.
- **Yu H-H**, Chaplin TA, Davies AJ, Verma R & Rosa MGP (2012) A specialized area in limbic cortex for fast analysis of peripheral vision. *Current Biology* 22, 1351-1357.
- Burman K, Reser R, **Yu H-H** & Rosa MGP (2011) Cortical input to the frontal pole of the marmoset monkey. *Cerebral Cortex* 21, 1712-1737.
- **Yu H-H** & Rosa MGP (2010) A simple method for creating wide-field visual stimulus for electrophysiology: mapping and analyzing receptive fields using hemispheric display. *Journal of Vision* 10, 15.
- **Yu H-H**, Verma R, Yang Y, Tibballs HA, Lui LL, Reser DH & Rosa MGP (2010) Spatial and temporal frequency in striate cortex: functional uniformity and specializations related to receptive field eccentricity. *European Journal of Neuroscience* 31, 1043-1062.
- Rosa MGP, Palmer SM, Gamerini M, Burman KJ, **Yu H-H**, Reser DH, Bourne J, Tweedale R & Galletti C (2009) Connections of the dorsomedial visual area: pathways for early integration of dorsal and ventral streams in extrastriate cortex. *Journal of Neuroscience* 29, 4548-4563.
- **Yu H-H** & de Sa VR (2004) Nonlinear receptive field mapping with synthesized naturalistic stimuli. *Neurocomputing* 58-60, 909-913.

PRESENTATIONS & DEMOS

- 2020: "The traveling salesman in the brain: modeling the formation of topographical maps in the visual cortex using self-organization principle" - IBM Research Australia Seminar
- 2020: "Artificial Intelligence and the Eye: a Window into Health" - New Advances in Biocomplexity Workshop. University of Sydney
- 2019: Technical demo at IBM Think Summit Sydney
- 2018: "The visual cortex as a deep neural network" - Monash University Machine Learning Symposium
- 2017: "The physiological consequences of damages to the primate visual cortex in different development stages" - Monash Biomedicine Discovery Institute "Rising Stars" Seminar Series
- 2017: "Where visual areas meet - The representation of the visual field in the dorsomedial cortex of the marmoset monkey" - Advances in Functional Studies of Marmoset Brain Mini-Symposium
- 2016: "New insights into the controversial "third-tier" areas of the primate visual cortex" - Anderson Stuart Seminar Series (Department of Physiology, The University of Sydney)

CONFERENCE ABSTRACTS

- Wu M, **Yu H-H** et al. (2021) Deep learning reduced test-to-test variability of visual field. Annual Meeting of the American Glaucoma Society.
- **Yu H-H**, Maetschke S, Antony BJ, Ishikawa H, Wollstein G, Schuman J, Garnavi R (2019) Estimating visual field functions in glaucoma patients using multi-regional neural network on OCT images. Annual Meeting of the Association for Research in Vision and Ophthalmology (ARVO2019, Vancouver, Canada).
- Rowley D, Sadakane O, Watakabe A, Tani T, Abe H, Ichinohe N, Mizukami H, Zavitz E, **Yu HH**, Rosa MGP, Yamamori T (2019) Multi-scale calcium imaging functional maps of the primate primary visual cortex. Computational and System Neuroscience (Cosyne) 2019.
- Rowley D, Sadakane O, Watakabe A, Tani T, Abe H, Ichinohe N, Mizukami H, **Yu H-H**, Rosa MGP, Yamamori T (2018) Studying the functional maps of the primary visual cortex using multi-scale calcium imaging. Australasian Neuroscience Society Annual Scientific Meeting (ANS2018, Brisbane, Australia).
- Sadakane O, Rowley D, Watakabe A, Tani T, Abe H, Ichinohe N, Mizukami H, **Yu H-H**, Rosa MGP, Yamamori T (2018) Calcium imaging during free viewing of natural images from the primary visual cortex of marmosets. Japan Neuroscience Society Annual Meeting (Kobe, Japan).
- Rowley D, Haghgooie S, Zavitz E, Price NSC, Rosa MGP, **Yu H-H** (2015) Feature selectivity of neurons in the dorsomedial (DM) area of the marmoset visual cortex. *Systems & Computational Neuroscience Down Under* (SCiNDU2015, Brisbane, Australia).
- Davies AJ, Rosa MGP, **Yu H-H** (2015) Context-dependent robust coding of stimulus speed in primate extrastriate cortex. *Annual Meeting of the Society for Neuroscience* (SfN2015, Chicago, USA).
- Hadjimitrakis K, Alanazi O, Chaplin TA, Chan J, **Yu H-H**, Bakola S, Rosa MGP (2015) Topographic organization of "third tier" dorsomedial visual cortex in the macaque monkey. *Annual Meeting of the Society for Neuroscience* (SfN2015, Chicago, USA).
- Majka P, Chaplin TA, **Yu H-H**, Tolpygo A, Mitra PP, Wójcik DK, Rosa MGP (2015) Workflow for mapping tracer injection studies of the common marmoset into a reference template. *Annual Meeting of the Society for Neuroscience* (SfN2015, Chicago, USA).
- Davies AJ, Chaplin TA, Rosa MGP, **Yu H-H** (2015) Context-dependent robust coding of stimulus speed in primate extrastriate cortex. *11th Asia-Pacific Conference on Vision* (APCV2015, Singapore).
- **Yu H-H**, Chaplin TA, Reser DH, Worthy KH, Rosa MGP (2015) The organization of the Middle Temporal area (MT) and the lateral geniculate nucleus (LGN) in monkeys with early-life lesions of the primary visual cortex. *11th Asia-Pacific Conference on Vision* (APCV2015, Singapore).
- Zavitz E, Haghgooie S, **Yu H-H**, Davies AJ, Rosa MGP, Price NSC (2014) Population coding of motion direction in marmoset area MT is rapid and sustained. *Annual Meeting of the Society for Neuroscience* (SfN2014, Washington D.C., USA).
- Kwan WC, Mundinano IC, **Yu H-H**, Warner CE, Bourne JA (2014) Reorganization of the primary visual cortex and the pulvinar following early life lesion to extrastriate area MT. *Annual Meeting of the Society for Neuroscience* (SfN2014, Washington D.C., USA).
- Majka P, Chaplin TA, **Yu H-H**, Pinskiy V, Mitra P, Rosa MGP, Wójcik DK (2014) Automated workflow for mapping tracer injection studies of the common marmoset into a reference template. *Neuroinformatics* 2014 (NI2014, Leiden, Netherlands).
- **Yu H-H**, Rosa MGP, Haghgooie S, Davies AJ, Zavitz E, Price, NSC (2014) Testing different models of the organization of the dorsal extrastriate cortex using multi-electrode arrays. *Australasian Neuroscience Society 34th Annual Meeting* (ANS2014, Adelaide).
- **Yu H-H**, Chaplin TA, Egan GW, Reser DH, Worthy KH, Rosa MGP (2013). The organization of the Middle Temporal area (MT) and the lateral geniculate nucleus (LGN) in monkeys with early-life lesions of the primary visual cortex. *Annual Meeting of the Society for Neuroscience* (SfN2013, San Diego, USA).
- **Yu H-H**, Chaplin TA, Egan GE, Worthy KH & Rosa MGP (2013) Organization of area MT in marmosets with early V1 lesions. *Australian Neuroscience Society 33nd Annual Meeting* (ANS2013, Melbourne).
- Haghgooie S, **Yu H-H**, Price NSC & Rosa MGP (2013) Simultaneous mapping of receptive fields and response properties of large neuronal populations in extrstriate cortex. *Australian Neuroscience Society 33nd Annual Meeting* (ANS2013, Melbourne).
- Davies AJ, **Yu H-H** & Rosa MGP (2013) Contextual effects in speed tuning of neurones in the middle temporal area (MT). *Australian Neuroscience Society 33nd Annual Meeting* (ANS2013, Melbourne).
- Chaplin TA, **Yu H-H** & Rosa MGP (2013) Scaling up the primate cerebral cortex: patterns and key areas of expansion across species. *Australian Neuroscience Society 33nd Annual Meeting* (ANS2013, Melbourne).
- **Yu H-H**, Chaplin TA, Davies AJ, Verma R & Rosa MGP (2012) A specialized area in primate limbic cortex for rapid processing of far peripheral vision. *Annual Meeting of the Society for Neuroscience* (SfN2012, New Orleans, USA).

- **Yu H-H**, Chaplin TA, Egan GW & Rosa MGP (2012) Visual responses of neurons in area MT following lesions of primary visual cortex in early life. *Vision Down Under* 2012 (VDU2012, Brisbane).
- **Yu H-H**, Chaplin TA, Verma R & Rosa MGP (2012) Response properties of neurons in area prostriata of the marmoset monkey. *Australian Neuroscience Society 32nd Annual Meeting* (ANS2012, Brisbane).
- **Yu H-H**, Verma R & Rosa MGP (2011) Visual responses in area prostriata: a proisocortical field located near the rostral tip of the calcarine sulcus. *Australian Neuroscience Society 31st Annual Meeting* (ANS2011, Auckland, NZ).
- **Yu H-H**, Tibballs HA, Lui LL, Reser DH & Rosa MGP (2009) Stimulus speed selectivity at the peripheral representation of visual area V1. *Australian Neuroscience Society 29th Annual Meeting* (ANS2009, Canberra).
- **Yu H-H**, de Sa VR & Sereno MI (2008) The organization of classical and non-classical receptive fields of V1 neurons of the California ground squirrel (*Spermophilus beecheyi*). *Asia-Pacific Conference on Vision* (APCV2008, Brisbane).
- **Yu H-H**, de Sa VR & Sereno MI (2008) The organization of classical and non-classical receptive fields of V1 neurons of the California ground squirrel (*Spermophilus beechey*). *Computation and System Neuroscience* (COSYNE2008, Salt Lake City, Utah, USA).
- **Yu H-H**, de Sa VR & Sereno MI (2005) The organization of classical and non-classic receptive fields in V1 of the California ground squirrel. *Annual Meeting of the Society for Neuroscience* (SfN 2005, Washington DC, USA).
- **Yu H-H** & de Sa VR (2003) Nonlinear receptive field mapping with synthesized naturalistic stimuli. *Annual Computational Neuroscience Meeting* (CNS2003, Alicante, Spain).
- **Yu H-H** & Sereno MI (2001) Intermediate-level shape processing – fMRI and modeling. *The 8th Annual Joint Symposium on Neural Computation* (AJSNC2001, San Diego, USA).

TRAINING/WORKSHOPS

2015 **Queensland Brain Institute (Brisbane, Australia)**

Conference Tutorial: "Vision, efficient coding and salience". Organiser: Professor Li Zhaoping

2013 **Florey Institute of Neuroscience and Mental Health (Melbourne, Australia)**

Workshop: **"**Modern views on the organization of the forebrain"

Organizer: Professor Charles Watson

2010 **Cold Spring Harbor Laboratory (Cold Spring Harbor, NY, USA)**

Workshop: **"**Circuit & Molecular Architecture of the Vertebrate Brain"

Organizers: Professor Partha Mitra and Professor Kathleen Rockland

2010 **Victorian Life Sciences Computation Initiative (VLSCI, Melbourne, Australia)**

Workshop: "High performance computing: Think big! Enabling scientific computing"

STUDENT SUPERVISION

2016- **Department of Physiology, Monash University**

Primary supervisor of Declan Rowley's PhD research

2015 **Department of Physiology, Monash University**

Primary supervisor of Declan Rowley's Honours thesis *"Feature selectivity of neurons in the dorsomedial (DM) area of the marmoset visual cortex"*

2014 **Department of Physiology, Monash University**

Primary supervisor of Tristan Dry's Honours thesis *"Selectivity of neurons in the dorsomedial (DM) visual area of the marmoset monkey to direction of motion"*

2012- **Department of Physiology, Monash University**

Co-supervisor of Amanda Davies' Ph.D. thesis

2011 **Department of Physiology, Monash University**

Co-supervisor of Sherry Zhao' PHY3990 thesis *"Visual responses of LGN neurons in marmosets with early V1 lesions"*

2011 **Department of Physiology, Monash University**

Primary supervisor of Amanda Davies' honours thesis *"Understanding the representation of speed in marmoset's visual cortex"*

2010 **Department of Physiology, Monash University**

Co-supervisor of Thomas Wijaksano's honours thesis "*Connection between LGN and area MT in marmoset with early V1 lesions"*

2009 **Department of Physiology, Monash University**

Primary supervisor of Tristan Chaplin's SCI2740 research thesis *"Reconstructing the primary visual cortex of the marmoset (Callithrix jacchus)"*

2003 **Department of Cognitive Science, UC San Diego**

Co-supervisor of Eugene Kim's honours thesis "*The role of noise in spike-time dependent plasticity (STDP)"*

TEACHING

2016-2017 **Department of Psychology, Monash University**

Lecturer, PSY3310 *Introduction to Computational Neuroscience*

Lecture on Human Vision as Computation in the Fourier Space

2015-2018 **Department of Physiology, Monash University**

Lecturer, *PHY3012 Integrative Neuroscience - Neuron to Brain*

Lecture on Plasticity in the Visual System in Development

2014, 2015 **Department of Physiology, Monash University**

Lecturer, *PHY3111 Sensation and Movement*

Lecture on Colour Vision

2012-2018 **Department of Radiography, Monash University**

Lecturer, *RAD2092 Radiologic biology 4*

Lectures on 1. Cerebral Cortex, 2. Eye and the Retina, and 3. The Visual Pathways

2008 **Department of Cognitive Science, UC San Diego**

Lecturer, *COGS 25 Introduction to Web Programming*

2008 **Department of Cognitive Science, UC San Diego**

Guest Lecturer, COGS91 SCANS Presents... (guest lecture on the visual cortex)

2007 **Department of Cognitive Science, UC San Diego**

Guest Lecturer, *COG101A Sensation and perception (guest lecture on colour vision)*

2002 **Department of Cognitive Science, UC San Diego**

Teaching Assistant, *COG14 Design and analysis of experiments*

2000, 2001 **Department of Cognitive Science, UC San Diego**

Teaching Assistant, *COG108B Artificial Intelligence Modeling*

1999 **Department of Cognitive Science, UC San Diego**

Teaching Assistant, *COG108A Theory of Computation and Formal Systems*

SERVICES

2020 IBM member of the ARC Training Centre in Cognitive Computing for Medical technologies

2020 Panelist for IBM Research's Accomplishment Awards

2019 Panel member of the Australian Brain Data Commons (ABDC) Working Group of the Australian Brain Alliance (ABA).

2017 Co-organiser (with Dr. Elizabeth Zavits) of the "*A New World in Primate Vision Research: The Marmoset as a Model Animal*" symposium for the Asian Pacific Conference on Vision.

2015 Member of the organising committee for the Introduction to Computational Neuroscience class in Psychology, Monash University (PSY3310).

2015 Delegate of ARC Centre of Excellence for Integrative Brain Function (CIBF) to the *Modeling and Computational Neuroscience Scientific Workshop* (Prato, Italy).

2014 Member of the local organizing committee for N*euroinformatics 2015: INCF Congress*.

2013 Delegate of the Victorian Node of the International Neuroinformatics Coordination Facility (INCF) to the Node Workshop of INCF (Stockholm, Sweden)

2009-2018	Grant reviewer for Australian Research Council (ARC) and National Health and Medical Research Council (NHMRC)
2008-2018	Honours thesis examiner for the Department of Physiology, Monash University

INVENTIONS

2020	Two USA patents filed

MEDIA

2012-2018	Contributing writer for public science websites: PanSci (www.pansci.asia), CASE (Center for Advancement of Science Education, National Taiwan University), and The News Lens (www.thenewslens.com).
2012	Interviewed by M3 Magazine (http://www.med.monash.edu.au/news/m3/) for the article "Early warning system: The eyes have it" about my research.

LANGUAGES

Mandarin, English