

## Issa CV

[Elias B Issa, PhD](#)

Curriculum Vitae 10/2023

Columbia University  
Zuckerman Mind Brain Behavior Institute  
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RESEARCH INTEREST | The neural mechanisms and computational principles underlying high-level vision

## POSITIONS

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<b>Columbia University</b> - New York, NY	09/2017-Present
Assistant Professor, Department of Neuroscience	
Affiliate Member, Department of Biomedical Engineering	01/2023-Present
Member, NSF AI Institute for Artificial & Natural Intelligence (ARNI)	05/2023-Present

## EDUCATION & TRAINING

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<b>Massachusetts Institute of Technology</b> - Cambridge, MA	2017
Visiting Scientist in Brain & Cognitive Sciences	
<b>Massachusetts Institute of Technology</b> - Cambridge, MA	2008-2016
Postdoctoral Associate in Brain & Cognitive Sciences	
<i>Neural dynamics in fMRI identified face selective regions in macaque IT cortex</i>	
Advisor - James DiCarlo, MD, PhD	
<b>Johns Hopkins University</b> - Baltimore, MD	2001-2008
PhD in Biomedical Engineering	
Thesis: <i>The processing of sounds in marmoset auditory cortex during sleep</i>	
Advisor - Xiaoqin Wang, PhD	
<b>Johns Hopkins University</b> - Baltimore, MD	1997-2001
BS in Biomedical Engineering with highest distinction	

## PUBLICATIONS

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**Issa CV**

Toosi T & **Issa EB**. Brain-like flexible visual inference by harnessing feedback-feedforward alignment. *NeurIPS* (accepted). 36. December 2023

Lindsey, JW & **Issa EB** (2023). [Factorized visual representations in the primate visual system and deep neural networks](#). *eLife* (under review).

Toosi T & **Issa EB** (2023). [Brain-like representational straightening of natural movies in robust feedforward neural networks](#). *International Conference on Learning Representations ICLR* 11. 2023.

Kell AJE Bokor SL Jeon Y Toosi T & **Issa EB** (2023). [Marmoset core visual object recognition behavior is comparable to that of macaques and humans](#). *iScience* 26(1): 105788

Kubilius J Schrimpf M Hong H Majaj NJ Rajalingham R **Issa EB** Kar K Bashivan P Prescott-Roy J Schmidt K Nayebe A Bear D Yamins DLK & DiCarlo JJ (2019). [Brain-Like Object Recognition with High-Performing Shallow Recurrent ANNs](#). In *Advances in Neural Information Processing Systems* 32: 12805-12816.

Kar K Kubilius J Schmidt K **Issa EB** & DiCarlo JJ (2019). [Evidence that recurrent circuits are critical to the ventral stream's execution of core object recognition behavior](#). *Nature Neuroscience* doi:10.1038/s41593-019-0392-5.

**Issa EB** Cadieu CF & DiCarlo JJ (2018). [Neural dynamics at successive stages of the ventral visual stream are consistent with hierarchical error signals](#). *eLife* 7: e42870.

Rajalingham R\* **Issa EB**\* Schmidt K Kar K Bashivan P & DiCarlo JJ (2018). [Large-scale, high-resolution comparison of core object recognition behavior in humans, monkeys, and deep neural networks](#). *Journal of Neuroscience* 38: 7255-7269.

Winn CB **Issa EB** Curcillo CP Townes CA Burns MA & Patterson MM (2018). [Daily water intake by common marmosets \(\*Callithrix jacchus\*\) with provisional recommendations for fluid regulation](#). *Journal of the American Association for Laboratory Animal Science*, doi: 10.30802/AALAS-JAALAS-18-000046

Aparicio PL\* **Issa EB**\* & DiCarlo JJ (2016). [Neurophysiological organization of the middle face patch in macaque inferior temporal cortex](#). *Journal of Neuroscience* 36: 12729-45.

**Issa EB** Papanastassiou AM & DiCarlo JJ (2013). [Large-scale, high-resolution neurophysiological maps underlying fMRI of macaque temporal lobe](#). *Journal of Neuroscience* 33: 15207-19.

**Issa EB** & Wang X (2013). [Increased neural correlations in primate auditory cortex during slow-wave sleep](#). *Journal of Neurophysiology* 109: 2732-2738.

**Issa EB** & DiCarlo JJ (2012). [Precedence of the eye region in neural processing of faces](#). *Journal of Neuroscience* 32: 16666-82.

**Issa CV**

**Issa EB & Wang X (2011).** [Altered neural responses to sounds in primate primary auditory cortex during slow-wave sleep.](#) *Journal of Neuroscience* 31: 2965-2973.

**Issa EB & Wang X (2008).** [Sensory responses during sleep in primate primary and secondary auditory cortex.](#) *Journal of Neuroscience* 28: 14467-14480.

\*Co-authors

**HONORS & AWARDS**

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2020-2023 Grossman-Kavli Scholar  
 2020-2022 Sloan Research Fellowship  
 2019-2022 Klingenstein-Simons Fellowship Award in Neuroscience  
 2017-2020 NIH Pathway to Independence Award (R00)

## Postdoctoral

2012-2014 NIH Pathway to Independence Award (K99)  
 2009-2012 NIH NRSA Postdoctoral Fellowship (F32)  
 2010 Cosyne Conference Gatsby Travel Fellowship

## Graduate

2008 Paul Ehrlich Award for Dissertation, Young Investigator's Day  
 2007 Murray B. Sachs Research & Travel Award  
 2002-2006 Whitaker Foundation Graduate Student Fellowship in Biomedical Engineering

**DOCTORAL STUDENT & POSTDOCTORAL SUPERVISION**

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Morrill, Ryan. PhD Neuroscience, UCSF. 2021-2023

Radvansky, Brad. PhD Neuroscience, Northwestern. 2020-2022

Shook, Erica. BS Mathematics, Davidson. 2020-2022

Kell, Alexander. PhD Brain & Cognitive Sciences, MIT. 2019-2022

Jeon, You-Nah. BA Neuroscience & Economics, Columbia. 2018-Present

Toosi, Tahereh. PhD Neuroscience, IPM Institute for Research in Fundamental Sciences. 2018-2022

Namburi, Praneeth. PhD Brain & Cognitive Sciences, MIT. 2018-2019

**Issa CV****UNDERGRADUATE & MASTER'S STUDENT SUPERVISION**

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Adiraju, Sreyas. BS Applied Mathematics & Neuroscience (expected 2025), Columbia University. 2023-Present

Chabenat, Eugénie. Bachelor's Life Sciences Engineering, EPFL. 2023

Ying, Zhuofan (Josh). BA Computer Science & Philosophy, UNC Chapel-Hill. 2023

**CONFERENCE PRESENTATIONS**

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Toosi T, Kriegeskorte N & Issa EB (2023). Object-enhanced and object-centered representations across primate ventral visual cortex. Conference on Cognitive Computational Neuroscience Paper #1349. Oxford, UK.

Toosi T & Issa EB (2022). Representational straightening of natural movies in robust feedforward neural networks. Soc. Neurosci. Abst. 51, #513.03. San Diego, CA. **talk** (nanosymposium)

Jeon Y, Cho H, Issa EB (2022). Marmosets can robustly recognize faces defined by 3D geometry alone, invariant to pose, lighting & background changes. Soc. Neurosci. Abst. 51, #053.08. San Diego, CA. **poster**

Lindsey JL & Issa EB (2021). Beyond invariant object classification: new normative principles for models of IT visual cortex. Cosyne Abstr. 18, #1-048. Virtual conference. **poster**

Toosi T, Issa EB (2020). Symbiotic Learning of Dual Discrimination and Reconstruction Networks. Neural Information Processing Systems. Beyond Backpropagation Workshop. Virtual conference. **poster**

Toosi T, Issa EB (2020). Symbiotic learning of feedforward and feedback networks. NAISys: From Neuroscience to Artificially Intelligent Systems. Cold Spring Harbor, Huntington, NY. Virtual conference. **talk**

Bokor SL, Kell AJE, Jeon Y, Toosi T, Issa EB (2019). Core visual object recognition behavior in common marmosets. Soc. Neurosci. Abstr. 49, #488.13. Chicago, IL. **poster**

Schrimpf M, Kar K, Bashivan P, Nayebi A, DiCarlo J, Kubilius J, Hong H, Majaj N, Rajalingham R, Issa EB, Bear D, Prescott-Roy J, Schmidt K, Yamins D (2019). Using Brain-Score to Evaluate and Build Neural Networks for Brain-Like Recognition. Cosyne Abstr. 16. Lisbon, Portugal. **poster**

**Issa CV**

Cooper E, Kanan C, Issa EB (2018). How can we best combine insights about vision gained with animal models, computational models, and humans? Cognitive Computational Neuroscience 2, SE-BK2. Philadelphia, PA **panel**

Issa EB\*, Leopold DA\* (2017). Marmoset Social. Soc. Neurosci. 47, #SC05. Washington, DC. **co-chair**

Kar K, Kubilius J, Schmidt K, Issa EB, DiCarlo JJ (2017). [Does the primate ventral stream need cortical feedback to compute rapid online image-by-image object identity?](#) Soc. Neurosci. Abstr. 47, #277.01. Washington, DC. **talk**

\*Rajalingham R, \*Issa EB, Schmidt K, Kar K & DiCarlo JJ (2017). [Feedforward Deep Neural Networks Diverge from Humans and Monkeys on Core Visual Object Recognition Behavior.](#) Cognitive Computational Neuroscience 1, #W91. New York, NY. **poster**

\*Rajalingham R, \*Issa EB, Kar K, Schmidt K, & DiCarlo JJ (2016). [Image-grain comparison of core object recognition behavior in humans, monkeys and machines.](#) Soc. Neurosci. Abstr. 46, #801.11. San Diego, CA. **poster**

Issa EB, Schmidt KM, Ohayon S & DiCarlo JJ (2016). [A simple, wireless system for remote, high-throughput behavioral testing of nonhuman primates.](#) Soc. Neurosci. Abstr. 46, #801.10. San Diego, CA. **poster**

Issa EB, Cadieu C & DiCarlo JJ (2015). Evidence that the ventral stream uses gradient coding to perform hierarchical inference. Cosyne Abstr. 12, #T-25. Salt Lake City, UT. **talk**

\*Cadieu C, \*Issa EB & DiCarlo JJ (2013). [A neural encoding model of area PL, the earliest face selective region in monkey IT.](#) Cosyne Abstr. 10, #T-27. Salt Lake City, UT. **talk**

Majaj NJ, Issa EB & DiCarlo JJ (2012). Humans, neurons, and machines: how can psychophysics, physiology, and modeling collaborate to ask better questions in biological vision? Cosyne, Snowbird, UT. workshop organizer

Issa EB & DiCarlo JJ (2011). Neuronal responses in an fMRI-defined face-selective region in posterior inferotemporal cortex. Soc. Neurosci. Abstr. 41, #324.06. Washington, DC. **talk**

\*Aparicio PL, \*Issa EB & DiCarlo JJ (2010). [What is the middle face patch?](#) Soc. Neurosci. Abstr. 40, #581.8. San Diego, CA. **poster**

Issa EB, Papanastassiou A, Andken, BB & DiCarlo JJ (2010). [Towards large-scale, high resolution maps of object selectivity in inferior temporal cortex.](#) Cosyne Abstr. 7, #I-95. Salt Lake City, UT. **poster**

Crum PA, Issa EB, Hackett TA & Wang X (2009). Targeting auditory cortex: combining physiology and anatomy to identify higher auditory regions. Cosyne Abstr. 6, #335. Salt Lake City, UT. **poster**

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Papanastassiou A, Issa EB & DiCarlo JJ (2008). A systematic exploration of the relationship of fMRI-signals and neuronal activity in the primate temporal lobe. Soc. Neurosci. Abstr. 38, #700.1. Washington, DC. **talk**

Issa EB & Wang X (2008). Correlated network activity in auditory cortex during slow-wave sleep revealed with acoustic stimulation. Soc. Neurosci. Abstr. 38, #784.1. Washington, DC. **poster**

Crum PA, Issa EB, Hackett TA & Wang X (2008). Physiological and anatomical identification of parabelt regions in primate auditory cortex. Soc. Neurosci. Abstr. 38, #566.11. Washington, DC. **poster**

Crum PA, Issa EB & Wang X (2008). Identification of auditory cortical areas using current-source-density analysis. Assoc. Res. Otolaryng. Abstr. 31, #991. Phoenix, AZ. **poster**

Issa EB & Wang X (2007). Neural responses in lateral belt of primate auditory cortex during sleep. Soc. Neurosci. Abstr. 37, #505.20. San Diego, CA. **poster**

Issa EB, Pistorio AP & Wang X (2005). Effects of sleep on neural responses to sounds in auditory cortex. Soc. Neurosci. Abstr. 35, #615.12. Washington, DC. **poster**

Issa EB & Wang XW (2005). Effect of sleep on processing of complex sounds in auditory cortex. Assoc. Res. Otolaryng. Abstr. 28, #1005. New Orleans, LA. **poster**

## INVITED PRESENTATIONS

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Geometry based face recognition. Vision Research Center Seminar, Penn (2023)

Technical advances in marmoset behavior and physiology. Marmoset Research Program Monthly Meeting, MIT. Virtual Seminar (2022)

Methods for behavioral studies in free moving, semi-restrained, and head-fixed marmosets. Marmoset Neural Recording talk series. Virtual seminar (2022)

Factorized encoding of scene variables as a putative normative principle for high-level visual cortex. Zuckerman Faculty Lunch, Columbia University, New York, NY (2021)

[Encoding scene properties: new normative principles for models of IT visual cortex beyond object classification.](#) Mind, Brain, Computation and Technology Symposium 2021 - Where the rubber meets the road: Computational models and empirical evidence. Stanford University, Virtual Seminar (2021)

Core visual object recognition behavior in common marmosets. Zuckerman Faculty Lunch, Columbia University, New York, NY (2019)

**Issa CV**

Comparing the predictions of deep neural networks to high-resolution behavioral and neural data in primates. Neuroscience Faculty Meeting, Columbia University, New York, NY (2018)

Comparison of object recognition behavior in humans, monkeys, and deep neural networks. Theoretical Neuroscience Seminar, Columbia University, New York, NY (2017)

Comparison of object recognition behavior in humans, monkeys, and deep neural networks. Computational Neuroscience Initiative, University of Pennsylvania, Philadelphia, PA (2017)

Evidence that the ventral visual stream codes the errors used in hierarchical inference and learning. Columbia Neurobiology Retreat, Columbia University, New Paltz, NY (2016).

[Evidence that the ventral visual stream codes the errors used in hierarchical inference and learning.](#) CCN Workshop: Predictive Coding, Dartmouth College, Hanover, NH (2016).

Core object recognition at the image-grain: a comparison of monkey, model, human, and neural behavior. Kanwisher Lab, MIT, Cambridge, MA (2016).

Behavior, neurons, and computation: an integrated approach to understanding how the brain solves visual object recognition. Department of Neuroscience, Columbia University, New York, NY (2016).

A simple, universal system for nonhuman primate behavioral testing. Division of Comparative Medicine, MIT, Cambridge, MA (2015).

Neural dynamics in the primate ventral visual cortex during face processing. Center for Brains, Minds & Machines Face Identification Workshop, MIT, Cambridge, MA (2015).

Dynamics of neural processing during hierarchical inference in the ventral stream. Department of Experimental Psychology, University College London, UK (2015).

Neural signals for performing visual inference and learning in the cortical hierarchy. Bodian Seminar, Mind/Brain Institute, Department of Neuroscience, Johns Hopkins University, Baltimore, MD (2015).

Visual face processing in primate cortex: dynamics and computation. Department of Neurobiology, Harvard Medical School, Boston, MA (2014).

Face processing in primates: a model system for studying the neural basis of high-level vision. Department of Psychology, UCSD, La Jolla, CA (2014).

Visual face processing in primate cortex: dynamics and computation. Salk Institute, La Jolla, CA (2014).

The neural computations that underlie face processing in primates. 9.S912: Vision & learning - computers and brains, MIT, Cambridge, MA (2013).

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Neural recordings and computational modeling of PL, the earliest face selective region in monkey IT. Kanwisher Lab, MIT, Cambridge, MA (2013).

Neural recordings and computational modeling of PL, the earliest face selective region in monkey IT. Vision Sciences Lab, Harvard University, Cambridge, MA (2013).

Neural recordings and computational modeling of the earliest face selective region in monkey IT, area PL. Serre Lab, Brown University, Providence, RI (2013).

Neural recordings and computational modeling of the earliest face selective region in monkey IT, area PL. Brain Lunch Series, Massachusetts Institute of Technology, Cambridge, MA (2012).

Mapping neural responses to faces in inferotemporal cortex. 9th Annual McGovern Institute Retreat, AAAS Norton Woods Conference Center, Cambridge, MA (2011).

Neural processing of sounds during sleep in primate auditory cortex. Object Recognition Laboratory, MIT McGovern Institute, Cambridge, MA (2007).

Cortical processing of sounds in the sleeping brain. Center for Hearing and Balance Seminar Series, Johns Hopkins Medical Institution, Baltimore, MD (2007).

Why you do not hear sounds (as well) while you sleep. Biomedical Engineering Friday Student Seminar, Johns Hopkins Medical Institution, Baltimore, MD (2007).

Effects of Sleep on Neural Responses to Sounds in Auditory Cortex. Neurology/Psychology Sleep Research Meeting, Johns Hopkins Bayview Medical Center, Baltimore, MD (2006).

## PATENTS

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Device for Mechanical Securement to Hard Tissue  
International PCT Application filed July 28, 2023 (Kell AJE & Issa EB)

Screwless Implant for Neural Access  
US Provisional Application No. 63/392,918 filed July 28, 2022 (Kell AJE & Issa EB)

Implant for Hip Replacement  
US Provisional Application No. 63/392,921 filed July 28, 2022 (Kell AJE & Issa EB)

## COURSES

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Imaging Structure & Function in the Nervous System (Summer 2014)



**Issa CV**

Cold Spring Harbor Laboratory

**TEACHING EXPERIENCE**

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## Faculty

Survey of Neuroscience II (Systems & behavior) (Springs 2020-2023) **guest lecturer**  
 GR6055 (1st year graduate), "Visual object & face recognition"  
 Dept. of Neuroscience, Columbia University

## Graduate

Principles and Design of Biomedical Instrumentation (Fall 2006) **teaching assistant**  
 580.471 (advanced undergraduate)  
 Dept. of Biomedical Engineering, Johns Hopkins University

Biomedical Engineering Signals and Systems (Spring 2004) **teaching assistant**  
 580.222 (undergraduate)  
 Dept. of Biomedical Engineering, Johns Hopkins University

**PROFESSIONAL SOCIETIES**

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2007-2017 Society for Neuroscience  
 2004-2008 Association for Research in Otolaryngology  
 2000-2001 Tau Beta Pi Undergraduate Engineering Honors Society

**REVIEWER** | *Journal of Neuroscience, Journal of Vision, Neuron, Nature*

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**REFERENCES**

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James DiCarlo  
 Professor of Neuroscience, MIT

[dicarlo@mit.edu](mailto:dicarlo@mit.edu)  
 617.452.2045

Xiaoqin Wang  
 Professor of Biomedical Engineering, Johns Hopkins

[xiaoqin.wang@jhu.edu](mailto:xiaoqin.wang@jhu.edu)  
 410.614.4547

Nancy Kanwisher  
 Professor of Neuroscience, MIT

[ngk@mit.edu](mailto:ngk@mit.edu)  
 617.258.0721

Ed Connor  
 Professor of Neuroscience, Johns Hopkins

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 410.516.7342

**Issa CV**

Mark Harnett  
Assistant Professor of Neuroscience, MIT

[harnett@mit.edu](mailto:harnett@mit.edu)  
617.324.6989

Eric Young  
Professor of Biomedical Engineering, Johns Hopkins

[eyoung@bme.jhu.edu](mailto:eyoung@bme.jhu.edu)  
410.955.3164