

# JUSTIN D. YAO, Ph.D.

✉ justin.yao@rutgers.edu | 📞 818-434-9816 | 🌐 www.yaolaboratory.com

## Scholarly Profile

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I am a sensory neuroscientist interested in systems, behavioral, cognitive, and computational neuroscience. I study how the brain solves complex problems for auditory function and cognition. My research program has two primary objectives: first, to understand how neural circuits form representations of sensory and cognitive variables that guide perceptual decision-making; and second, to uncover the neural basis of how specific sensory deficits, such as hearing loss, leads to cognitive impairments and increases the risk of neurodegenerative disorders. To achieve these objectives, I employ cutting-edge techniques in animal psychophysics, neural circuit manipulations, in vivo awake-behaving neural recordings, and computational modeling approaches.

## Personal Information

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Place of birth: Manila, Philippines

Citizenship: USA

## Academic Appointments

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Assistant Professor, Rutgers University Department of Otolaryngology, Brain Health Institute	2022 – Present
Associate Faculty Member, Rutgers University Psychology Department	2023 – Present
Postdoctoral Fellow, New York University Center for Neural Science	2016 – 2022

## Education and Research Experience

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Ph.D. Research, University of California at Irvine Department of Neurobiology and Behavior	2010 – 2016
Undergraduate Honors Research, University of California at Berkeley Psychology Department	2008 – 2010
B.A., University of California at Berkeley Psychology Department	2008 – 2010
A.A., Psychology, Pasadena City College, CA	2006 – 2008

## Research Support

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### *Principal Investigator*

K99/R00 Pathway to Independence Award, NIDCD Total Funding: \$858,322 (Direct: \$623,635; Indirect: \$234,687)	2020 – Present
NRSA Postdoctoral (F32) Individual Research Fellowship, NIDCD Total Funding: \$179,478 (Direct: \$179,478; Indirect: \$0)	2017 – 2020
NRSA Predoctoral (F31-Diversity) Individual Research Fellowship, NIDCD Total Funding: \$96,837 (Direct: \$96,837; Indirect: \$0)	2013 – 2016

### *Trainee*

Postdoctoral Institutional Training Program (T32), NIMH	2016 – 2017
Predoctoral Interdisciplinary Training Program (T32) in Hearing Research, NIDCD	2012 – 2013

## Honors and Recognition

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Advances and Perspectives in Auditory Neurophysiology (APAN), Travel Award	2021
Advances and Perspectives in Auditory Neurophysiology (APAN), Travel Award	2017
University of California, Irvine School of Biological Sciences, Travel Award	2014
Most Outstanding Graduate Student Award, Center for Hearing Research, UC Irvine	2014
Honors in Psychology, University of California, Berkeley	2010
Warner Brown Memorial Prize, University of California, Berkeley	2010
Alpha Gamma Sigma Scholar, Pasadena City College, Pasadena, CA	2008
Extraordinary in Social Sciences Award, Pasadena City College, Pasadena, CA	2008

## Publications and Presentations

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### Publications

Berns MP, Nunez GM, Zhang X, Chavan A, Zemlianova K, Mowery TM, **Yao JD**. (In Review). Auditory decision-making deficits after permanent noise-induced hearing loss.

Hong SS, Wackym PA, Murphy DJ, Peci E, Kiel MY, Tucker A, Carayannopoulos NL, Chandrasekar SC, Suresh N, Utku UA **Yao JD**, Mowery TM. (2024). Model of superior semicircular canal dehiscence: Asymmetrical vestibular dysfunction induces reversible balance impairment *Frontiers in Neurology* 15, doi: 10.3389/fneur.2024.1476004

Mowery TM, Wackym PA, Nacipucha J, Dangcil E, Stadler RD, Tucker A, Carayannopoulos NL, Beshy M, **Yao JD**. (2023). Superior semicircular canal dehiscence and subsequent closure induces reversible impaired decision-making. *Frontiers in Neurology* 14, doi: 10.3389/fneur.2023.1259030

Paraouty N, **Yao JD**, Varnet L, Chou C, Chung SY, Sanes DH. (2023). Sensory cortex plasticity supports auditory social learning. *Nature Communications*, 14(1), 5828. doi: 10.1038/s41467-023041641-8.

Gay J, Dangcil E, Nacipucha J, Botrous J, Suresh N, Tucker A, Carayannopoulos N, Khan M, Meng R, **Yao JD**, Wackym PA, Mowery T. (2023). An animal model of neonatal intensive care unit exposure in the preterm infant. *Integrative and Comparative Biology*:icad020. doi: 10.1093/icb/icad020.

**Yao JD**, Zemlianova KO, Hocker DL, Savin C, Constantinople CM, Chung SY, Sanes DH. (2023). Transformation of acoustic information to sensory decision variables in the parietal cortex. *Proc Natl Acad Sci USA* 120(2):e2212120120. doi: 10.1073/pnas.2212120120

Anbuhl, KL, **Yao JD**, Hotz RA, Mowery TM, Sanes DH. (2022). Auditory processing remains sensitive to environmental experience during adolescence, *Nature Communications* 13(1):2872. doi: 10.1038/s41467-022-30455-9

**Yao JD**, Sanes DH. (2021). Temporal encoding is required for categorization, but not discrimination, *Cerebral Cortex* 31(6):2886-2897, doi: 10.1093/cercor/bhaa396

**Yao JD**, Gimoto J, Constantinople CM, Sanes DH. (2020). Parietal cortex is required for the integration of acoustic evidence, *Current Biology* 30(17):3293-3303.e4, doi:10.1016/j.cub.2020.06.017

**Yao JD**, Sanes DH. (2018) Developmental deprivation-induced perceptual and cortical processing deficits in awake-behaving animals. *Elife*, doi: 10.7554/eLife.33891

**Yao JD**, Bremen P, Middlebrooks JC. (2015). Emergence of Spatial Stream Segregation in the Ascending Auditory System. *Journal of Neuroscience* 35(49):16199–16212.

**Yao JD**, Bremen P, Middlebrooks JC. (2015). Transformation of Spatial Sensitivity along the Ascending Auditory Pathway. *Journal of Neurophysiology* 113(9):3098–111.

**Yao JD**, Bremen P, Middlebrooks JC. (2013). Rat Primary Auditory Cortex is Exclusively Tuned to the Contralateral Hemifield. *Journal of Neurophysiology* 110(9):2140–51.

van der Helm E, **Yao J**, Dutt S, Rao V, Saletin JM & Walker MP. (2011). REM Sleep Depotentiated Amygdala Activity to Previous Emotional Experiences. *Current Biology*, 21(23):1-4.

### **Published Abstracts/Conference Presentations**

- Berns MP, Zhang X, Hintelmann C, Nunez G, Chavan A, Raskonda D, Patel P, Zemlianova KO, Kujawa SG, **Yao JD**. (2024) Audiovisual Decision-Making Deficits After Hearing Loss. *ARO 2024*
- Nunez G, Hintelmann C, Berns MP, Raskonda D, Patel P, Zhang X, **Yao JD**. (2023) Audiovisual Decision-Making Deficits After Hearing Loss. *APAN 2023*
- Yao JD**, Zemlianova KO, Sanes DH. (2022) Transformation of Acoustic Information to Sensory Decisions in Parietal Cortex. *SfN 2022*
- Yao JD**, Zemlianova KO, Sanes DH. (2022) Transformation of Acoustic Information to Sensory Decisions in Parietal Cortex. *APAN 2022*
- Yao JD**, Zemlianova KO, Sanes DH. (2022) Transformation of Acoustic Information to Sensory Decisions in Parietal Cortex. *ARO 2022*
- Yao JD**, Zemlianova KO, Sanes DH. (2021) Transformation of Acoustic Information to Sensory Decisions in Parietal Cortex. *SfN 2021*
- Yao JD**, Zemlianova KO, Sanes DH. (2021) Transformation of Acoustic Information to Sensory Decisions in Parietal Cortex. *APAN 2021*
- Yao JD**, Sanes DH. (2021) Temporal Encoding is Required for Categorization but not Discrimination. *ARO 2021*
- Kelsey Anbuhl, **Yao JD**, Sanes DH. (2021) Transient developmental hearing loss after the critical period impairs cortical encoding. *ARO 2021*
- Yao JD**, Sanes DH. (2020) Temporal Encoding is Required for Categorization but not Discrimination. *APAN 2020*
- Kelsey Anbuhl, Todd Mowery, **Yao JD**, Sanes DH. (2020) Prolonged transient hearing loss after the critical period impairs cortical encoding. *APAN 2020*
- Yao JD**, Gimoto J, Sanes DH. (2020) Representation of perceptual integration time downstream of auditory cortex. *ARO 2020, San Jose, CA*.
- Yao JD**, Sanes DH. (2019) Representation of behavioral integration time downstream of auditory cortex. *SfN 2019, Chicago, IL*.
- Yao JD**, Sanes DH. (2019) Representation of behavioral integration time downstream of auditory cortex. *APAN 2019, Chicago, IL*.
- Yao JD**, Sanes DH. (2019) Effect of Developmental Hearing Loss on Behaviorally Gated Responses in Auditory Cortex. *ARO 2019, Baltimore, MD*.
- Yao JD**, Sanes DH. (2018) Effect of developmental hearing loss on behaviorally-gated responses in auditory cortex. *Gordon Research Seminar & Conference "Auditory System"; Smithfield, RI*.
- Yao JD**, Sanes DH. (2018) Population coding of high frequency amplitude modulations in auditory cortex. *ARO 2018, San Diego, CA*.
- Yao JD**, Sanes DH. (2017) Developmental hearing loss impairs fast temporal processing. *SfN 2017, Washington, DC*.
- Yao JD**, Sanes DH. (2017) Developmental hearing loss impairs fast temporal processing. *APAN 2017, Washington, DC*.
- Yao JD**, Sanes DH. (2017) Rate coding of high frequency amplitude modulations during behavior. *ARO 2017, Baltimore, MD*.
- Yao JD**, Sanes DH. (2016) Rate coding of high frequency amplitude modulations during behavior. *APAN 2016, San Diego, CA*.
- Yao JD**, Sanes DH. (2016) Rate coding of high frequency amplitude modulations during behavior. *Gordon Research Seminar & Conference "Auditory System"; Lewiston, ME*.
- Yao JD**, Bremen P, Middlebrooks JC. (2016) Emergence of Spatial Stream Segregation in the Ascending Auditory Pathway. *39th Annual Association for Research in Otolaryngology MidWinter Meeting, Baltimore, MD*.
- Javier L, **Yao JD**, Middlebrooks JC. (2016) Monkey Business in the Cat Auditory Cortex. *39th Annual Association for Research in Otolaryngology MidWinter Meeting, Baltimore, MD*.
- Yao JD**, Bremen P, Middlebrooks JC. (2015) Emergence of Spatial Stream Segregation Along the Ascending Auditory System. *SoCal Hearing Conference, UC San Diego, San Diego, CA*
- Yao JD**, Bremen P, Middlebrooks JC. (2015) Spatial Stream Segregation by Neurons Along the Ascending Auditory System. *38th Annual Association for Research in Otolaryngology MidWinter Meeting, Baltimore, MD*.

**Yao JD**, Bremen P, Middlebrooks JC. (2014) Sharpening of Spatial Tuning Along the Ascending Auditory System. *SoCal Hearing Conference, Irvine, CA*

**Yao JD**, Bremen P, Middlebrooks JC. (2014) Sharpening of Spatial Tuning Along the Ascending Auditory System. *Gordon Research Seminar & Conference “Auditory System”; Lewiston, ME.*

**Yao JD**, Bremen P, Middlebrooks JC. (2014) Spatial and frequency sensitivity in the subdivisions of the medial geniculate body. *37<sup>th</sup> Annual Association for Research in Otolaryngology MidWinter Meeting, San Diego, CA.*

**Yao JD**, Bremen P, Middlebrooks JC. (2013) Characterization of Spatial Sensitivity within Subdivisions of the Medial Geniculate Body: Implications for Spatial Stream Segregation in Auditory Cortex. *SoCal Hearing Conference, Los Angeles, CA*

**Yao JD**, Bremen P, Middlebrooks JC. (2013) Rat cortical units display sharp hemifield tuning. *36<sup>th</sup> Annual Association for Research in Otolaryngology MidWinter Meeting, Baltimore, MD.*

van der Helm E, **Yao J**, Rao V, Dutt S, Walker MP. (2011) “Overnight therapy? Sleep de-potentiates emotional brain reactivity.” *Cognitive Neuroscience Society, San Francisco, CA*

### **Invited Presentations**

Medical University of South Carolina’s Hearing Research Seminar Series; Charleston, SC, 6<sup>th</sup> December 2023

Rutgers Department of Otolaryngology Grand Rounds; New Brunswick, NJ, 12<sup>th</sup> July 2023

Center for Hearing Research, University of California; Irvine, CA, 17<sup>th</sup> May 2023

Rutgers Brain Health Institute 8<sup>th</sup> Annual Symposium; Piscataway, NJ, 2<sup>nd</sup> December 2022

Western University; London, Ontario, Canada, 27<sup>th</sup> January 2022

Emory University; Atlanta, GA, 20<sup>th</sup> January 2022

Simons Collaboration on the Global Brain, Simons Foundation; New York, NY, 14<sup>th</sup> December 2021

Acoustical Society of America, 181<sup>st</sup> Meeting; Seattle, WA, 1<sup>st</sup> December 2021

Boston College; Newton, MA, 22<sup>nd</sup> November 2021

Rutgers Brain Health Institute, Rutgers University; Piscataway, NJ, 29<sup>th</sup> October 2021

Center for Integrative Brain Research, Seattle Children’s Research Institute, Seattle, WA, 12<sup>th</sup> October 2021

Electronic Auditory Research Seminar Series, <https://www.crowdcast.io/e/ears/9>, 11<sup>th</sup> May 2021

University of Illinois at Chicago; Chicago, IL, 25<sup>th</sup> February 2021

Purdue University; West Lafayette, IN, 4<sup>th</sup> February 2021

University of Washington; Seattle, WA, 13<sup>th</sup> January 2021

Rutgers University; Piscataway, NJ, 17<sup>th</sup> November 2020

University of Maryland; College Park, MD, 16<sup>th</sup> November 2020

Feinstein Institutes for Medical Research; Manhasset, NY, 20<sup>th</sup> October 2020

The SoCal Hearing Conference; University of California at San Diego, San Diego, CA, 29<sup>th</sup> August 2015

The Gordon Research Seminar & Conference “Auditory System”; Lewiston, ME, 13<sup>th</sup> July 2014

### **Professional Service**

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#### **Peer Review Service**

Ad-hoc reviewer: *Nature Neuroscience, Nature Communications, Neuron, PNAS, Current Biology, Cerebral Cortex, European Journal of Neuroscience, Journal of Neurophysiology, Proceedings of The Royal Society B, Frontiers in Neuroscience, Plos One, Hearing Research*

#### **Professional Membership**

Acoustical Society of America	2021 – Present
Society for Neuroscience	2013 – Present
Association for Research in Otolaryngology	2011 – Present

### **Professional Development & Committee Service**

NIH Study Section: BRAIN Initiative (Targeted BRAIN Circuits Projects)	2024
Rutgers University, Psychology Department, PhD Graduate Admissions Committee	2024
Auditory Neuroscience on the East Coast Conference, Organizer	2023
Advances and Perspectives in Auditory Neuroscience Program Committee	2023 – Present
Association for Research in Otolaryngology Steering Committee, Mentorship Program	2021 – 2022
Neuroscience Institute Postdoc Committee, New York University, Senior Advisor	2019 – 2022

### **Outreach**

Association of Filipino Scientists in America, Mentor	2020 – Present
Regional Intel Science and Engineer Fair, Irvine, CA	2013 – 2014

### **Teaching Experience**

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Byrne Seminar Course: The Sensory Brain Across Lifespan Development, Rutgers University	2024
Advanced Topics In Perception: Auditory System in Cognitive Function, Rutgers University	2023
Development & Dysfunction of the Nervous System, Teaching Assistant, New York University	2018
Hearing and the Brain, Teaching Assistant, University of California at Irvine	2014
Neurobiology Laboratory Course, Teaching Assistant, University of California at Irvine	2012

### **Supervision and Mentorship**

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Marissa Calvano, Graduate Student, Rutgers University	2024 – Present
Madeline Berns, Graduate Student, Rutgers University	2023 – Present
Prisha Patel, Undergraduate researcher, Rutgers University	2023 – Present
Divyanjali Raskonda, Undergraduate researcher, Rutgers University	2023 – Present
Bruce Zhang, Medical Student, Rutgers University	2023 – Present
Xingeng Zhang, Research Assistant, Rutgers University	2023 – 2024
Anindita Chavan, Research Assistant, Rutgers University	2023 – 2024
Chase Hintelmann, Medical Student, Rutgers University	2023 – 2024
Genesis Nunez, Laboratory Assistant, Rutgers University	2023 – 2024
Jianina Suazo, Undergraduate researcher, New York University	2021 – 2022
Vivian Lee, Undergraduate researcher, New York University	2021 – 2022
Janu Tatachar, Undergraduate researcher, New York University	2020 – 2021
Justin Gimoto, Undergraduate researcher, New York University	2018 – 2020
Juliana Rupolo, Undergraduate researcher, New York University	2018 – 2020
Susan Chow, Undergraduate researcher, New York University	2017 – 2018
Saurab Faruque, Undergraduate researcher, New York University	2016 – 2017