# Vy Ai Vo

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## POSITIONS

2019 – present: AI / ML Research Scientist
Intel Labs, Intel Corporation, Hillsboro, OR
Brain-Inspired Computing Lab

## EDUCATION

2013 – 2019: Ph.D. in Neurosciences (Computational specialization)
University of California, San Diego, La Jolla, CA
Thesis committee: John Serences (advisor), Ed Vul, Tim Gentner, Ed Callaway, Doug Nitz

2007 – 2011: B.A. with High Honors, double major in Biology & Cognitive Science
Swarthmore College, Swarthmore, PA
Advisors: Kathleen K. Siwicki & Frank H. Durgin

## PUBLICATIONS

Jain, S., **Vo, V.A.**, Wehbe, L., Huth, A.G. (2023). Computational language modeling and the promise of in silico experimentation. *Neurobiology of Language*.

Raccah, O., Chen, P., Willke, T., Poeppel, D., **Vo, V.A.** (2022). Memory in humans and deep language models: Linking hypotheses for model augmentation. *Memory in Artificial and Real Intelligence (MemARI) workshop, Neural Information Processing Systems (NeurIPS)*.

Ma, G., **Vo, V.A.**, Ahmed, N., Willke, T. (2022). Cache-memory gated graph neural networks. *Memory in Artificial and Real Intelligence (MemARI) workshop, Neural Information Processing Systems (NeurIPS)*.

Antonello, R., Turek, J.S., **Vo, V.A.**, Huth, A. Low-Dimensional Structure in the Space of Language Representations is Reflected in Brain Responses. (2021). *Neural Information Processing Systems (NeurIPS).*

Kumar, M., Anderson, M., Antony, J.W., Baldassano, C., Brooks, P., Cai, M., Chen, P-H.C., Ellis, C., Henselman-Petrusek, G., Huberdeau, D., Hutchinson, J.B., Li, Y.P., Lu, Q., Manning, J., Mennen, A., Nastase, S., Richard, H., Shapiro, A.C., Schuck, N., Shvartsman, M., Sundaram, N., Suo, D., Turek, J.S., **Vo, V.**, Wallace, G., Wang, Y., Zhang, H., Zhu, X., Capotă, M., Cohen, J., Hasson, U., Li, K., Ramadge, P.J., Turk-Browne, N., Willke, T., Norman, K.A. (2021). BrainIAK: The Brain Imaging Analysis Kit. *Aperture*.

**Vo, V.A.**, Sutterer, D.W., Foster, J.J., Sprague, T.C., Awh, E., Serences, J.T. (2021). Shared representational formats for information maintained in working memory and information retrieved from long-term memory. *Cerebral Cortex.*

Chien, H-Y.S., Beckage, N.M., **Vo, V.A.**, Turek, J.S., Honey, C., Willke, T.L. (2021). Long short-term memory with slower information decay. *LatinX in AI workshop, International Conference on Machine Learning (ICML)*.

Mahto, S., Vo, V.A., Turek, J.S., Huth, A.G. (2021). Multi-timescale representation learning in LSTM language models. *International Conference on Learning Representations (ICLR).*

Jain, S., Vo, V., Mahto, S., LeBel, A., Turek, J., Huth, A. (2020). Interpretable multi-timescale models for predicting fMRI responses to continuous natural speech. *Neural Information Processing Systems (NeurIPS)*.

Turek, J., Jain, S., Vo, V., Capotă, M., Huth, A., Willke, T. (2020). Approximating stacked and bidirectional recurrent architectures with the delayed recurrent neural network. *International Conference on Machine Learning (ICML)*.

Itthipuripat, S.I.*, Vo, V.A.*, Sprague, T.C., Serences, J.T. (2019). Value-driven attentional capture enhances distractor representations in early visual cortex. *PLOS Biology*.

Henderson, M.H.*, Vo, V.A.*, Chunharas, C., Sprague, T.C., Serences, J.T. (2019). Multivariate analysis of BOLD activation patterns recovers graded depth representations in human visual and parietal cortex. *eNeuro*.

Sprague, T.C.*, Adam, K.C.S.*, Foster, J.J.*, Rahmati, M.*, Sutterer, D.W.*, Vo, V.A.* (2018). Inverted encoding models assay population-level stimulus representations, not single-unit neural tuning. *eNeuro*.

Sprague, T.C., Itthipuripat, S., Vo, V.A., and Serences, J.T. (2018). Dissociable signatures of visual salience and behavioral relevance across attentional priority maps in human cortex. *Journal of Neurophysiology*.

Vo, V.A., Sprague, T.C., and Serences, J.T. (2017). Spatial tuning shifts increase the discriminability and fidelity of population codes in visual cortex. *Journal of Neuroscience.*

Vo, V.A., Li, R., Kornell, N., Pouget, A., Cantlon, J.F. (2014). Young children bet on their numerical skills: Metacognition in the numerical domain. *Psychological Science*.

* These authors made equal contributions.

## SELECTED ACADEMIC TALKS

"Building explicitly multi-timescale artificial neural networks that explain natural language processing in the human brain." (2022) Talk at Computational and Systems Neuroscience (COSYNE) Workshop on *Mechanisms, functions, and methods for diversity of neuronal and network timescales*.

"Memory systems in cognitive neuroscience and machine learning." (2019) Invited talk for University of Oregon cognitive neuroscience group, Eugene, OR.

"Neural representations of spatial position recalled from long-term and short-term memory diverge across the cortical hierarchy." (2017) Talk at Vision Sciences Society meeting, St. Pete Beach, FL.

"Spatial attention modulates voxel receptive fields to boost the fidelity of multi-voxel stimulus representations." (2016) Nanosymposium talk at Society for Neuroscience meeting, San Diego, CA.

## SELECTED PRESENTATIONS

Toneva, M., Vo, V., Turek, J., Jain, S., Michelmann, S., Capotă, M., Huth, A., Hasson, U., Norman, K. (2022). Language models that can remember. Poster at Context and Episodic Memory Symposium.

Vo, V.*, Turek, J., Capotă, M., Willke, T. (2022). Using neuroscience to improve long-range sequential processing in language models. Poster at From Neuroscience to Artificially Intelligent Systems (NAISys) meeting at Cold Spring Harbor Labs.

Jain, S.*, **Vo, V.***, Beckage, N.M., Chien, H.Y.S., Obinwa, C., Huth, A.G. (2021). A unifying computational account of temporal processing in natural speech across cortex. Poster slide slam at Society for Neurobiology of Language (SNL) meeting.

**Vo, V.**, Beckage, N., Capotă, M., Turek, J. Brain-inspired multi-timescale language models. (2021). Intel Labs Open House demo.

**Vo, V.A.**, Serences, J.T. (2018). The effects of attentional scope on voxel receptive fields and population codes for space. Poster at Vision Sciences Society meeting, St. Pete Beach, FL.

Itthipuripat, S., **Vo, V.A.**, Sprague, T.C., Serences, J. (2017). Reward and selection history shape neural representations of an attentional priority in human visual and parietal cortex. Poster at Society for Neuroscience meeting, Washington, D.C.

Itthipuripat, S., Chang, K., **Vo, V.**, Serences, J. (2017). Dissociable effects of stimulus strength, task demands, and training on occipital and parietal EEG signals during perceptual decision-making. Talk at Vision Sciences Society meeting, St. Pete Beach, FL.

Sprague, T.C., Itthipuripat, S., **Vo, V.A.**, and Serences, J.T. (2016). Graded representations of stimulus salience and attentional priority across visually-responsive cortex. Nanosymposium talk at Society for Neuroscience meeting, San Diego, CA.

**Vo, V.A.**, Herrera, E.I., Serences, J.T. (2016). Orientation selective responses as measured with EEG track both featural and temporal attention enhancements. Poster at Vision Sciences Society meeting, St. Pete Beach, FL.

Henderson, M., Chunharas, C., **Vo, V.**, Sprague, T., Serences, J. (2016). Reconstructing 3D stimuli using BOLD activation patterns recovers hierarchical depth processing in human visual and parietal cortex. Poster at Vision Sciences Society meeting, St. Pete Beach, FL.

**Vo, V.A.**, Sprague, T.C., Serences, J.T. (2015). Linking attentional modulations of single-voxel population receptive fields and region-level spatial reconstructions. Poster at Society for Neuroscience meeting, Chicago, IL.

Emerson, R., **Vo, V.A.**, Kurtz, T., Cantlon, J.F. (2014). Mathematics expertise predicts structural and functional variability in the intraparietal sulcus. Nanosymposium talk at Society for Neuroscience meeting, Washington, D.C.

Emerson, R., **Vo, V.**, Cantlon, J.F. (2013). Longitudinal changes in children's IPS responses are number-specific and mathematics related. Poster at Cognitive Neuroscience Society meeting, San Francisco, CA.

**Vo, V.**, Li, R., Kornell, N., Cantlon, J.F. (2012). Metacognition in children is specific to domain knowledge. Poster at Cognitive Science Society meeting, Sapporo, Japan.

**Vo, V.**, Ning, A., Bhattacharjee, A., Li, Z., Durgin, F. (2011). Pointing accurately at a target doesn't require perceiving its location accurately. *Journal of Vision*, *11*(11):944. Poster at Vision Sciences Society meeting, Naples, FL.

## AWARDS AND HONORS

Intel Innovator High 5 Award (2020) for filing 5+ patent applications
Intel Labs Emerging Technologies Research Division Recognition Award (2020)
Vision Sciences Society Student Travel Award (2017)
Center for Visual Sciences Symposium Student Travel Award (2016)

NSF Graduate Research Fellowship (awarded 2013)
Howard Hughes Medical Institute Summer Research Fellow (2010)

## PROFESSIONAL ACTIVITIES

*Workshop co-organizer:* NeurIPS "Memory in Artificial and Real Intelligence (MemARI)" (2022)
*Workshop committee*: NeurIPS "Gaze Meets ML" (2022)
*Workshop co-organizer:* ICLR "How can findings about the brain improve AI systems?" (2021)
*Workshop committee:* NeurIPS "Context and compositionality in biological and artificial neural systems" (2019)
*Ad-hoc reviewer:* Cerebral Cortex, eNeuro, Journal of Cognitive Neuroscience, NeuroImage, Proceedings of the National Academy of Sciences, PLOS Computational Biology, NeurIPS, ICLR
*Courses:* Computational Neuroscience: Vision, Cold Spring Harbor Laboratory summer course (2016)

## TEACHING & MENTORSHIP

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| 2022 | *Intern mentor* for Omri Raccah (Intel Labs), resulting in NeurIPS workshop paper. |
| 2021 | *Project mentor* for Neuromatch Academy (computational neuroscience). Project extension with Hanxiao Lu and Andréanne Proulx, resulting in Neuromatch 4.0 main track talk "Untangling contributions of distinct features of images to object processing in inferotemporal cortex". |
| 2013 – 2019 | *Graduate student mentor* for independent study students and volunteers (UCSD).<br>Isabel Asp (Psychology); Kaylee Craig; Eduardo Herrera; Avery Rogers; Matthew Jaconetta (Psychology); Kia Shams; Wenjing Dong (Psychology); Rie Davis (Psychology); Naomi Lee (Psychology). |
| Spring 2016 | *Student Lecturer*, Fundamentals in Statistics and Computation for Neuroscientists course. This student-taught, student-led, and student-organized course serves as an introduction to concepts and techniques necessary for students to succeed in the Computational Neuroscience specialization track in the Neurosciences Graduate Program at UCSD. Prepared two video lectures and wrote accompanying quizzes and problem sets on basic hypothesis testing and permutation testing. |
| Spring 2015 | *Teaching Assistant*, Data Analysis in MATLAB graduate course (taught by John Serences). Reviewed student code & algorithmic solutions to weekly problem sets on advanced topics in data analysis, such as bootstrapping & permutation statistics, time-frequency analysis, pattern classification, and nonlinear curve & surface fitting. |
| Spring 2015 | *Guest Lecturer*, Sensation & Perception undergraduate course (taught by John Serences). Lectured on sensory development for this Psychology core course. |
| 2014 - 2015 | *Teaching Assistant*, Neurosciences Graduate Program Boot Camp for incoming students (taught by Stefan Leutgeb & Jing Wang). Led computational neuroscience workshops & labs designed to familiarize students with common programming & data analysis techniques using Python and MATLAB. |
| 2011 – 2013 | *Graduate student mentor* for independent study students (University of Rochester).<br>Laura Ackerman (Brain & Cognitive Sciences), undergraduate thesis; Emily Kasman (Brain & Cognitive Sciences); Matthew Mullen (Neurosciences). |