

Lily Zihui Zhu

PHD STUDENT · HARVARD PSYCHOLOGY

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Education

Harvard University

PH.D. IN PSYCHOLOGY

- Advisors: Dr. Jesse Snedeker, Dr. Erika Bergelson

Cambridge, MA

2024 - 2029 (expected)

Johns Hopkins University

M.S.E. IN DATA SCIENCE

- Thesis: "Modeling the acquisition of generative principles: the mapping between cross-linguistic number words and symbols"
- Cumulative GPA: 4.0/4.0

Baltimore, MD

2022 - 2024

B.S. IN APPLIED MATHEMATICS AND STATISTICS & B.A. IN COGNITIVE SCIENCE

- Minor in Linguistics
- Cumulative GPA: 4.0/4.0

2019 - 2023

Publications

Zhu, L. Z. & Yuan, L., (submitted). From Components to Compositionality: A Case Study of Cross-Linguistic Differences in Number Learning Without Cross-Cultural Confounds.

Zhu, L. Z., Amatuni, A., Egan-Dailey, S., Garrison, H., Kalenkovich, E., Koorathota, S., Righter, L., Tor, S., & Bergelson, E. (under review). Experience Shapes Early Noun Comprehension from 8-18 Months: The Roles of Word Frequency and Referent Familiarity.

Zhu, R., Kilonzo, T. N., **Zhu, L. Z.**, Fan, J. E., & Frank, M. C. (2025). Cross-Contextual Variability in Children's Early Understanding of Visual Media. *Topics in Cognitive Science*, 00, 1-27.

Zhu, R., Goddu, M. K., **Zhu, L. Z.**, & Gopnik, A. (2024). Preschoolers' comprehension of functional metaphors. *Open Mind*, 8, 924-949.

Zhu, Z., & Nguyen, A. (2022). The interaction between structure, discourse, and prosody in wh-questions in English. *Proceedings of the Fifty-eighth Annual Meeting of the Chicago Linguistic Society*, Chicago, IL, 501-517.

Presentations

CONFERENCE PRESENTATIONS

Zhu, L. Z., Bergelson E., & Snedeker, J. (2026) Compositional Thought Before Compositional Language: Evidence from 9-11-Month-Olds. Poster presented at *the Budapest CEU Conference on Cognitive Development*, Budapest, Hungary.

Zhu, L. Z., Kalenkovich, E., Dong Y., Righter L., & Bergelson E. (2025). Experience Shapes Early Noun Comprehension from 8-18 Months: The Roles of Word Frequency and Referent Familiarity. Oral presentation at *the 50th Annual Boston University Conference on Language Development*, Boston, MA. Acceptance rate: 54%.

Dong Y., Moore C., **Zhu, L. Z.**, & Bergelson E. (2025). Measuring early word exposure in infants: a low-cost parent-report survey captures individual language input and predicts vocabulary outcomes. Poster presented at *the 50th Annual Boston University Conference on Language Development*, Boston, MA. Acceptance rate: 54%.

Zhu, Z., Nguyen, A. (2022). The interaction between structure, discourse, and prosody in wh-questions in English. Oral presentation at *the 58th Annual Meeting of the Chicago Linguistic Society*, Chicago, IL.

INVITED TALKS

July 2025. Experience Shapes Early Noun Comprehension from 8-18 Months: The Roles of Word Frequency and Referent Familiarity. Language & Cognition Lab Meeting, Standard University.

Fellowships, Grants, & Awards

2025	Mind Brain Behavior Interdisciplinary Mind Grant , Harvard University <i>Learning from Experience: Leveraging Machine Learning and Vision Science to Understand Infant Category and Word Learning</i>	\$ 9,700
	Norman Anderson Fund , Dept. of Psychology, Harvard University <i>The Developmental Origins of Compositional Thought and Compositional Language</i>	\$ 6,500
	Departmental Travel Fund , Dept. of Psychology, Harvard University	\$ 750
2024	Stimson Research Fund , Dept. of Psychology, Harvard University	\$ 1,000
2023	Applied Mathematics & Statistics Achievement Award , Johns Hopkins University	\$ 500
	Intuitive Surgical Best Project Award , Deep Learning Course, Johns Hopkins University	\$ 400
	General Honors , Johns Hopkins University	
	Departmental Honors , Dept. of Applied Mathematics & Statistics, Johns Hopkins University	
	Departmental Honors , Dept. of Cognitive Science, Johns Hopkins University	
	Phi Beta Kappa , Alpha of Maryland at Johns Hopkins University	
2021	“Design Your Summer Experience” Grant , Johns Hopkins University	\$ 1,000
	JHU Student Employee of the Year (Nomination) , Johns Hopkins University	
2020	Bloomberg Distinguished Professors Summer Research Award , Johns Hopkins University	\$ 4,000
2019-2023	Dean’s List x 6 , Johns Hopkins University	

Research Experience

DEL Lab, University of Colorado Boulder - Research Assistant

Boulder, CO

Principle Investigator/Advisor: Dr. Lei Yuan

Jan 2022 - May 2024

- Contributed 700+ hours to 3 projects investigating children’s learning mechanisms (e.g., language-guided relational attention, associative learning) and knowledge structure (e.g., place value).
- Implemented and trained deep image captioning models (CNN + LSTM) in PyTorch to name multi-digit number symbols, assessed their sensitivity to the consistency of visual-verbal mappings in learning input.
- Conducted systematic literature review on children’s early knowledge of place value concepts.
- Modeled the structure of components of mathematical knowledge using partial correlation networks and co-occurrence networks and created network visualizations in R and Python.
- Performed hypothesis testing in R using mixed effect models to assess effectiveness of various place value training paradigms.
- Implemented Hidden Markov Model in Python to model eye gaze patterns and reduce noise in behavioral data.
- Analyzed and visualized eye-tracking data in R via growth curve analysis, onset-contingent analysis, and divergence analysis.

Gopnik Lab, University of California, Berkeley - Research Assistant

Berkeley, CA

Principle Investigator: Dr. Alison Gopnik | Advisor: Dr. Rebecca Zhu

June 2021 - May 2024

- Contributed 600+ hours to 4 projects studying how children comprehend, produce, and learn from various types of symbols (e.g., non-literal language, pictures, and relational words).
- Extracted 250+ million utterances from CHILDES using R to study the distribution of abstract relational words (e.g., same, different) in child-directed speech and children’s production.
- Trained 5 research assistants on study-specific procedures and supervised their experimental data collection processes.
- Collected data from 50+ preschoolers (i.e., 3-5 year-olds) and 30+ adults on studies investigating how children acquire and learn from non-literal expressions.
- Administered standardized experiments online over Zoom, e.g., checking consent forms, collecting demographic information, running experimental scripts, and coding behavioral data.

Language Acquisition Lab, Johns Hopkins University - Research Assistant

Baltimore, MD

Principle Investigator: Dr. Géraldine Legendre | Advisor: Dr. An Nguyen

Jan 2021 - Dec 2022

- Contributed 300+ hours to 2 projects investigating linguistic cues that guide children to acquire syntactic variations.
- Analyzed 10 children's corpora on CHILDES using CLAN to study the distribution of different wh-questions.
- Designed and launched controlled linguistic production experiments on Prolific.
- Collected, cleaned, and analyzed 600+ recordings to extract phonetic information such as pitch and word duration.
- Applied statistical models to understand prosodic differences of English wh-questions in different contexts.
- Abstract on wh-question prosody in English was accepted as an oral presentation at the Chicago Linguistic Society annual conference in 2022.

Teaching Experience

Johns Hopkins University

Baltimore, MD

EN.553.432/632 BAYESIAN STATISTICS

Spring 2024

- Instructor: Dr. Sergey Kushnarev, Dept. of Applied Mathematics and Statistics
- Role: Head Teaching Assistant. *Coordinated logistics, graded assignments, and held weekly office hours.*

EN.553.431 HONORS INTRODUCTION TO STATISTICS

Fall 2022, Spring 2023

- Instructor: Dr. Avanti Athreya, Dept. of Applied Mathematics and Statistics
- Role: Teaching Assistant. *Taught lecture materials, led discussion sessions, graded assignments, and held weekly office hours.*

EN.553.291 LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS

Fall 2021

- Instructor: Dr. Mario Micheli, Dept. of Applied Mathematics and Statistics
- Role: Teaching Assistant. *Led problem-solving sessions, graded assignments, and held weekly office hours.*

Work Experience

Handshake

San Francisco, CA

DATA ENGINEER INTERN, DATA INFRASTRUCTURE

June 2022 - Aug 2022

- Developed Python SDK for third-party API service, integrated it to existing data pipelines on Google Cloud Platform, simplified data team messaging workflow.
- Refactored Terraform module for scalable access control on cloud service, wrote Bash script for automated module deployment, migrated 1k+ Google Secret Management resources.

Johns Hopkins School of Public Health

Baltimore, MD

STUDENT INTERN, CHILD AND ADOLESCENT HEALTH MEASUREMENT INITIATIVE

Jan 2020 - Aug 2021

- Collected, cleaned, and input annual national child health survey data into SPSS database.
- Created codebook in SPSS, SAS, Stata to generate summary statistics and visualizations to describe the data on the Data Resource Center for Child & Adolescent Health dashboard.

Outreach

2024- Harvard Prospective Ph.D. & RA Event in Psychology (PPREP) Program, Mentor

2022-2023 Women Mentoring Whiting at Johns Hopkins Whiting School of Engineering, Mentor

2021-2023 Mentorship Program at Johns Hopkins Omega Psi Cognitive Science Society, Mentor

2020-2021 Johns Hopkins University Counseling Center, Counseling Center Advisory Board Member

Skills

Programming Python, PyTorch, Java, R, Julia, SQL, Matlab, Bash, Gen

Data Analytics statistical analysis (regression, network, time series), eye-tracking data analysis, deep learning, probabilistic Bayesian modeling

Natural Languages Mandarin (native), English (fluent), Cantonese (fluent)

Coursework

Computation: Data Structures, Algorithms, Machine Learning, Deep Learning, Natural Language Processing, Computational Cognitive Science

Mathematics: Multivariate Calculus, Discrete Mathematics, Linear Algebra, Differential Equations, Probability, Statistics, Optimization, Applied Statistics & Data Analysis, Time Series Analysis, Bayesian Statistics, Information Theory

Linguistics: Psychosemantics, Syntax, Phonology, Research Seminar in OT Syntax, Research Seminar in Minimalist Syntax

Psychology: Research Methods in Psychology, Design & Analysis for Experimental Psychology, Developmental Psychology, Social Psychology, Foundations of Brain, Behavior, and Cognition, Developmental Proseminar

Other relevant courses: Foundations of Cognitive Science, Research Seminar in Language Acquisition, First Language Acquisition, Second Language Acquisition, Theories of Learning