

# Lily Zihui Zhu

PHD STUDENT · HARVARD PSYCHOLOGY

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## Education

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### Harvard University

#### Ph.D. in Psychology

- Advisors: Dr. Jesse Snedeker, Dr. Elika 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

2019 - 2023

- Minor in Linguistics
- Cumulative GPA: 4.0/4.0

## Publications

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**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, L. 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

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### 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, L. 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

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

## Research Experience

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| <b>DEL Lab, University of Colorado Boulder</b> - 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.

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| <b>Gopnik Lab, University of California, Berkeley</b> - 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.

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| <b>Language Acquisition Lab, Johns Hopkins University</b> - Research Assistant<br>Principle Investigator: Dr. Géraldine Legendre   Advisor: Dr. An Nguyen  | Baltimore, MD<br>Jan 2021 - Dec 2022 |
| <ul style="list-style-type: none"> <li>Contributed 300+ hours to 2 projects investigating linguistic cues that guide children to acquire syntactic variations.</li> <li>Analyzed 10 children's corpora on CHILDES using CLAN to study the distribution of different wh-questions.</li> <li>Designed and launched controlled linguistic production experiments on Prolific.</li> <li>Collected, cleaned, and analyzed 600+ recordings to extract phonetic information such as pitch and word duration.</li> <li>Applied statistical models to understand prosodic differences of English wh-questions in different contexts.</li> <li>Abstract on wh-question prosody in English was accepted as an oral presentation at the Chicago Linguistic Society annual conference in 2022.</li> </ul> |                                      |

## Teaching Experience

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| <b>Johns Hopkins University</b>  | Baltimore, MD          |
| <b>EN.553.432/632 BAYESIAN STATISTICS</b>  | Spring 2024            |
| <ul style="list-style-type: none"> <li>Instructor: Dr. Sergey Kushnarev, Dept. of Applied Mathematics and Statistics</li> <li>Role: Head Teaching Assistant. <i>Coordinated logistics, graded assignments, and held weekly office hours.</i></li> </ul>                      |                        |
| <b>EN.553.431 HONORS INTRODUCTION TO STATISTICS</b>  | Fall 2022, Spring 2023 |
| <ul style="list-style-type: none"> <li>Instructor: Dr. Avanti Athreya, Dept. of Applied Mathematics and Statistics</li> <li>Role: Teaching Assistant. <i>Taught lecture materials, led discussion sessions, graded assignments, and held weekly office hours.</i></li> </ul> |                        |
| <b>EN.553.291 LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS</b>  | Fall 2021              |
| <ul style="list-style-type: none"> <li>Instructor: Dr. Mario Micheli, Dept. of Applied Mathematics and Statistics</li> <li>Role: Teaching Assistant. <i>Led problem-solving sessions, graded assignments, and held weekly office hours.</i></li> </ul>                       |                        |

## Work Experience

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| <b>Handshake</b>   | San Francisco, CA    |
| <b>DATA ENGINEER INTERN, DATA INFRASTRUCTURE</b>   | June 2022 - Aug 2022 |
| <ul style="list-style-type: none"> <li>Developed Python SDK for third-party API service, integrated it to existing data pipelines on Google Cloud Platform, simplified data team messaging workflow.</li> <li>Refactored Terraform module for scalable access control on cloud service, wrote Bash script for automated module deployment, migrated 1k+ Google Secret Management resources.</li> </ul> |                      |
| <b>Johns Hopkins School of Public Health</b>   | Baltimore, MD        |
| <b>STUDENT INTERN, CHILD AND ADOLESCENT HEALTH MEASUREMENT INITIATIVE</b>  | Jan 2020 - Aug 2021  |
| <ul style="list-style-type: none"> <li>Collected, cleaned, and input annual national child health survey data into SPSS database.</li> <li>Created codebook in SPSS, SAS, Stata to generate summary statistics and visualizations to describe the data on the Data Resource Center for Child &amp; Adolescent Health dashboard.</li> </ul>   |                      |

## Outreach

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| 2024-     | <b>Harvard Prospective Ph.D. &amp; RA Event in Psychology (PPREP) Program</b> , Mentor      |
| 2022-2023 | <b>Women Mentoring Whiting at Johns Hopkins Whiting School of Engineering</b> , Mentor      |
| 2021-2023 | <b>Mentorship Program at Johns Hopkins Omega Psi Cognitive Science Society</b> , Mentor     |
| 2020-2021 | <b>Johns Hopkins University Counseling Center</b> , Counseling Center Advisory Board Member |

## Skills

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**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

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**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