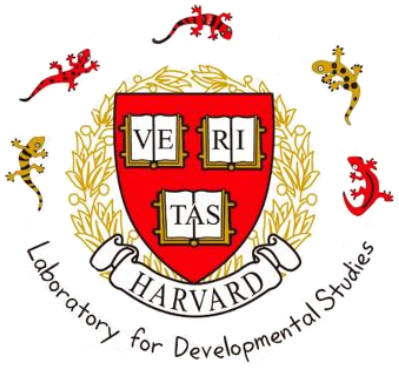
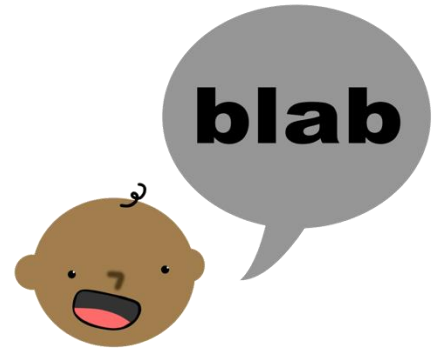




Experience Shapes Early Noun Comprehension from 8-18 Months

The Roles of Word Frequency and Referent Familiarity

Lily Zihui Zhu, Evgenii Kalenkovich, Yuzhen Dong, Lillianna Righter, and Elika Bergelson

BUCLD, November 8, 2025

Characterizing word learning experience

(concrete nouns, specifically)

Word form

"dog"

Referents

Your dog

Unfamiliar, typical dog

Unfamiliar, less typical dog

Word frequency
(exposure to word forms)

Referent familiarity
(exposure to specific referents)

How does everyday experience with specific **word forms** and **referents** link up with early word learning?

Research questions

How do **word frequency** and **referent familiarity** influence infants' real-time word comprehension from 8-18 months?

Word frequency

- Learner needs exposure to word form to infer its meaning

- Predicts word learning outcome
  - Evidence from CDI comprehension/production (e.g., Braginsky et al., 2019; Swingley & Humphrey, 2018) and age of acquisition (Ambridge et al., 2015; Goodman et al., 2008)
  - **Evidence from real-time processing over development?**
    - Influences real-time processing in adults (e.g., Dahan et al., 2001; Magnuson et al., 2007)
    - Limited evidence with 2-yo's (Potter & Lew-Williams, 2024), little with infants

Research questions

How do **word frequency** and **referent familiarity** influence infants' real-time word comprehension from 8-18 months?

Can we find converging evidence for word frequency effects on word learning outcomes, using a real-time processing task?

Semantic representations

Word form → **Conceptual category** → **Extension to different exemplars**

I. Broad scope
Conceptual category

"dog" → DOG

Your dog

Unfamiliar,
typical dog

Unfamiliar,
less typical dog

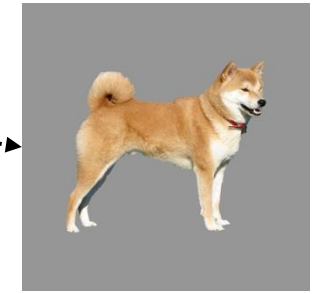
Semantic representations

Word form → **Conceptual category** → **Extension to different exemplars**

II. Narrow scope
Specific referents

"dog" — DOG

Your dog

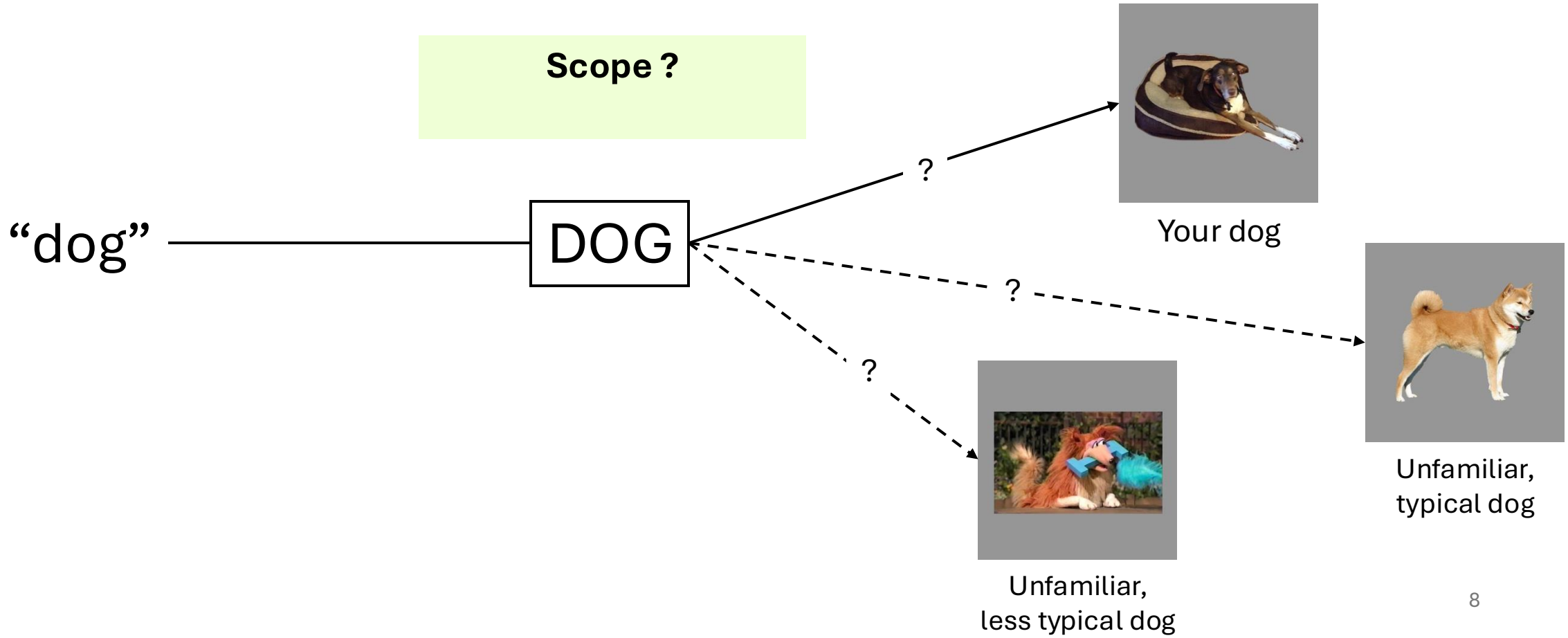


Unfamiliar,
typical dog

Unfamiliar,
less typical dog

Semantic representations

- Manipulating referent familiarity



Research questions

How do **word frequency** and **referent familiarity** influence infants' real-time word comprehension from 8-18 months?

Can we find converging evidence for word frequency effects on word learning outcomes, using a real-time processing task?

Are infants better at extending nouns to familiar than to unfamiliar referents, and how might this change over time?

Study design

Study 1:
Longitudinal
SEEDLingS

Study 2:
Cross-Sectional
Control

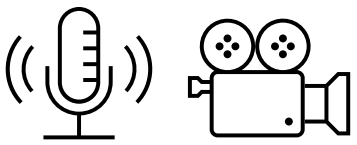
SEEDLingS infants' age in months

Study 1:
Longitudinal
SEEDLingS

- n = 44
- Part of a yearlong longitudinal study of word learning (6-18 mos.)
- Collected ~2015 in Rochester, NY
- Primarily White, mid/high-SES

6 7 8 9 10 11 12 13 14 15 16 17 18

Study 1:
Longitudinal
SEEDLingS



Monthly recordings (Bergelson, 2017; Bergelson et al., 2018)

- 6-17 mos.
- Daylong audio
- Hourlong video
- All nouns were annotated (Kalenkovich et al., 2025)

Study 1:
Longitudinal
SEEDLingS

Looking-while-listening eyetracking experiments every two months

- Assessing noun comprehension
- 6x in total (at mos. 8, 10, 12, 14, 16, 18)
- **Hand-picked** stimuli from each infant's home recordings

6 7 8 9 10 11 12 13 14 15 16 17 18

Study 1:
Longitudinal
SEEDLingS

Example: **eyetracking stimuli** for one infant at 14 mo.,
selected based on their home recordings at 12 & 13 mos.

	Month 12 home visit		**Month 13 home visit**	
	Audio recording	Video recording	Audio recording	Video recording
Select high-frequency nouns (n = 2 from each recording)	drum, shoe	egg, cow	ball, hand	water, baby

6 7 8 9 10 11 12 13 14 15 16 17 18

Study 1:
Longitudinal
SEEDLingS

Example: **eyetracking stimuli** for one infant at 14 mo.,
selected based on their home recordings at 12 & 13 mos.

	Month 12 home visit		**Month 13 home visit**	
	Audio-Nouns	**Video-Nouns**	**Audio-Nouns**	**Video-Nouns**
Select high-frequency nouns (n = 2 from each recording)	drum, shoe	egg, cow	ball, hand	water, baby
Select corresponding images	 	 	 	 

6 7 8 9 10 11 12 13 14 15 16 17 18

Study 1:
Longitudinal
SEEDLingS

Example: **eyetracking stimuli** for one infant at 14 mo.,
selected based on their home recordings at 12 & 13 mos.

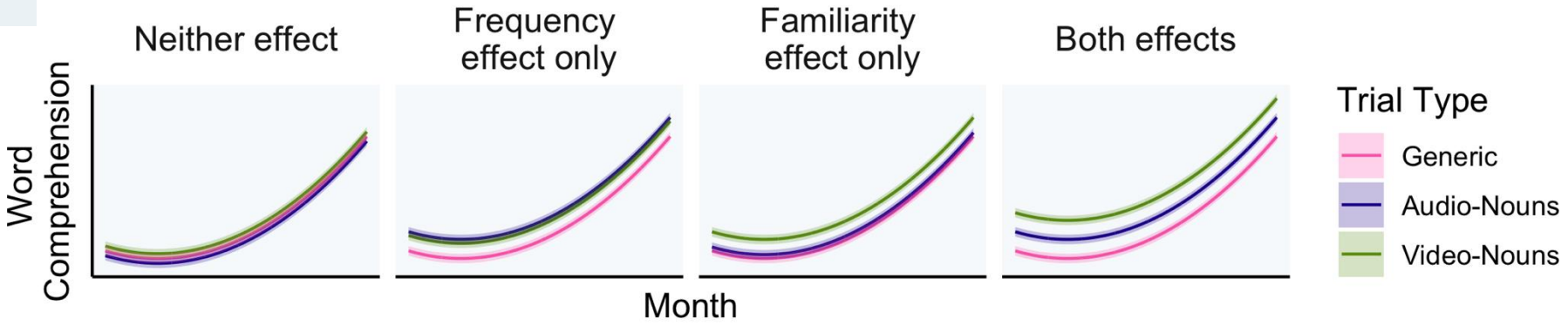
Generic	Audio-Nouns	Video-Nouns
Shown to all infants at 14 mo.	Hand-picked for each child	Hand-picked for each child
Predetermined list of nouns	High-frequency nouns from audio recordings	High-frequency nouns from video recordings
Unfamiliar images from lab database	Unfamiliar images from lab database	Familiar images from video recordings
8 words, 4 yoked pairs e.g., door-leg	4 words, 2 yoked pairs e.g., drum-shoe	4 words, 2 yoked pairs e.g., egg-water
		

6 7 8 9 10 11 12 13 14 15 16 17 18

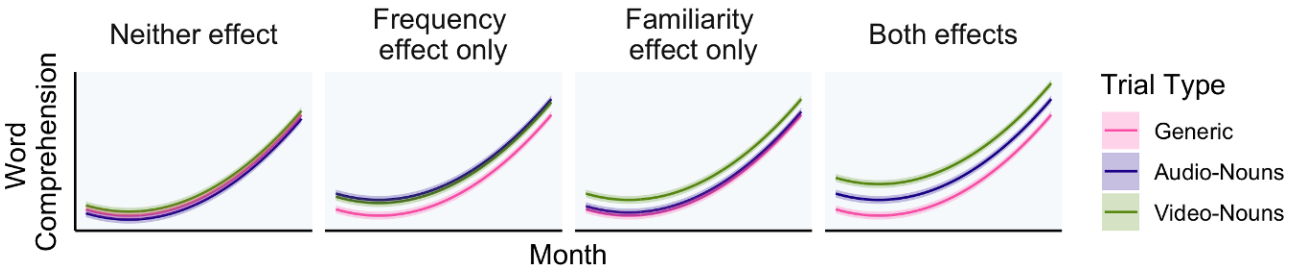
Study 1: Longitudinal **SEEDLingS**

	Generic (unfamiliar words + unfamiliar images)	Audio-Nouns (familiar words + unfamiliar images)	Video-Nouns (familiar words + familiar images)
Word frequency	Less frequent	More frequent	More frequent
Referent familiarity	Unfamiliar, prototypical	Unfamiliar, prototypical	Familiar, hand-picked for them

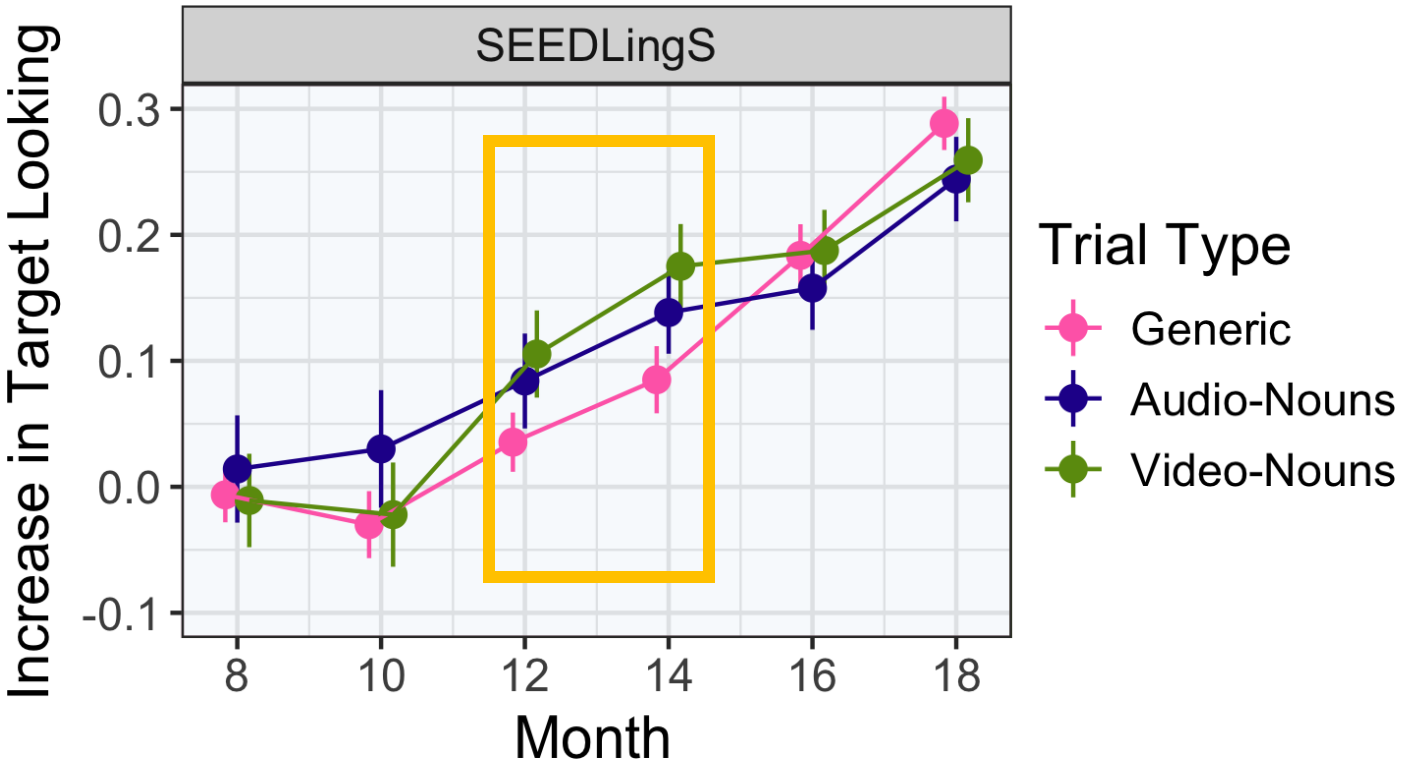
Predictions



Analysis I: SEEDLingS



- Compare across trial types



Best fitting reduced model:

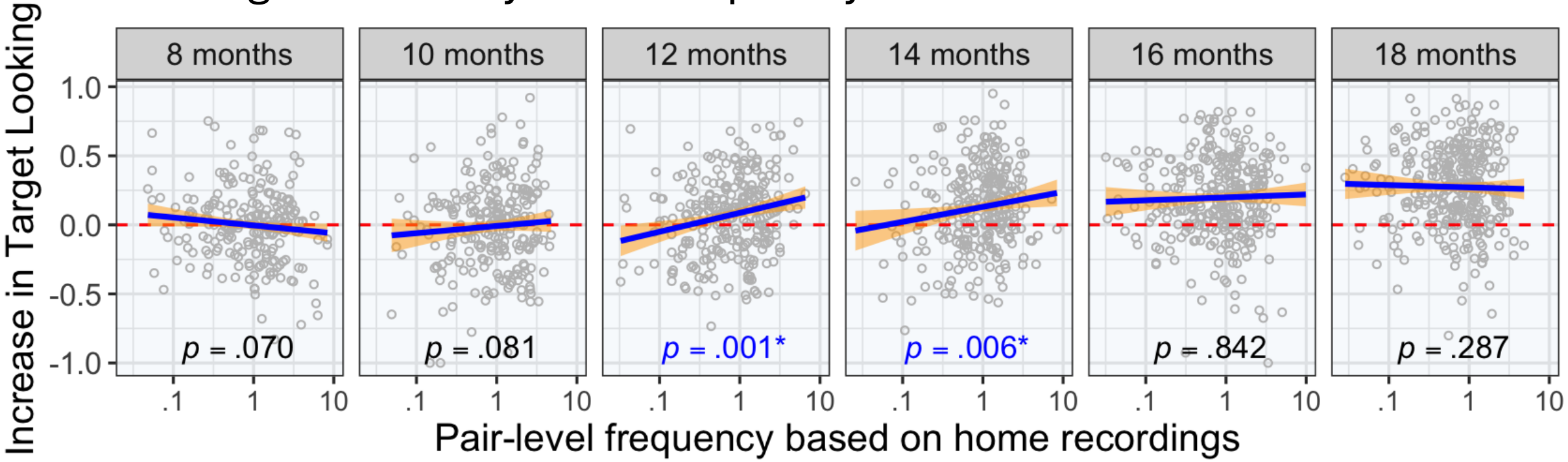
Looking ~

$Age + Age^2 + TrialType + TrialType \times Age^2 + (1|Subj)$

- Sig. age & age^2 (*ps* < .01)
- Sig. trial type (generic vs. others, *ps* < .05)
- **Sig. trial-type × age^2 interaction (*ps* < .05)**

Analysis I: SEEDLingS

- Finer-grained analysis on frequency effects



Best fitting reduced model:
Looking ~ LogFreq × (Age + Age²) + (1|Subj)

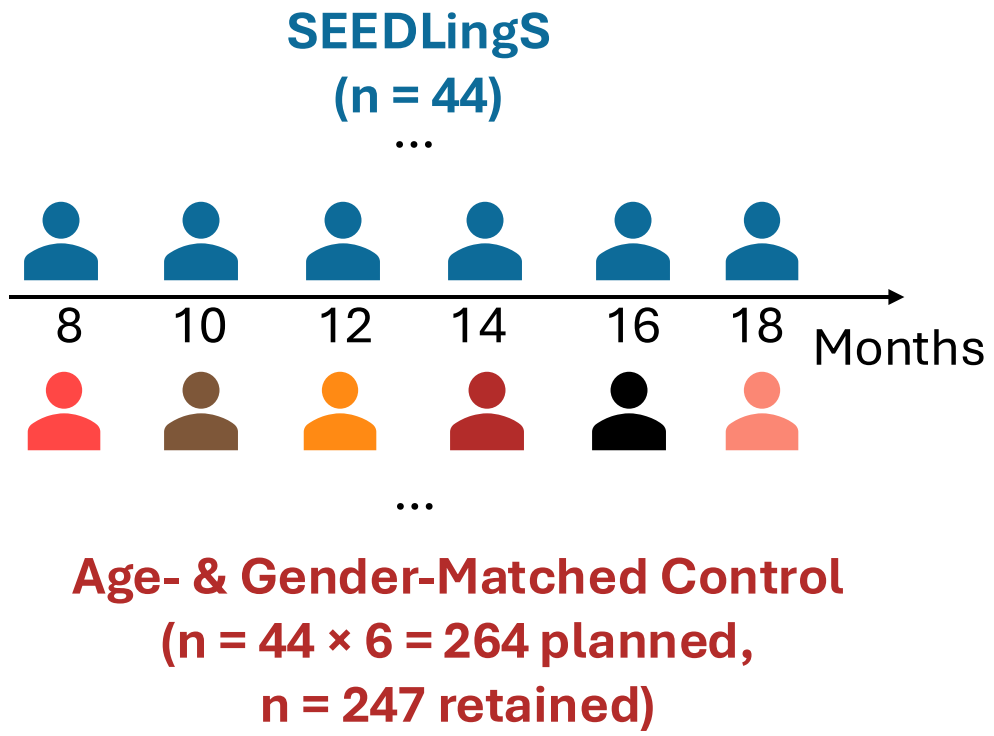
- Sig. age & age² (*p*s < .001)
- Sig. log-frequency (*b* = .027, *p* < .001)
- **Sig. log-frequency × age² interaction (*b* = -.025, *p* < .001)**

Study design

1. Familiarity with in-lab testing?
2. Properties of hand-picked items?

Study 1:
Longitudinal
SEEDLingS

Study 2:
Cross-Sectional
Control

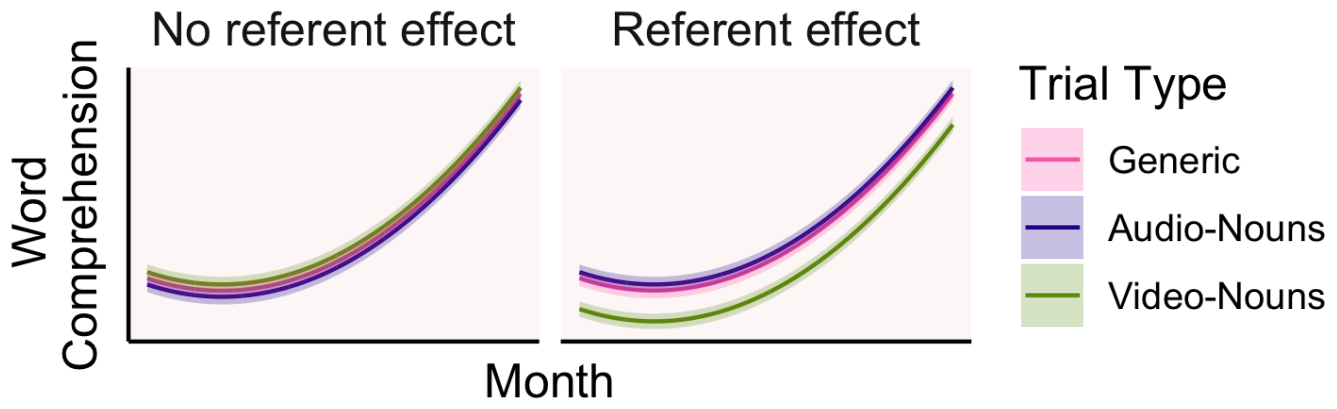


6 7 8 9 10 11 12 13 14 15 16 17 18

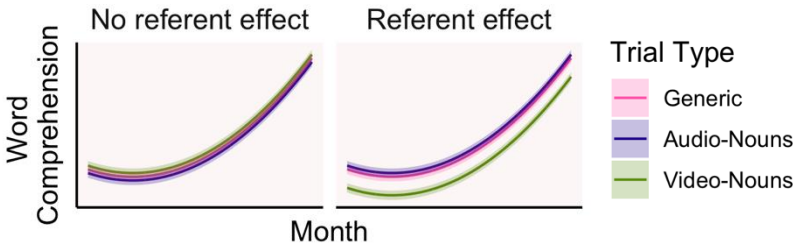
Study 2: Cross-Sectional **Control**

	Generic (unfamiliar words + unfamiliar images)	Audio-Nouns (unfamiliar words + unfamiliar images)	Video-Nouns (unfamiliar words + unfamiliar images)
Word frequency	Similar in frequency		
Referent familiarity	Unfamiliar, prototypical	Unfamiliar, prototypical	Unfamiliar, hand-picked for others

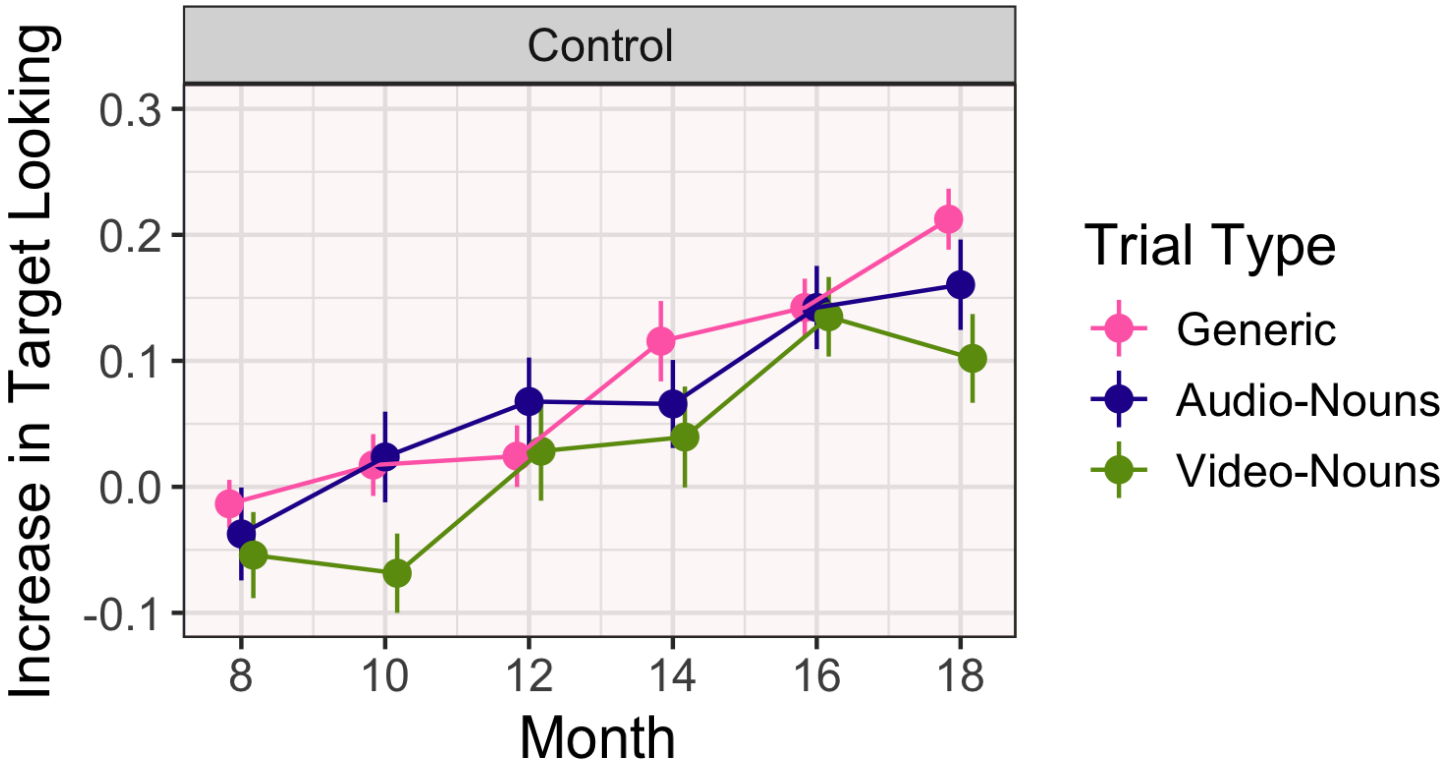
Predictions



Analysis II: **Control**



- Compare across trial types



Best fitting reduced model:
Looking ~
Age + *TrialType* + *(1|Subj)* + *(1|TestPair)*

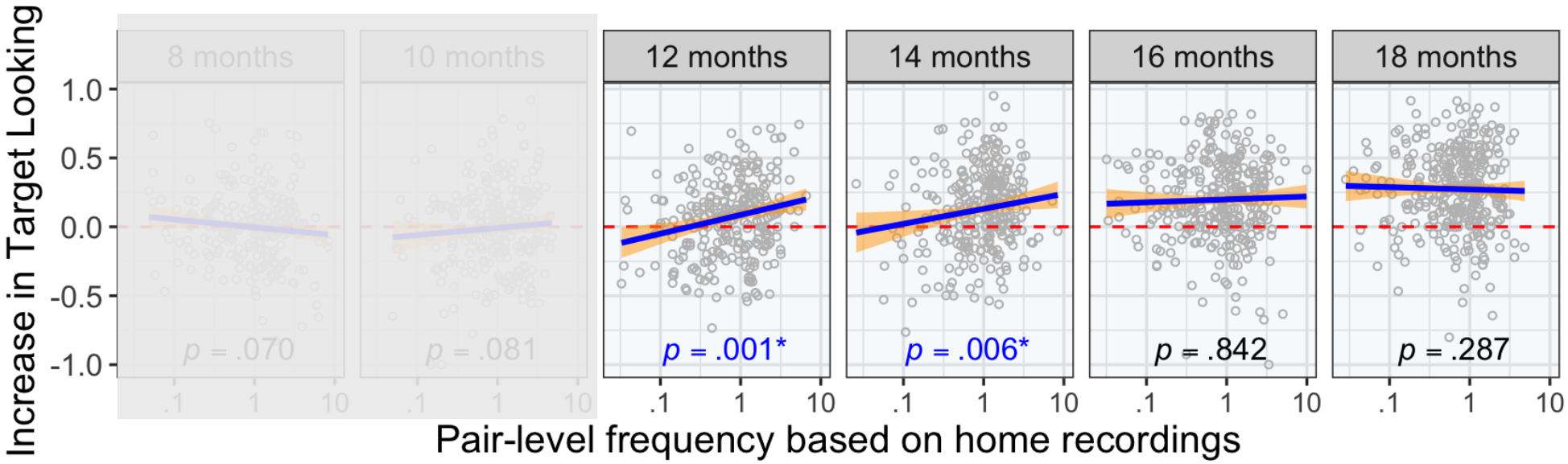
- Sig. age ($p < .001$)
- Sig. contrast between **Video-Nouns** and other trials ($p = .014$) but not between **Audio-Nouns** and other trials ($p = .50$)
- No trial-type × age interaction

Are **SEEDLingS** children better at the task?

No, both **SEEDLingS** and **Control**:

- Similar amounts of retained data
- Similar performance on **Generic** items (after controlling for CDI)

Discussion: Word frequency



Infants' noun input is stable within children across months (Bergelson & Aslin, 2017; Rowe, 2008)

➔ Older infants (16-18mos.) are better, more efficient learners.

Meylan & Bergelson, 2022; Bergelson, 2020

Discussion:
Scope of early semantic representations

I. Broad scope
Conceptual category

"dog" — DOG

SEEDLingS participants could extend words to both familiar and novel referents.

Your dog

Unfamiliar, typical dog

Control participants were worse at recognizing unfamiliar referents hand-picked for others.

- Adults were slower at recognizing these hand-picked items → Typicality?

Unfamiliar, less typical dog

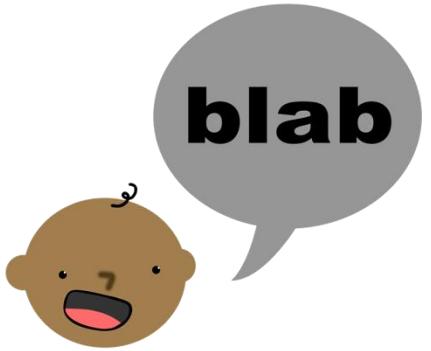
Discussion: Category learning

What kinds of early experiences help infants form broad categories (semantic, conceptual, or perceptual)?

Future direction:

- Further analyses of naturalistic recordings of infants' everyday experiences
- E.g., visual features of natural kinds, e.g., exemplar variability (e.g., Perry et al., 2010; Twomey et al., 2014; Quinn et al., 1993)

Check out our preprint!



Thank you!

SEEDLingS staff:

- Andrei Amatuni
- Shannon Egan-Dailey
- Hallie Garrison
- Sharath Koorathota
- Shaelise Tor

Experience shapes real-time noun comprehension from 8-18 months

Word form

"dog"

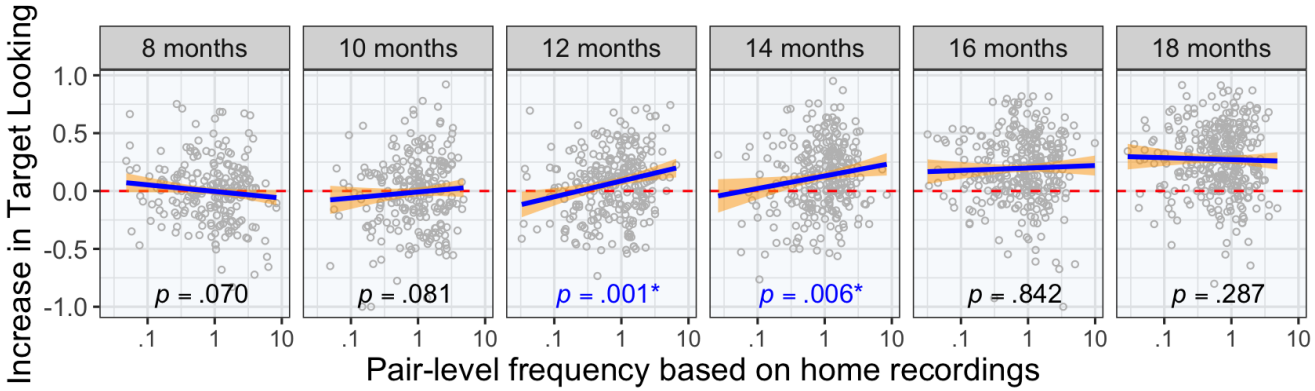
Referents

Your dog

Unfamiliar, typical dog

Unfamiliar, others' dog

Word frequency (exposure to word forms)
Word frequency significantly predicted comprehension **only at 12&14 months**, but not before or after.



Referent familiarity (exposure to specific referents)
Infants extended nouns **equally well to familiar and unfamiliar referents** from 8-18 months, though not to those hand-picked from others' experiences.