# Novel noun learning during naturalistic picture book reading in 14-, 18-, and 22-month-olds

Where do new words come from?

Kristen Gilyard & Elika Bergelson

# Where do new words come from?

# How much and what kind of input promotes word learning?

That's so colorful!

Ball!

Ball, ball, ball


See the ball!

# What does it take to learn a new word at different ages in toddlerhood?



# Infants' + Toddlers' Early Abilities

**~ 6 Months**

- Detect patterns in native language
- Start understanding common words

**~ 12 Months**

- Begin to produce words
- Comprehension Boost

**2nd year**

- Use words + gestures
- Start combining words

e.g. Bergelson, 2020; Bergelson, 2019, Weisleder & Fernald, 2013, Laing & Bergelson, 2020; Vihman et al., 2014; Frank et al., 2021; Fenson et al., 1994; Benedict, 1979; Xu et al., 1999, inter alia

# How much and what kind of input promotes word learning?

Naturalistic studies

- Increasing word learning over time
- Relatively stable input quantity

But: hard to capture all exposure!

**Current Project**

Controlled exposure to set of new words for 14-, 18-, and 22-mos

Lab-based studies

- Learn with varied recurrence rates
- Learn with interval and block practices

But: learning is fragile and short-lived…

e.g. VanDam et al., 2016; Bergelson et al., 2019; Hansen & Markman, 2009; Mather & Plunkett, 2009; Bion et al., 2013; Childers & Tomasello, 2002; Schafer & Plunkett, 1998; Fenson et al, 1994; Bergelson, 2020; Schwartz & Terrell, 2008; inter alia

# Shared Book Reading: New but Old Method

Creates a naturalistic setting for word learning that incorporates **joint attention**, **clear object naming**, **interactive responses**, and **word repetition**.

Extensions beyond the book

- Builds connections to familiar items
- Reinforce word learning

e.g. Weitzman et al., 2004; Mendelsohn et al., 2001; Dowdall et al., 2020; Colmar, 2014; Noble et al., 2020; Noble et al., 2019; Zuckerman & Khandekar, 2010; Montag et al., 2015; Flack et al., 2018, inter alia

# Current Questions

1. Can toddlers learn new words in two weeks?
2. If they can, what aspects of the input facilitate this learning?

How does age contribute to this story?

**Current Project**

e.g. VanDam et al., 2016; Bergelson et al., 2019; Hansen & Markman, 2009; Mather & Plunkett, 2009; Bion et al., 2013; Childers & Tomasello, 2002; Schafer & Plunkett, 1998; inter alia

# Methods

<u>Procedure:</u>

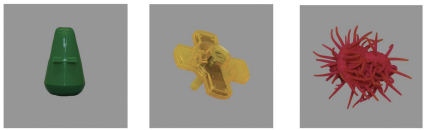
Caregivers recorded book-reading sessions 2/day for 2 weeks

- The short picture book contained three novel word/object pairing: “shang”, “blick”, and “dax”.
- Each appeared in differing positions and sizes



For each word:

9x/read-through * 14 days * 2x/day = 252 exposures



Recordings annotated for child & parent speech

Following 2-week exposure, toddlers returned to the lab for eyetracking tasks

# Methods

Participants: 32 caregiver-child dyads

- 14-month-olds (n = 7)
- 18-month-olds (n = 10)
- 22-month-olds (n=15)

In total:

~ 2,688 minutes of data for this collection

*Data collection still in progress

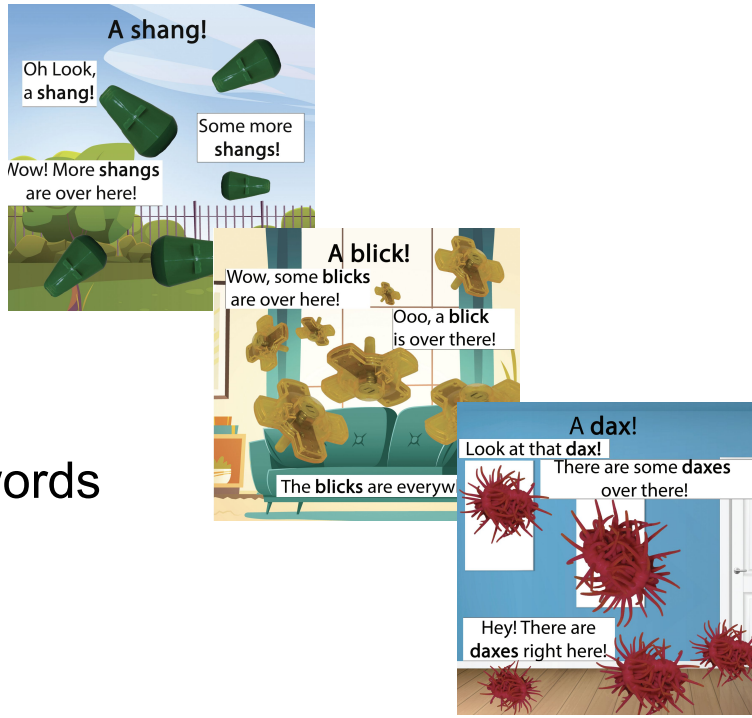
# Annotation Process

Broad tally for variables:

Input:

- **#** of times **caregivers say each target word** (Shang, Blick, and Dax)
- **#** of caregivers **extensions** beyond book

Main outcome: **children's production** of target words



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# Do the toddlers produce the words at all?

<u>Yes and No</u>

22-mos produced the words

- ~90% of 22-mos produced 1 word after 1 week
- ~50% of 22-mos produced all 3 words

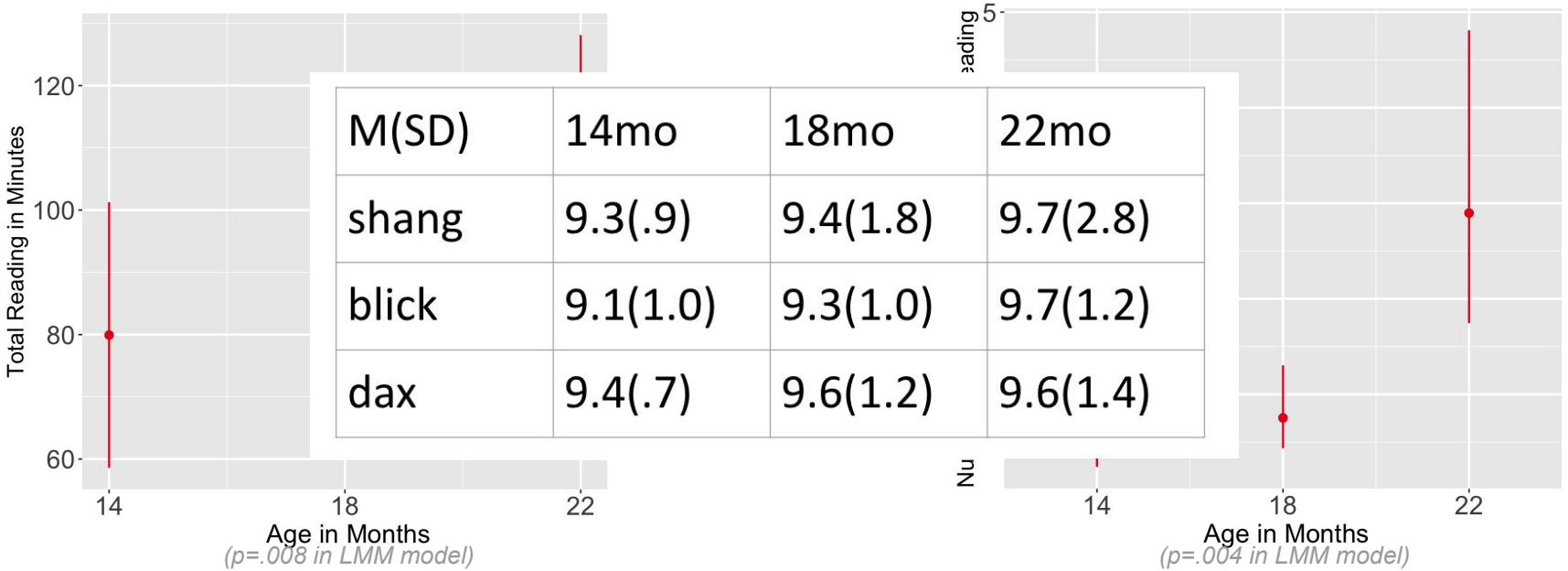
18-mos somewhat produced the words

- ~40% of 18-mos produced a new word

14-mos did not really produce the words

- Only ~14% of 14-mos produced a new word

# Do caregivers read differently for different age groups?



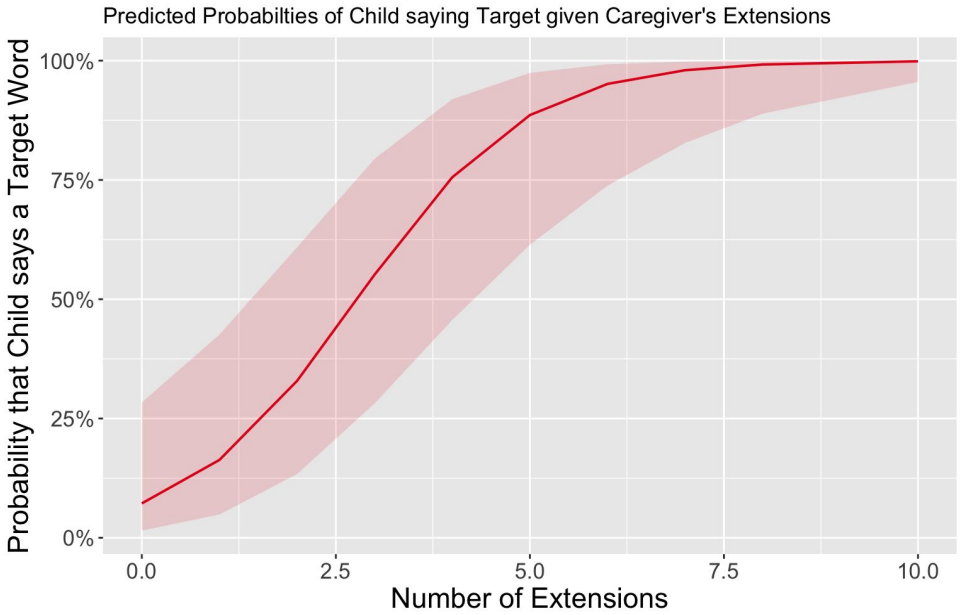

| M(SD) | 14mo | 18mo | 22mo |
|---|---|---|---|
| shang | 9.3(.9) | 9.4(1.8) | 9.7(2.8) |
| blick | 9.1(1.0) | 9.3(1.0) | 9.7(1.2) |
| dax | 9.4(.7) | 9.6(1.2) | 9.6(1.4) |

- On average, caregivers said each target word ~9 times per session
- 22 month olds hear ~40 more minutes of book reading than 18 or 14mo.
  - 22mo hear ~3x as many extensions per reading as 18 or 14mo.

# Do the # of caregiver extensions predict toddler's word production?

So far: Yes! As the number of caregiver's extensions increased, the probability that the child said the target word increased significantly

(p = 0.005 in our logistic mixed effects model)



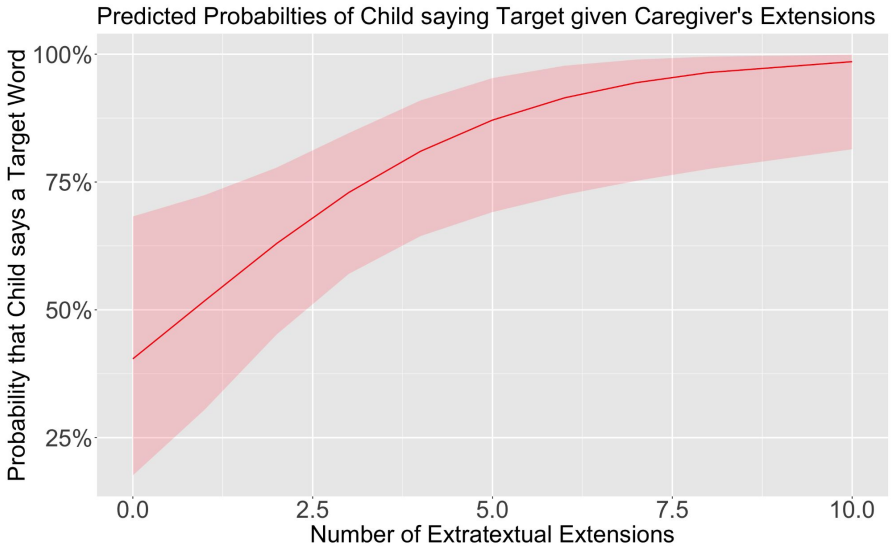

*Logistic MEM: child_says_target ~ extensions_number*age + (1|child)*

# Do the # of caregiver extensions predict word production for JUST 22-mos?

So far: Yes!

Within 22-mos, as the number of caregiver's extensions increased, the probability that their child said the target word increased significantly

(p = 0.012 in our logistic mixed effects model)




*Logistic MEM: child_says_target ~ extensions_number + (1|child))*

# What about word learning in the younger age groups?

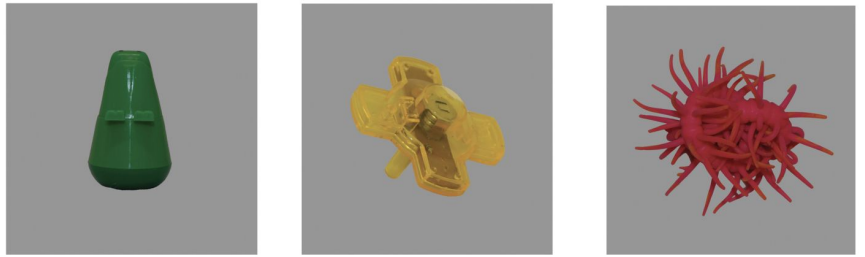



e.g. Bergelson, 2020; Laing & Bergelson, 2020; Vihman et al., 2014; Frank et al., 2021; Fenson et al., 1994; Benedict, 1979; Xu et al., 1999, inter alia

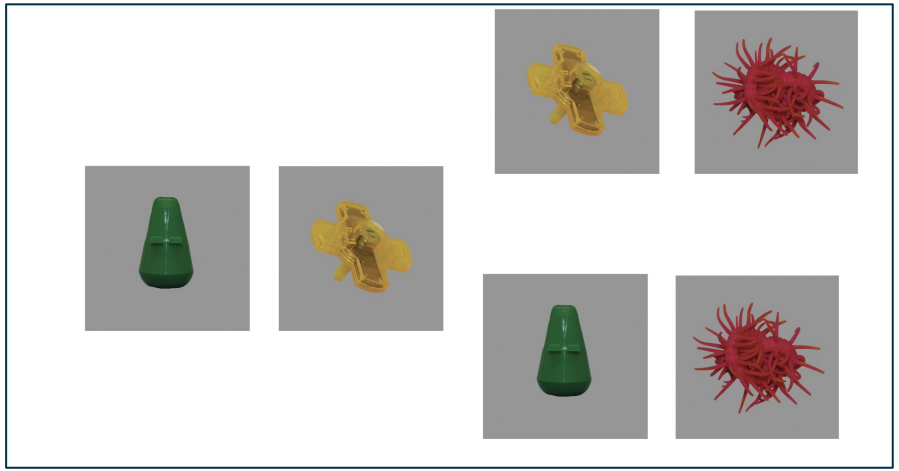
# How do infants learn new words?

Shang, Blick, and Dax

Bergelson Lab



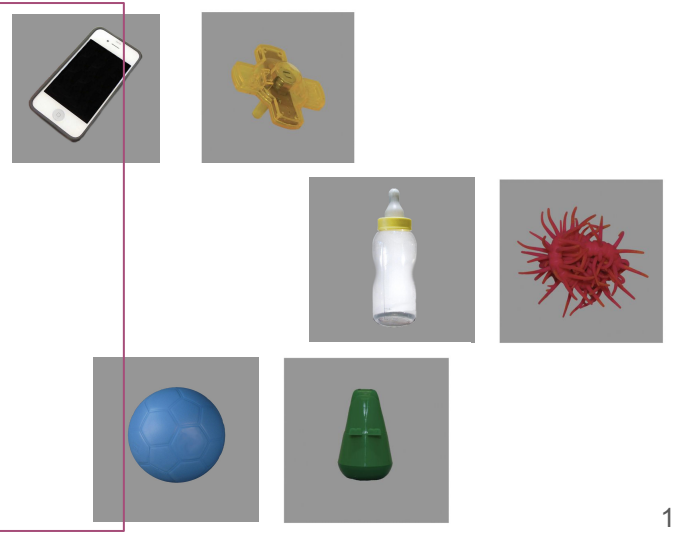
# Methods



Procedure:

Looking-While-Listening Task

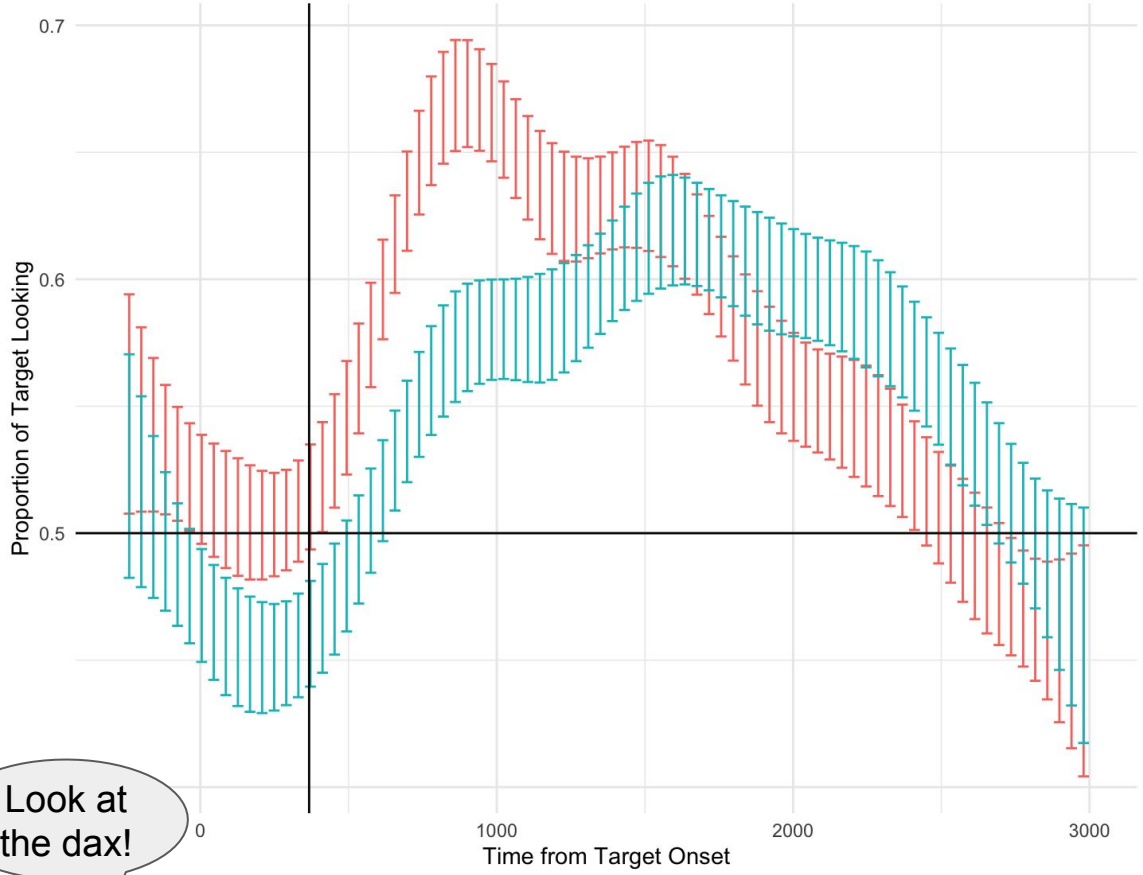
- 3 warm-up trials
- 12 **novel-novel** trials (shang/blick, shang/dax, dax/blick)
- 12 **novel-familiar** trials (ball/shang, bottle/dax, phone/blick)



# Did toddlers look at the target, and did this differ by age?

**Target**

**Other Item**

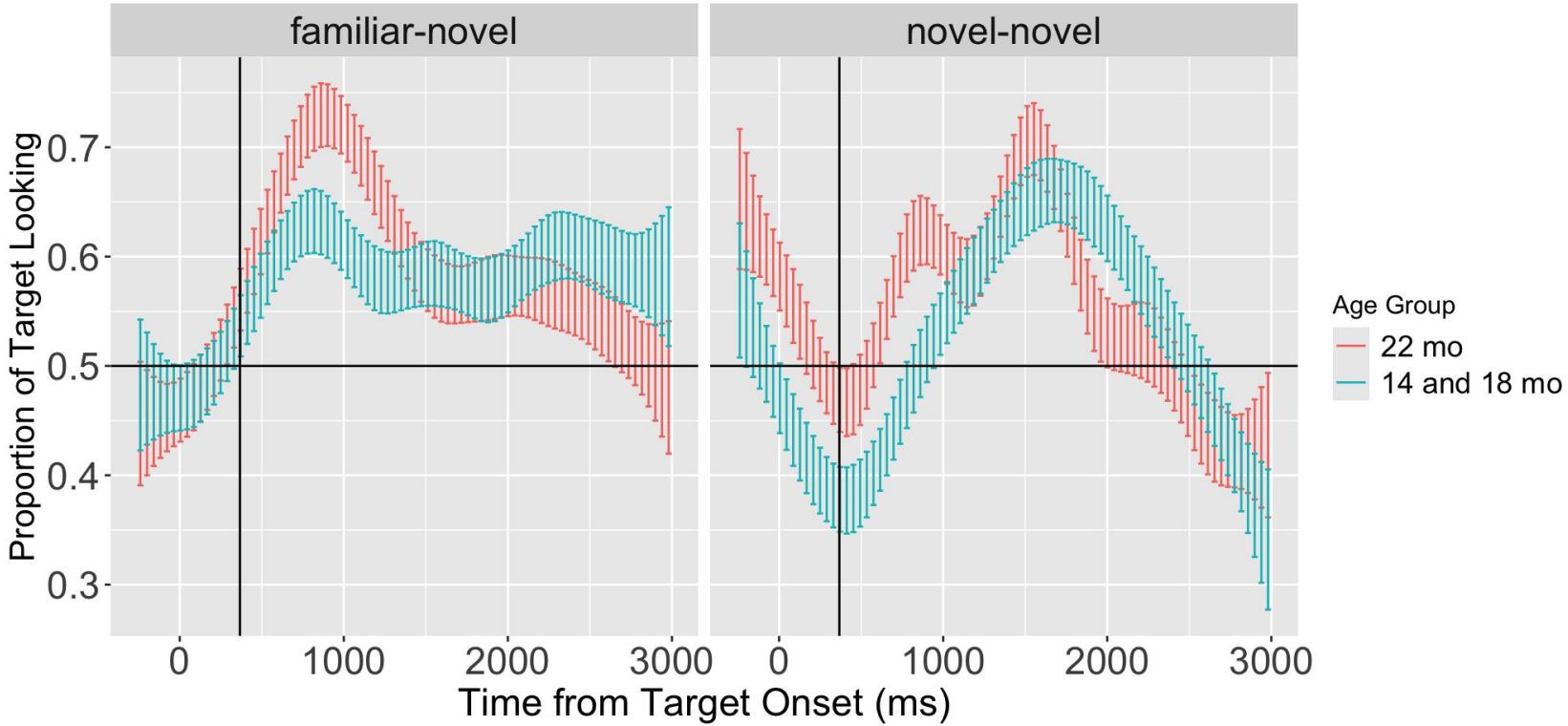



Look at the dax!

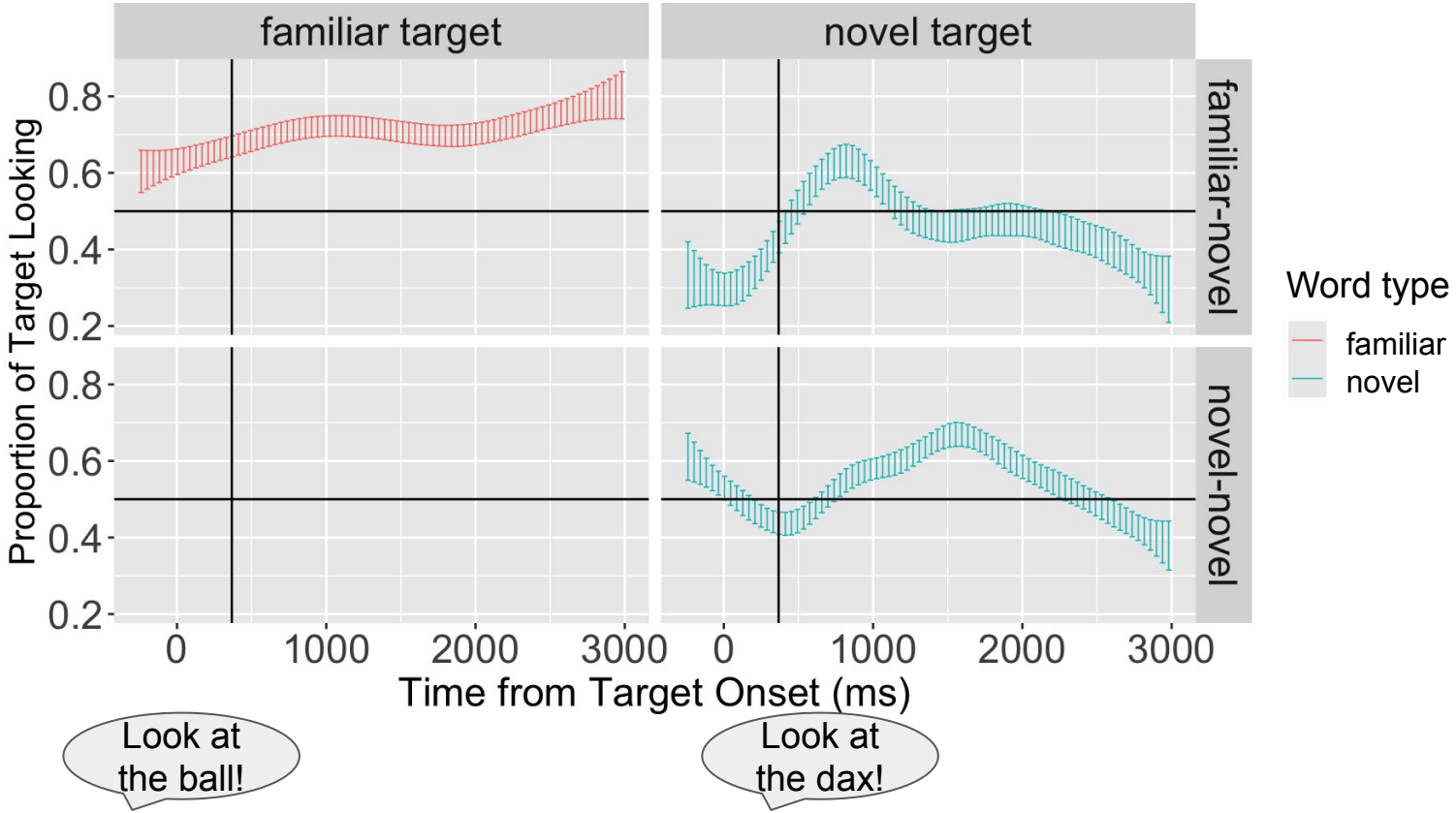
# How do results differ in the familiar-novel condition versus novel-novel condition?

Target

Other Item

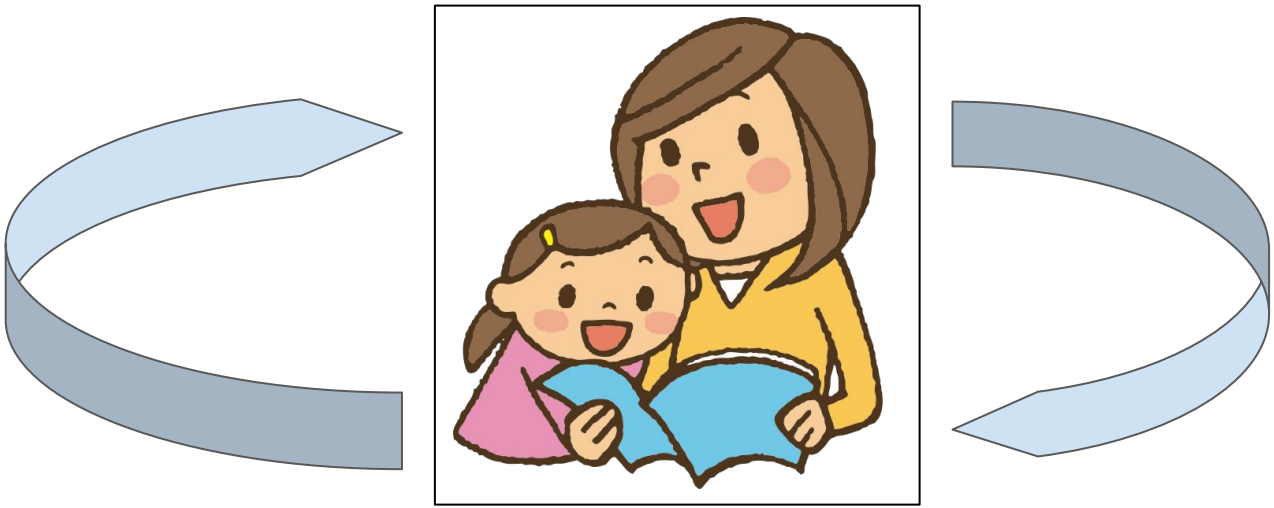


# How do these results differ by target type?



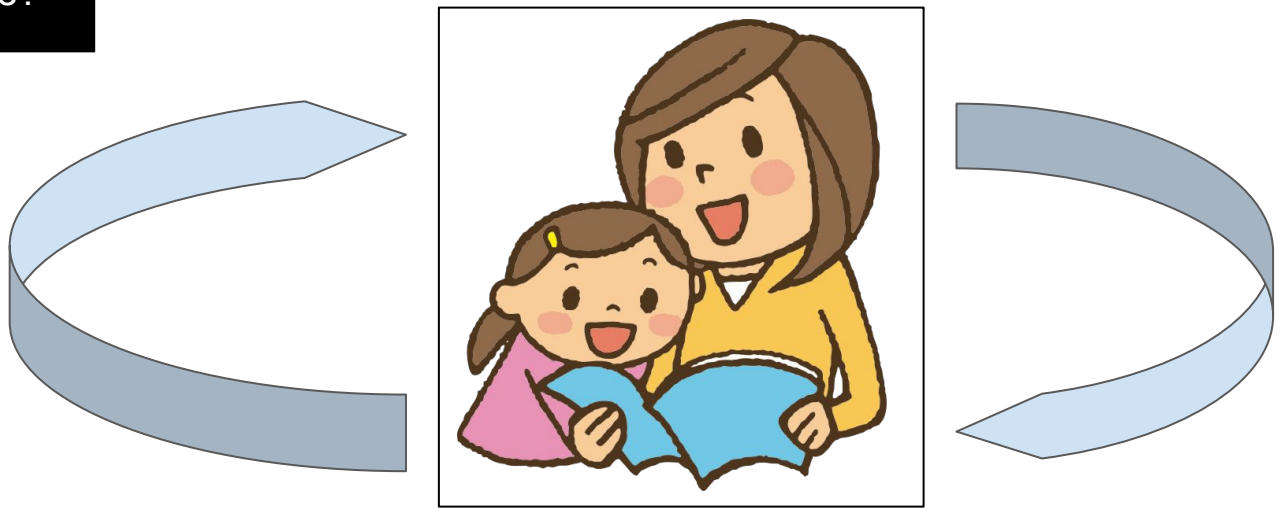
# Still to do:

Link the aspects of book reading (such as caregiver extensions) to toddlers' overall word comprehension



# Discussion: What is driving the relationship between caregivers' reading and children's learning?

3rd variable?

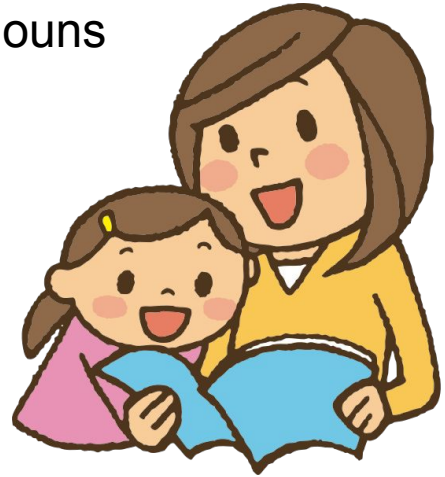


**Causality is hard, ask me more!**

# Conclusions: What does it take to learn a new word?

- For 22-month olds, 252 instances over 2 weeks was enough exposure to learn and produce a few novel nouns
  - Extensions predicted spontaneous word production

- Ongoing work will give a more fine-grained look at word learning across 14- and 18- and 22-mo's



The Bergelson Lab!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Stephanie Zaragoza

RA/Coder:
Teagan Crye

All the wonderful families!

IASCL

Questions? Comments? Email: kristen_gilyard@g.harvard.edu

# How do these results differ by item?

Pairs:

phone/blick

bottle/dax

ball/shang

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