# WORD LEARNING IN TYPICAL & ATYPICAL DEVELOPMENT

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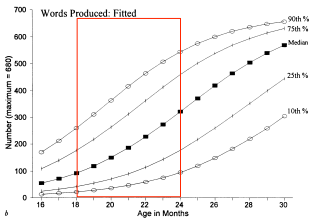
## RESEARCH OVERVIEW

- Parental gestures in infant word learning
- Longitudinal study of late talkers (in progress)

## PARENTAL GESTURES IN WORD LEARNING

## GESTURE STUDY: BACKGROUND




Expressive vocabulary in 16–30 month olds (Fenson et al., 1994)

## GESTURE STUDY: BACKGROUND


## GESTURE STUDY: HYPOTHESES

- Parents will offer more gestural cues (esp. deictic) when faced with more potential referents during word learning
- Parents will offer more speech + gesture cues (esp. speech containing target label) when faced with more potential referents during word learning
- Infants of parents who offer more of these cues will show higher accuracy when tested on their knowledge of the new words

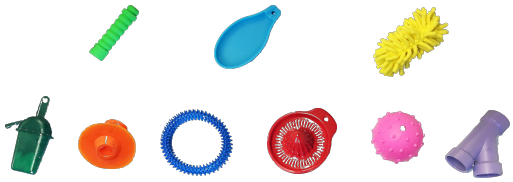
## METHOD: PARTICIPANTS

- 53 parent-infant dyads recruited aged 18–24-mos.
- Monolingual English, middle-level SES, from Babylab
- Completed UK-CDI (expressive, receptive, gestures)
- N=47 completed training trials
  (M=20.9 mos.; SD=1.7; 25 female)
- N=27 completed testing trials
  (M=20.8 mos.; SD 1.6; 14 female)

## METHOD: STIMULI

3 novel target words: darg noop terb

9 novel objects: 3 targets, 6 foils



## METHOD: TRAINING TRIALS

One referent: (target) **terb**

terb

Two referents: (1 target + 1 foil) **darg**

darg

Six referents: (1 target + 5 foils) **noop**

noop

## METHOD: VIDEO CODING TRAINING

- Video recorded and coded per utterance (Rowe et al. 2008)

| Cue type | Description |
|---|---|
| Deictic gesture | Singles out target referent |
| Representative gesture | Properties of referent |
| Complementary speech + gesture | Singles out target referent |
| Supplementary speech + gesture | Properties of referent |

- 20% second coded (IRR $\kappa$ = 0.78 for gesture, N = 284; $\kappa$ = 0.86 for speech with gesture, N = 160)

## ANALYSIS: TRAINING TRIALS

- Linear mixed effects models used → prediction of parental gestures during training
  - Fixed effects: condition + child CDI vocabulary scores (expressive & gesture subscales)
  - Random effect: parent
  - ANOVAs comparing each model to null or best-fitting (Barr et al., 2013)

## TRAINING RESULTS: GESTURES

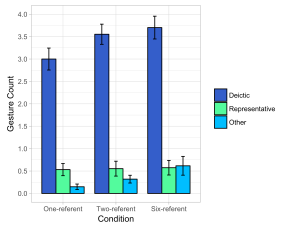



Figure 1.
Mean count & standard error: gesture type per condition

- Main effect of **condition** ($\chi^2(2)=8.35$, $p=.015$) in **deictic** cues:
  - Significant difference between **one-ref v. two-ref (p=.030)**, and **one-ref v. six-ref (p=.006)**
  - No significant difference between **two-ref v. six-ref (p=.550)**

## TRAINING RESULTS: SPEECH + GESTURE

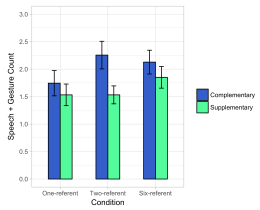



Figure 2.
Mean count and standard error: speech + gesture type per condition

- Main effect of **condition** + **expressive** vocab + **symbolic gesture** ($\chi^2(4)=10.03$, $p=.034$) in **comp. speech + gesture**:
  - Significant difference between **one-ref v. two-ref (p=.012)**
  - No significant difference between **one-ref v. six-ref (p=.096)**, or **two-ref v. six-ref (p=.375)**

## METHOD: TESTING TRIALS

*"Where is the [x]? Can you see the [x]? Point to the [x]"*

1: terb

2: noop

3: darg

## TESTING RESULTS: ACCURACY

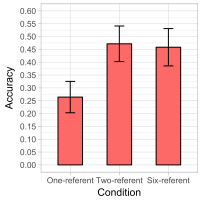



Figure 3.
Mean infant accuracy and standard error per condition (testing trials)

- Main effect of **condition** ($\chi^2(2)=6.08$, $p=0.048$)
  - Significant difference between **one-ref v. two-ref (p=.028)** and **one-ref v. six-ref (p=.044)**
  - No significant difference between **two-ref v. six-ref (p=.893)**

## GESTURE STUDY: DISCUSSION

- Parents offered more cues with more referents, BUT significant only from one referent → more than one
  - Does gesture reduce cognitive load? (Goldin-Meadow & Wagner, 2005)
- Infants learnt best in two-referent condition
  - Variability of cues (Monaghan, 2017)
- No translation of training to infant word learning – why?
  - No effect?
  - Sample-related (SES; McGregor, 2009)
  - Experimental design (how patient is a toddler?)

## GESTURE STUDY: CONCLUSIONS

- Parental gesture use can be manipulated by altering the environment surrounding word learning
- Parents use gesture according to presence, rather than degree of referential uncertainty
- Infants learnt best with some referential uncertainty
- Future directions:
  - Timing of gesture
  - Improvement to testing trials
  - Possible 'enforced' condition of pointing

## LEARNING MECHANISMS IN LATE TALKERS

## LT STUDY: BACKGROUND

Definition: between 18–35 mos old
- ≤10th percentile in expressive vocab in absence of any other disorder
- Receptive skills – differ across studies (Roos & Ellis-Weismer, 2008)

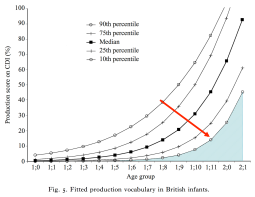


Fig. 5. Fitted production vocabulary in British infants.

Why investigate late talkers?
- Most catch up but still score lower as a group on language measures
- 17% → SLI/DLD (Reilly et al. 2010)
- Reduce burden on SLT/improvement of SES outcomes

Are there factors that can predict outcome in our sample?

Figure from Hamilton, Plunkett & Schafer (2000)

## LT STUDY: BACKGROUND

Predictors of outcomes: Fisher (2017)
- Expressive vocab size (6%)
- Receptive language skills (12%)
- SES (1%)

LTs may be relying on different strategies than TDs during word learning: (process > product of language learning)
- Less able to use syntactic information to build vocab (Moyle et al. 2007)
- Reduced comprehension & production of novel words (Weismer et al. 2013)
- Less able to segment speech (Fernald & Marchman, 2012)

## LT STUDY: RESEARCH QUESTIONS

- Can performance on a cross-situational word learning task at age 2 predict language outcomes at age 3.5?
- Can speech segmentation and generalisation ability at age 2 predict language outcomes at age 3.5?
- [Is there a difference between TDs and LTs in symbolic skills?]
- Are there differences in word learning that are related to social ability in LTs?
- Predictions

## LT STUDY: DESIGN

A **longitudinal study** comparing **LTs versus TDs** on **word learning and symbolic understanding tasks**

Inclusion criteria:
- LT (≤10th percentile CDI) or TD (≥25th percentile CDI)
- 24–28-months-old
- Monolingual

Exclusion criteria:
- Developmental delay
- Neurological or sensory deficits (including auditory and visual deficits)

## LT STUDY: SPEECH SEGMENTATION

Training: 15 minutes of continuous speech stream of AXC words
- Two A_C pairings: ba_so, li_fe
- Two possible 'X': mu; ga
- e.g. *bamuso*

Frost & Monaghan (2016), Marchetto & Bonatti (2014), Peña et al. (2002)

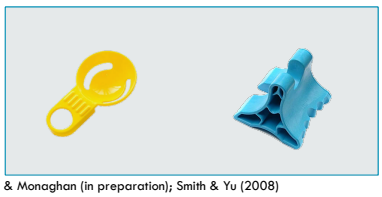
## LT STUDY: SPEECH SEGMENTATION

Testing: Words (AXC, e.g. '*bamuso*') v. part-words (CAX, e.g. '*felimu*') - visual stimulus paired with auditory stimulus on L or R of screen and looking time measured (8 trials)

## LT STUDY: WORD LEARNING

Cross-situational word learning: 6 novel words + 6 referents

- 36 learning trials (two blocks)



Hartley, Bird, & Monaghan (in preparation); Smith & Yu (2008)

## LT STUDY: OTHER MEASURES

- Social ability (SRS-2)
- Expressive and receptive vocabulary and grammar (UKCDI, EOWPVT/ROWPVT)
- IQ (Leiter-3)
- ME (fast mapping and retention)
- Non-word repetition test
- Symbolic ability

## LT STUDY: CURRENT STATUS

Timepoint 1: 2-year-olds
Completed (LT, n=21; TD, n=39) — **June 2018**

Timepoint 2: 3-year-olds — **Starts: June 2019**

Timepoint 3: 3.5-year-olds — **Starts: Dec 2019**

## THANK YOU FOR LISTENING

## QUESTIONS?

Sponsors:

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