Characterizing North American child-directed speech by age, gender, and SES

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CDS is...
- Linguistically distinct from ADS [1,2]
- Preferred over ADS by infants [3–5]
- Related to faster lexical processing and larger vocabularies in the first few years of life [6,7]
- Variable given a range of demographic factors [8,9]

Current literature
- Difficult to compare across diverse studies/methods
- Short (semi-)structured sampling
  - Overestimates CDS [10]
  - Neglects non-maternal speech [11]

Daylong recordings
- Increase ecological validity
- Focus on *all* speech instead of CDS
  - Lack of automated tools

Our approach: Combined North American sample with multiple demographic variables
- Child and caregiver age
- Child and caregiver gender
- Maternal age and education

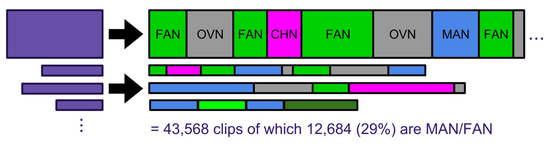
Methods

- Daylong audio from four N.A. corpora [12–16]
- 61 typically developing, Eng-speakers (29F)
- Age sampled as uniformly as possible 0–20 months

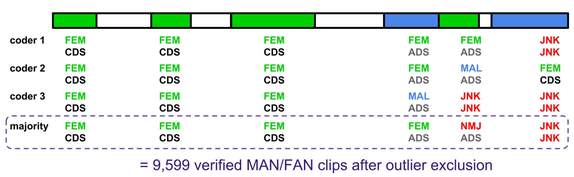
Sampled & annotated across labs with custom software [17]

Randomly select 20 LENA conversational blocks, requiring each to have 10+ utterances, at least two of which are classified as nearby adult speech (MAN or FAN).

Split each block into its component LENA speaker-tagged audio clips.



Three coders annotate each MAN/FAN clip for gender (male/female/junk) and addressee (child-directed/adult-directed/junk). We analyze the majority code from these annotations.



Data Analysis

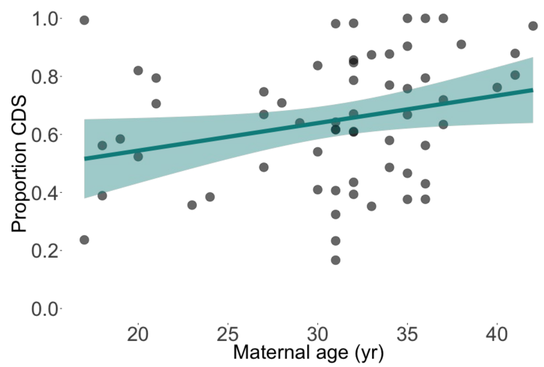
Three measures
- CDS quantity (minutes per hour)
- ADS quantity (minutes per hour)
- Proportion CDS ($\frac{CDS}{CDS+ADS}$)

Mixed-effects linear regressions with (a) all speakers pooled together for each child (b) male and female speakers separated for each child

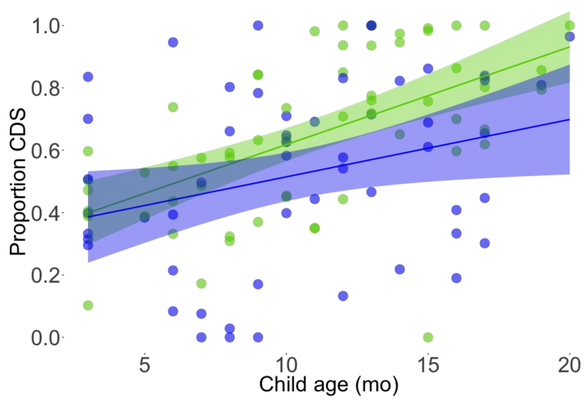
Exploratory; only include predictors that improve fit. Child age (0–20 mo; M=10.8) and gender (M/F), maternal age (17–42 yr; M=30.9) and education (no-BA/BA/AD), and number of older siblings (0–4; M=0.79)

CDS proportion: M=.65(.22)

Pooled speakers:
Child age: each month +2.7% CDS (*SE* = .005, *t* = 5.5)
Maternal age: each year +.9% CDS (*SE* = .004, *t* = 2.5)

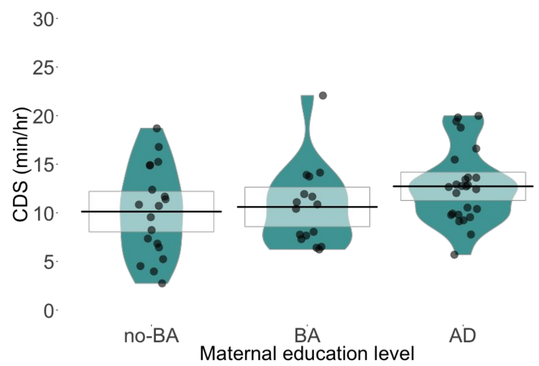


By speaker gender:
Speaker gender: women +10% CDS vs. men (β = -.1, *SE* = .04, *t* = -2.5)
Child age: each month +2.5% CDS (*SE* = .005, *t* = 4.9)

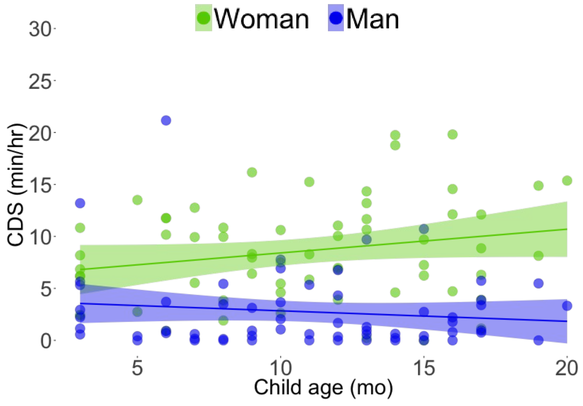


CDS Quantity: M=11.36(4.24) min/hr

Pooled speakers:
Maternal education: each level +1.3 min/hr CDS (*SE* = .6, *t* = 2.2)

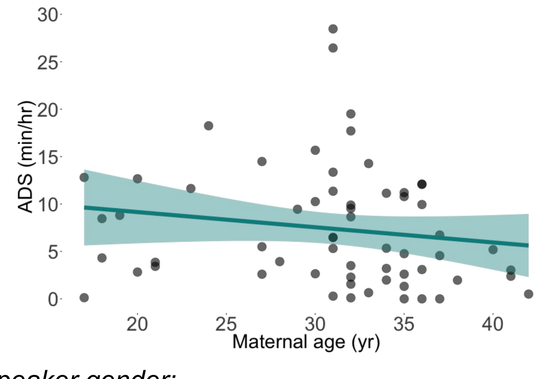


By speaker gender:
Speaker gender: women x3 CDS vs. men (β = -5.4, *SE* = .8, *t* = -6.6)

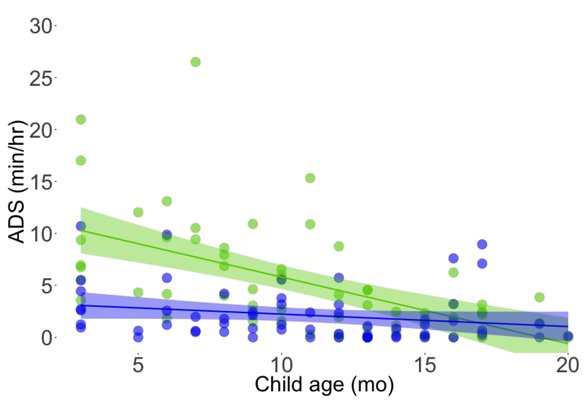


ADS Quantity: M=7.34(6.4) min/hr

Pooled speakers:
Child age: each month -.74 min/hr ADS (*SE* = .2, *t* = -4.7)
Maternal age: each year -.27 min/hr ADS (*SE* = .1, *t* = -1.9)



By speaker gender:
Speaker gender: women x2 ADS vs. men (β = -2.8, *SE*= .7, *t*= -4.1)
Child age: each month -.64 min/hr of ADS (*SE* = .1, *t* = -6.3)
Child age * speaker gender: age effect is smaller for male speakers (β = -.5, *SE* = .1, *t* = -3.7)



Conclusions

- **Children hear more speech from women,** now we quantify it! Speaker gender effects outpace all others >> implications for models of linguistic input
- **ADS decreases with age**. CDS estimates are similar to others' but ADS decrease is novel >> children's increasing independence on speech input?
- **SES effects are comparatively small** in these data but are otherwise in-line with previous work. We find no evidence of child gender effects

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(see handout for references)

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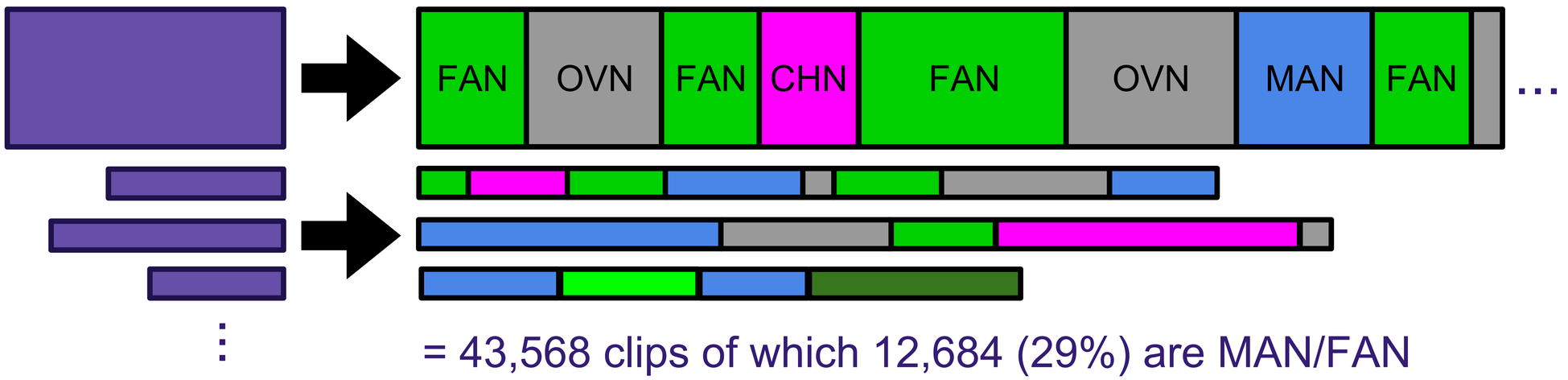
Randomly select 20 LENA conversational blocks, requiring each to have 10+ utterances, at least two of which are classified as nearby adult speech (MAN or FAN).

= 1,220 conv. blocks

Split each block into its component LENA speaker-tagged audio clips.



= 43,568 clips of which 12,684 (29%) are MAN/FAN

Three coders annotate each MAN/FAN clip for gender (male/female/junk) and addressee (child-directed/adult-directed/junk). We analyze the majority code from these annotations.

coder 1	FEM CDS	FEM CDS	FEM CDS	FEM ADS	FEM ADS	JNK JNK
coder 2	FEM CDS	FEM CDS	FEM CDS	FEM ADS	MAL ADS	FEM CDS
coder 3	FEM CDS	FEM CDS	FEM CDS	MAL ADS	JNK JNK	JNK JNK
majority	FEM CDS	FEM CDS	FEM CDS	FEM ADS	NMJ ADS	JNK JNK

= 9,599 verified MAN/FAN clips after outlier exclusion