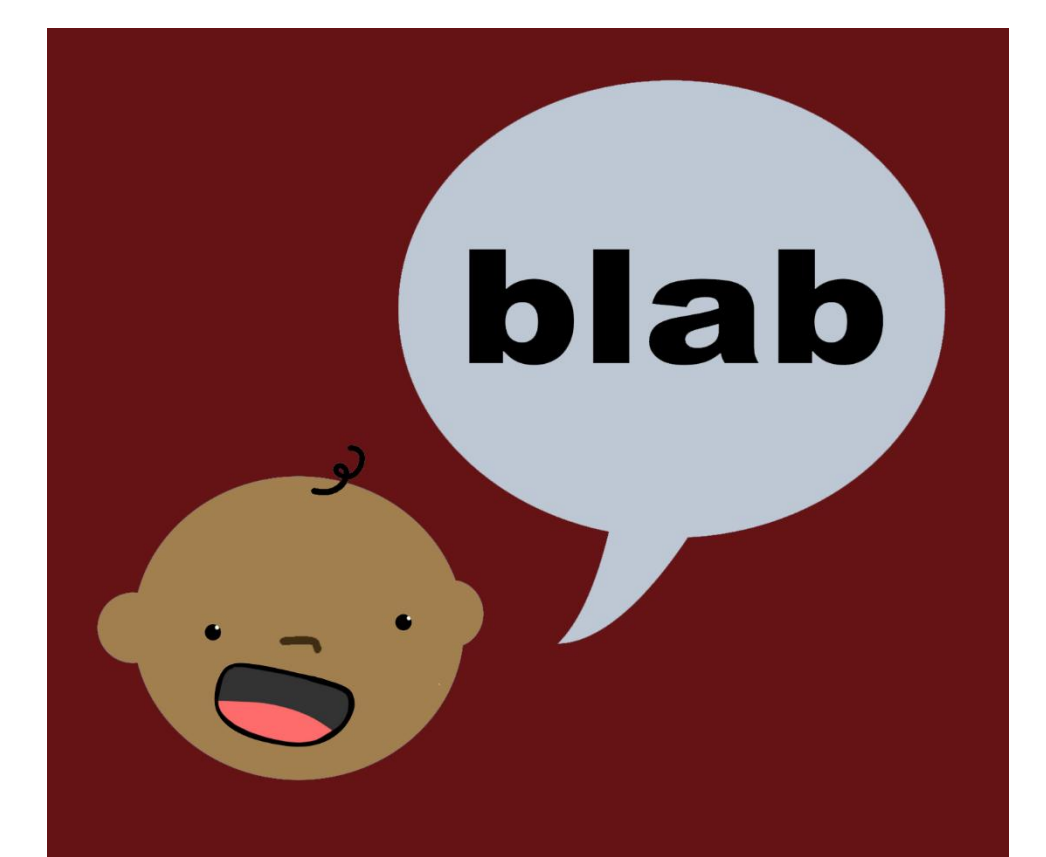




Social communication and vocalization in blind vs. typically developing infants

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Introduction

- While infants do babble alone, they produce more vocalizations, and more adult-like vocalizations around others (Lee et al, 2018; Ollers, 2011)
- Interacting with adults increases amounts of speech-like babbling (Albert et al, 2010)
- Blind infants react differently to presence of others (Pérez-Pereira, 2013; Preisler, 1991) and rely on non-visual cues to determine their social contexts
- Developmental differences (e.g., sensory impairment, *inter alia*) can feature:
 - more crying, reduced babbling (Locke, 2006)
 - differences in sensory integration of social cues

Research question:

Given their differential access to visual social cues, is there a difference in how blind and sighted infants vocalize alone vs. with others?

Predictions:

- Blind infants will vocalize relatively more when hearing adults around them than sighted infants will
- Blind infants' canonical (more mature) babbling in particular may be modulated by (auditory) social context relative to sighted infants

Methods

Corpus: Daylong LENA recordings

Transcribed + Hand-coded regions: 40 min, per infant = 800 min. total

Automated LENA measurements: ~16 hours per infant (i.e., daylong recordings)

Participants: 10 blind and 10 sighted 6-15 months (mean = 10.52 months) matched on age, gender, maternal education, number of siblings

Time intervals for analysis: 2-minute segments

Measure	Derived from
Child vocalization count	Full daylong recording (via algorithm)
Child vocalization duration	
Adult word count	40 minute transcripts
Canonical syllables	

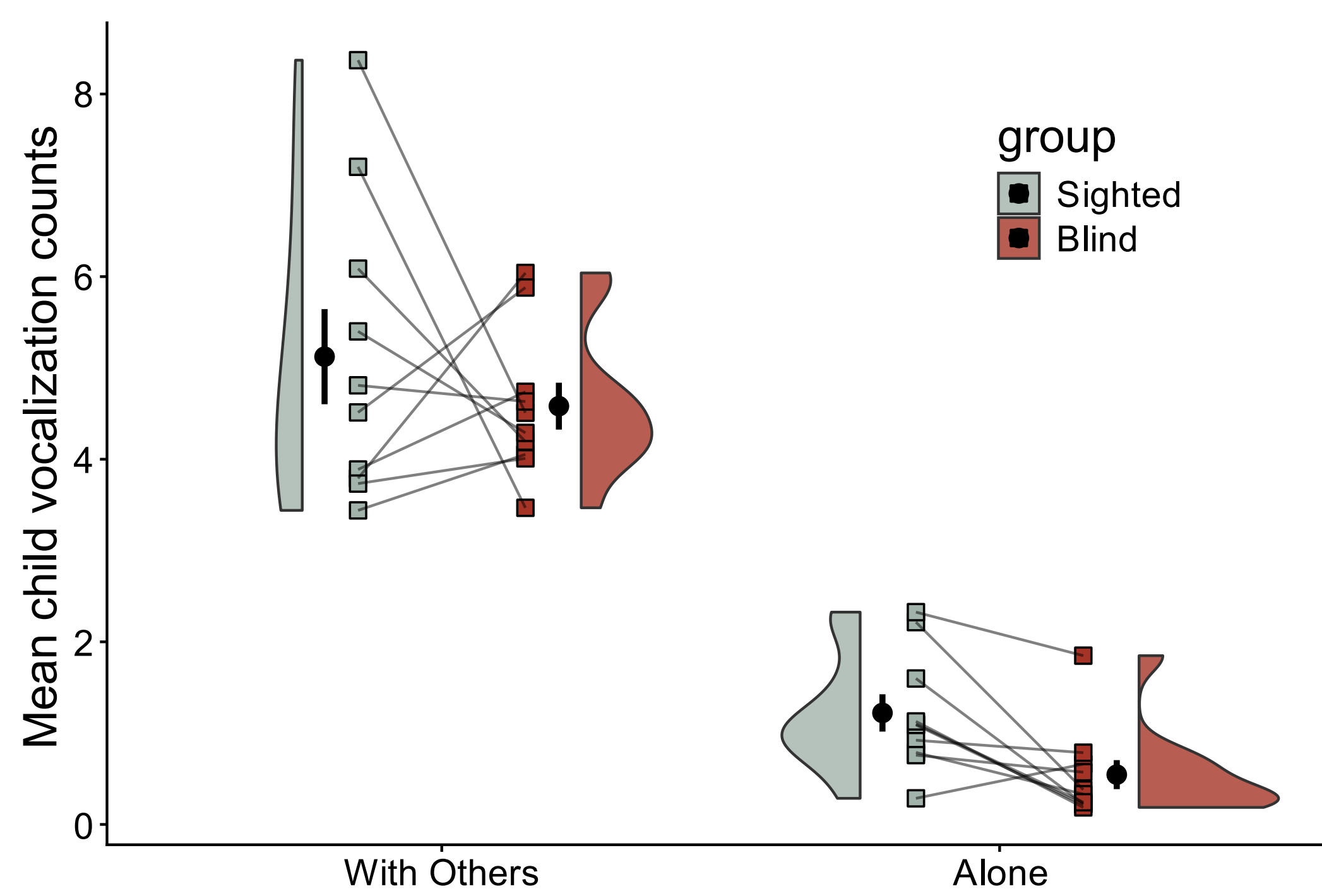


We ask whether blind and sighted infants produce...

1. the **same number** of vocalizations alone vs. in company?
2. vocalizations of the **same length**?
3. the same proportion of **canonical babble**?

Results

1. Number of vocalizations



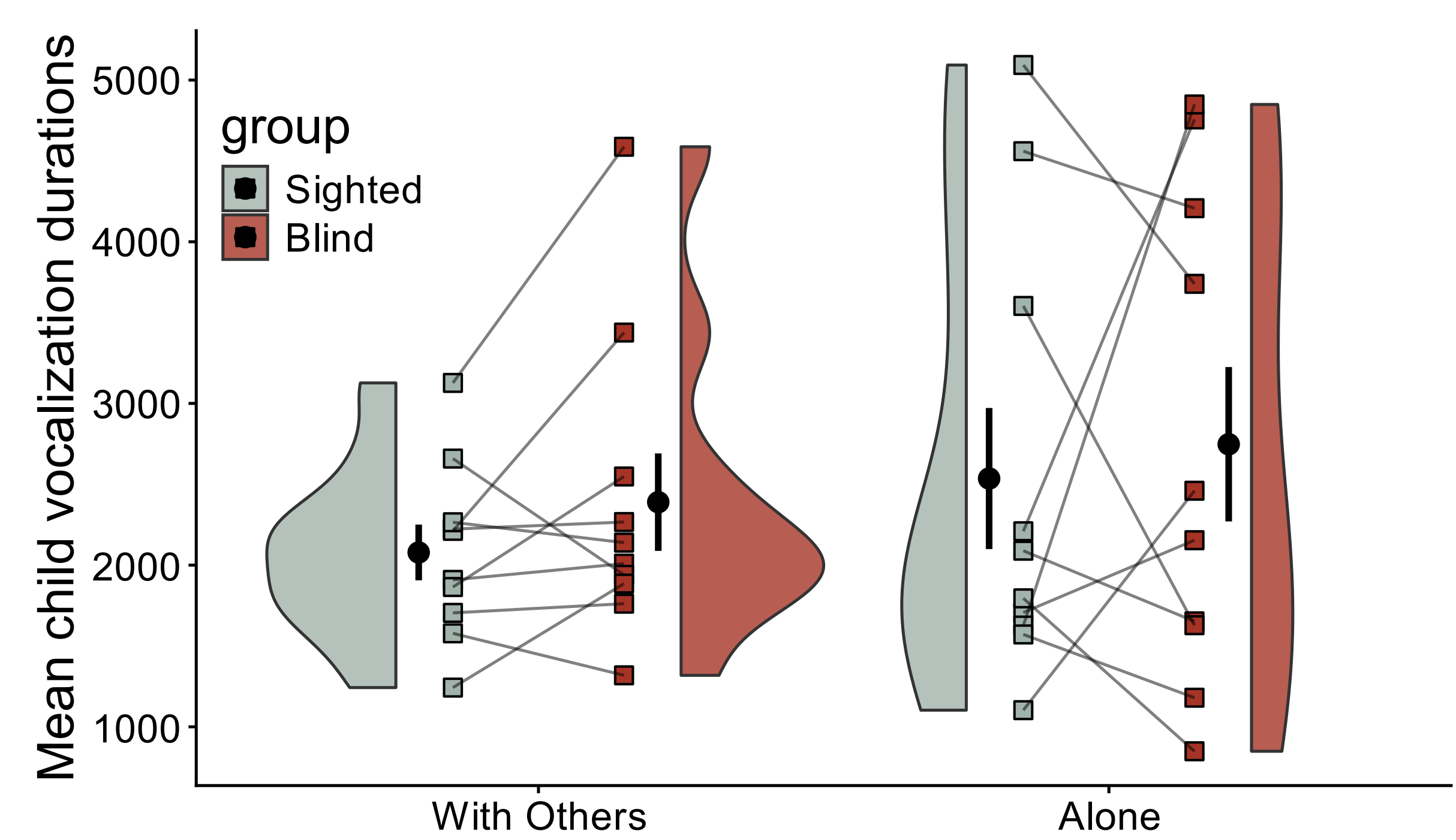
Blind infants produced **fewer vocalizations** than sighted infants did ($p < .001$)
Both groups **vocalized more when others were present** than alone ($p < .001$)

Measuring interaction: Alone x group status



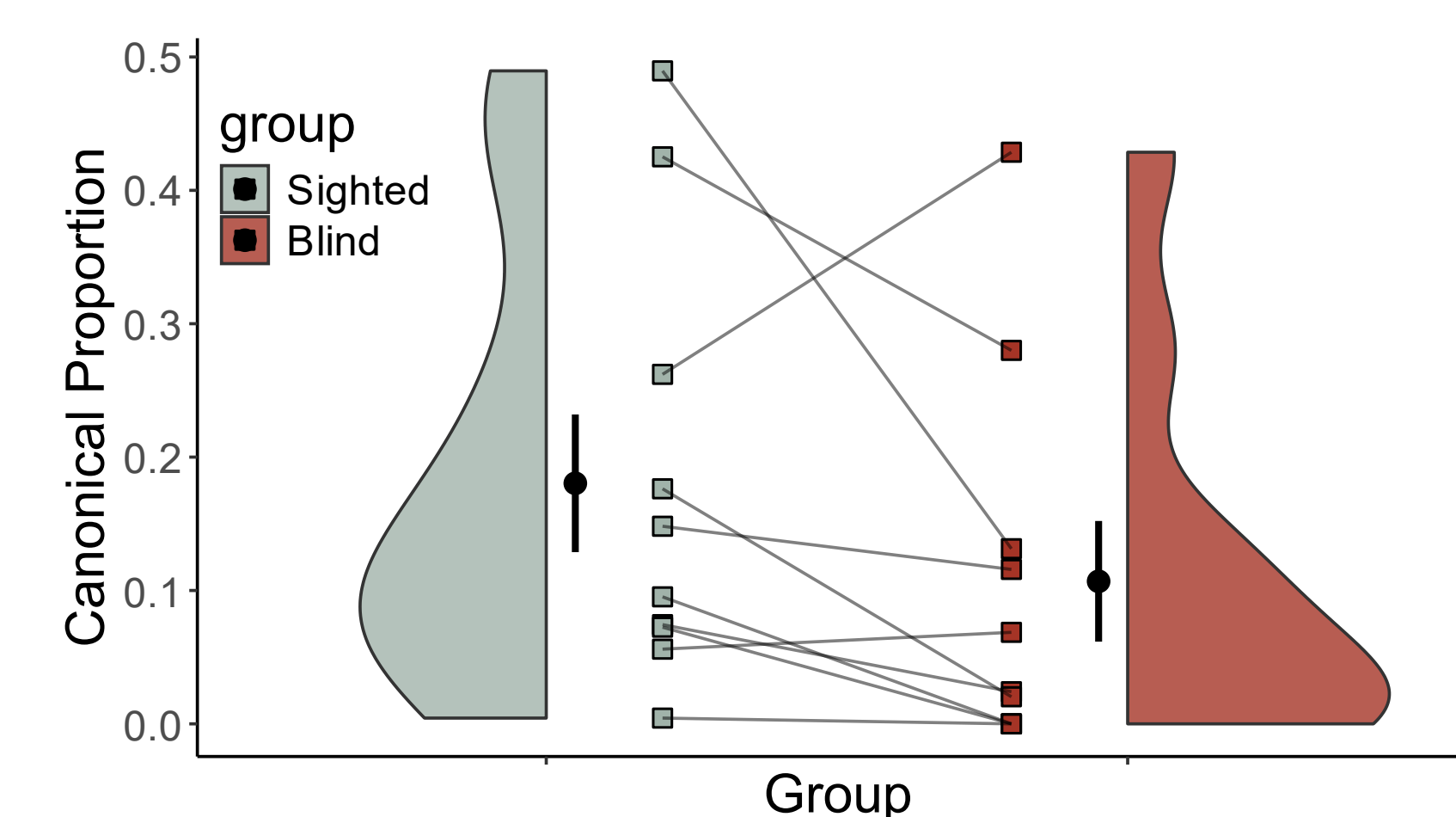
Blind **and** sighted infants produce more utterances with others around, but increase **is greater** in blind infants compared to sighted (group x alone status $p < .001$)

2. Length of vocalizations



Duration of babbles per two-minute interval **did not differ** between being alone vs. with others, or between the two groups of infants.

3. Other vocalizations



- In manual annotations, proportion of canonical babbling was similar between sighted and blind infants (and did not differ by alone status)
- Crying too did not differ between groups or by presence of others
- Automated analysis of vocal maturity over daylong recordings in progress

Discussion and Conclusion

- Both sighted and blind infants produced substantially more (but not longer) vocalizations around others than alone
- Blind infants were more affected than sighted peers by audible presence of others in terms of how *much* they vocalized (but not for duration or amount of crying)
- Vocal maturity (i.e. canonical babbling) was, contra our prediction, not modulated by social context (for either blind or sighted infants)

Future Questions and Work in Progress

- How might reduced rates of overall babbling link to other aspects of early language in blind infants and children? How does this shift into adulthood?
- How do cues from different modalities trade off in blind infants' social interactions (e.g., as captured in video recordings)
- To what degree does "visual" speech information (e.g. labials vs. coronals) link to which sounds infants babble and master, and when?

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Selected References

- Albert, R. R., Schwade, J. A., & Goldstein, M. H. (2018). The social functions of babbling: acoustic and contextual characteristics that facilitate maternal responsiveness. *Developmental science*, 21(5), e12641. <https://doi.org/10.1111/desc.12641>
- Lee, C.-C., Jhang, Y., Relyea, G., Chen, L., & Oller, D. K. (2018). Babbling development as seen in canonical babbling ratios: A naturalistic evaluation of all-day recordings. *Infant Behavior and Development*, 50, 140-153. <https://doi.org/10.1016/j.infbeh.2017.12.002>
- Locke J. L. (2006). Parental selection of vocal behavior : Crying, cooing, babbling, and the evolution of language. *Human nature (Hawthorne, N.Y.)*, 17(2), 155-168. <https://doi.org/10.1007/s12110-006-1015->
- Oller, D. K., Eilers, R. E., Neal, A. R., & Schwartz, H. K. (1999). Precursors to speech in infancy: The prediction of speech and language disorders. *Journal of Communication Disorders*, 32(4), 223-245. [https://doi.org/10.1016/S0021-9924\(99\)00013-1](https://doi.org/10.1016/S0021-9924(99)00013-1)
- Preisler, G. M. (1991). Early patterns of interaction between blind infants and their sighted mothers. *Child: Care, Health and Development*, 17(2), 65-90. <https://doi.org/10.1111/j.1365-2214.1991.tb00680.x>
- Pérez-Pereira, M. (2013). *Language Development and Social Interaction in Blind Children*. Psychology Press. <https://doi.org/10.4324/9780203776087>