

Prediction and learning: A chicken-or-egg problem in language development

Tracy Reuter, Carolyn Mazzei, Casey Lew-Williams & Lauren Emberson
Princeton University

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Introduction

- Prediction is claimed to support language processing¹ and learning.²
- Correlational findings support these claims³ but directionality is unclear:
- Does prediction support learning, or does learning support prediction?⁴
- **Hypothesis: Prediction supports learning (i.e., increases in comprehension) and vice-versa.**
- Prediction and comprehension should emerge *concurrently* over time.

Methods

- We tested infants (N=67) in four age groups (12, 15, 18, and 24 mos).
- We measured prediction and comprehension via eye-tracking, with two trial types:

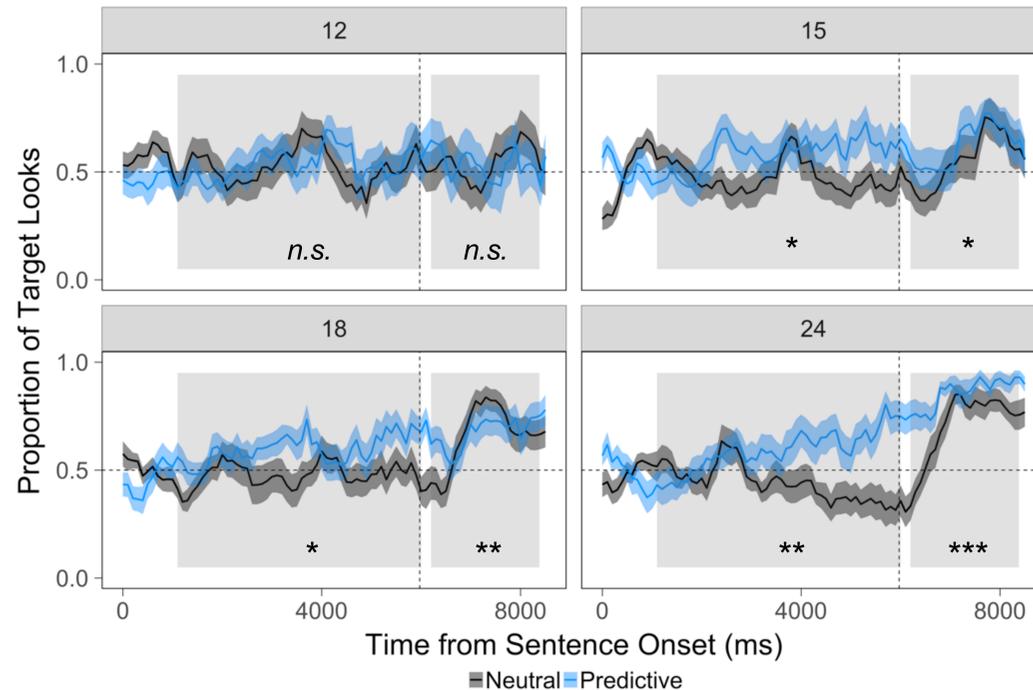


Predictive: Let's go eat! Oh yum yum!
Open your mouth! Where's the cookie?
Find the cookie!

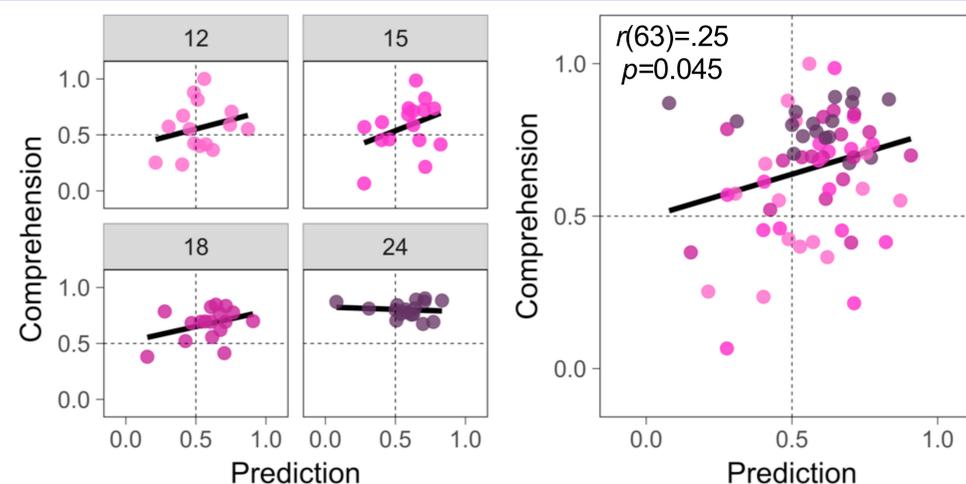
Neutral: Look at that! There it is!
Do you see it? Where's the cookie?
Find the cookie!

Results

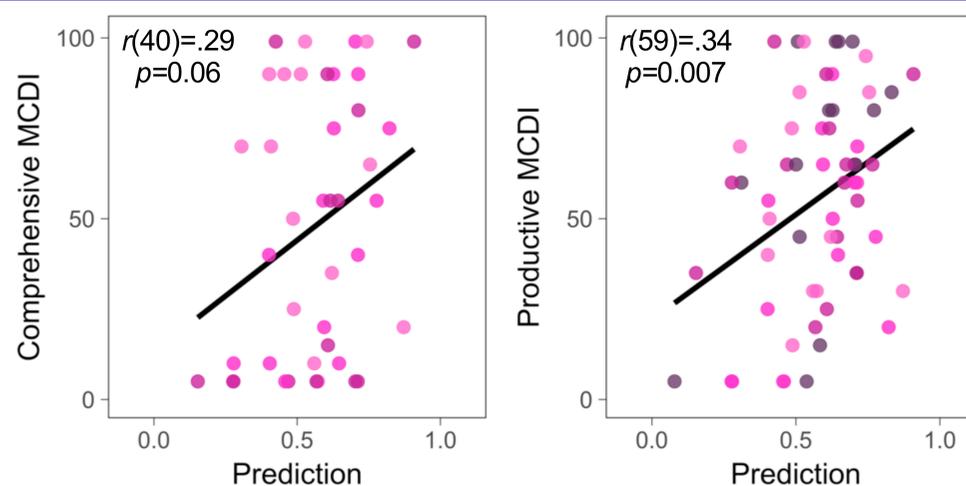
As soon as infants comprehend, they predict:



Prediction correlates with comprehension:



Prediction correlates with vocabulary size:³



Summary

- Prediction and comprehension appear to emerge concurrently over time.
- We do *not* observe sequential development (i.e., reliable comprehension before prediction).
- Findings at the group level and at the individual level suggest that prediction supports learning *and vice-versa*.
- Prediction may support language learning from the earliest stages, as infants are learning their first words.

Future Directions

- How *specific* are infants' predictions? Do predictions include phonology, semantics, and syntax?⁴
- Can we measure neural signatures of infants' predictions using fNIRS?⁵
- Do infants learn faster if they predict more and/or predict more accurately?

Acknowledgments

References: [1] Christiansen & Chater, 2015; [2] Dell & Chang, 2014; [3] Mani & Huettig, 2012; [4] Rabagliati, Gambi & Pickering, 2016; [5] Zinszer et al., 2017

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