

Adults and children use prediction to varying degrees in naturalistic contexts

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Introduction

Past studies have found evidence for the ideas that prediction supports language processing^{1,2,3,4} and development^{2,5}. A significant limitation of these studies, however, is their unknown **ecological validity**⁶.

We aimed to address this limitation via 3 eye-tracking experiments comparing adults' and children's abilities to predict in more naturalistic contexts.

If prediction supports processing and development, both groups should predict via complex visual and complex auditory stimuli.

Methods

Participants

* No vision or hearing problems

Children 4-5 yrs

Exp.1 N = 24 | Exp.2 N = 24 |

Exp.3 N = 24

o > 85% exposure to English

Adults 18-35 yrs

Exp.1 N = 24 | Exp.2 N = 24 |

Exp.3 N = 15

o Monolingual, native English speakers

Design

- Exp.1 - complex visual stimuli
- Exp. 2 - complex auditory stimuli
- Exp. 3 - complex visual and auditory stimuli

o Participants saw a series of images (**visual stimuli**)

o For each image, after a short pause, predictive or neutral audio (**auditory stimuli**) referencing an object in the picture would play.

Experiment 1

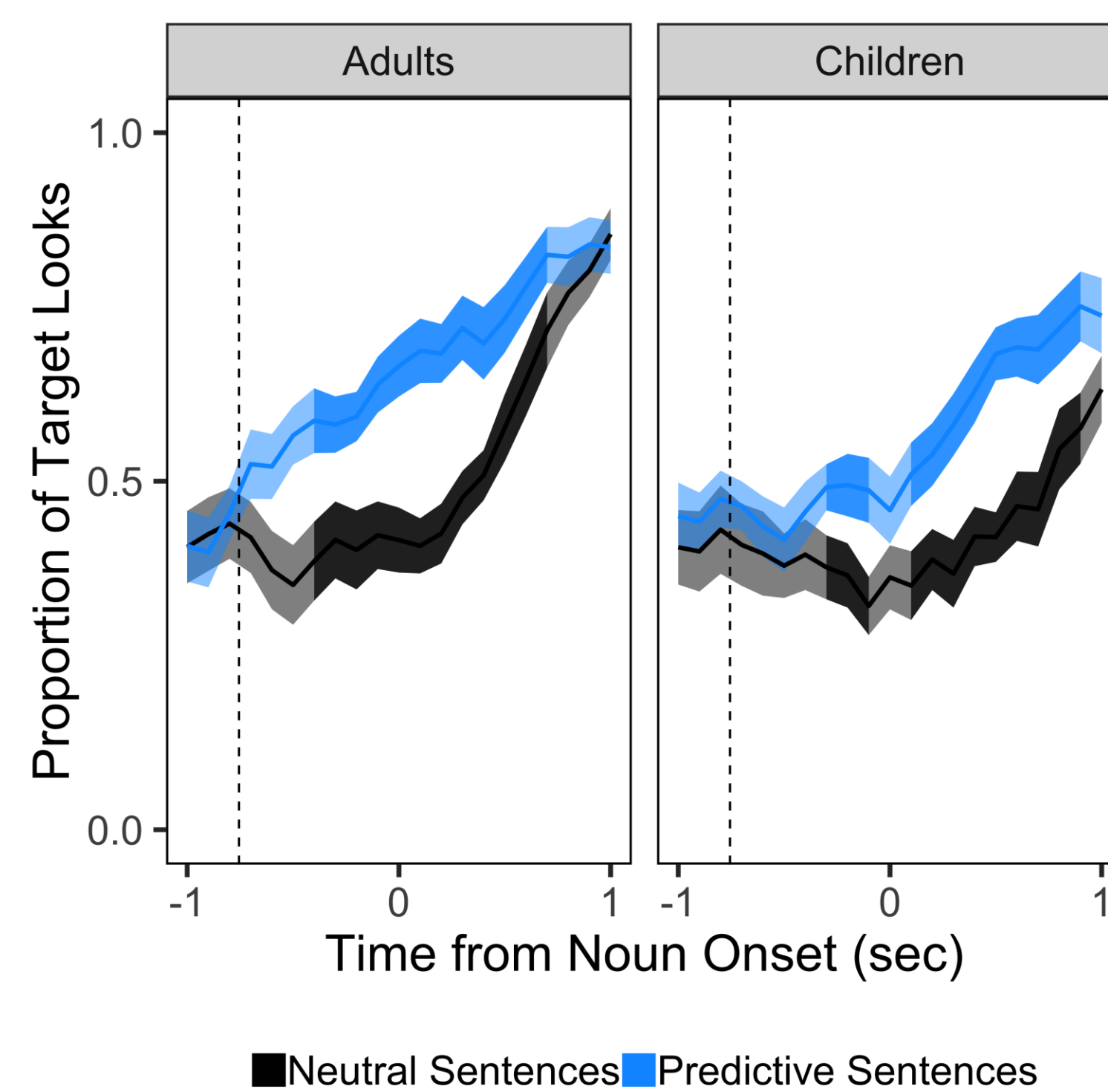


■ predictive verb ■ target object ■ neutral verb

Predictive:
Sally **drank** the **juice** on the counter.
Dan **ate** the **sandwich** on the counter.

Neutral:
Sally **overlooked** the **juice** on the counter.

Adults and children predict when visual stimuli is more naturalistic:



■ Neutral Sentences ■ Predictive Sentences

Experiment 2

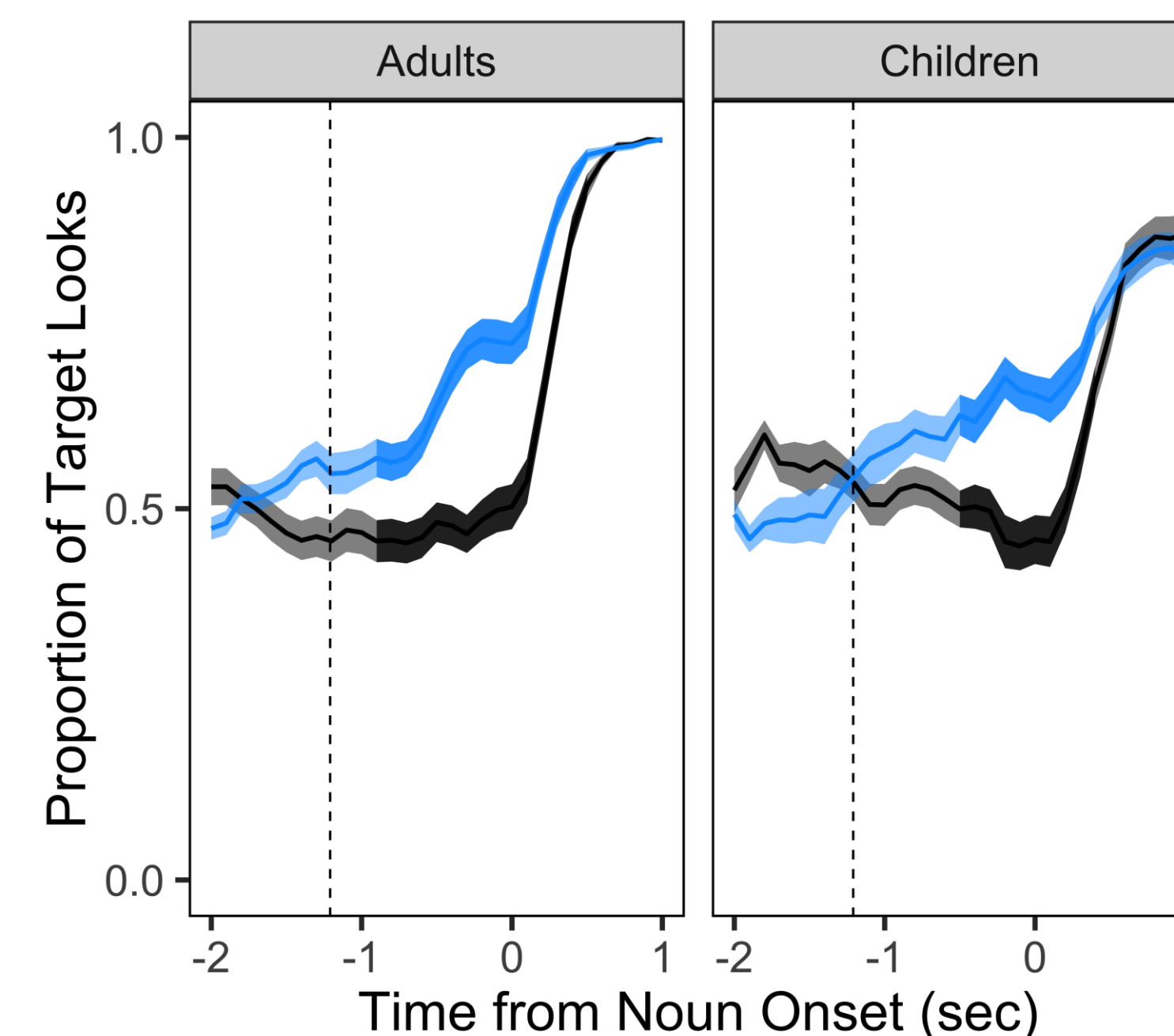


■ predictive cue ■ target object ■ neutral verb

Predictive:
1. (verb) Do you want to **ride** the green **bike**?
2. (is/are) Where **is** the green **bike**?
3. (that/those) Do you see **that** green **bike**?
4. (big/small) Do you see the **big** green **bike**?

Neutral:
Can you see the green **bike**?

Adults and children predict when auditory stimuli is more naturalistic:



■ Neutral Sentences ■ Predictive Sentences

Experiment 3

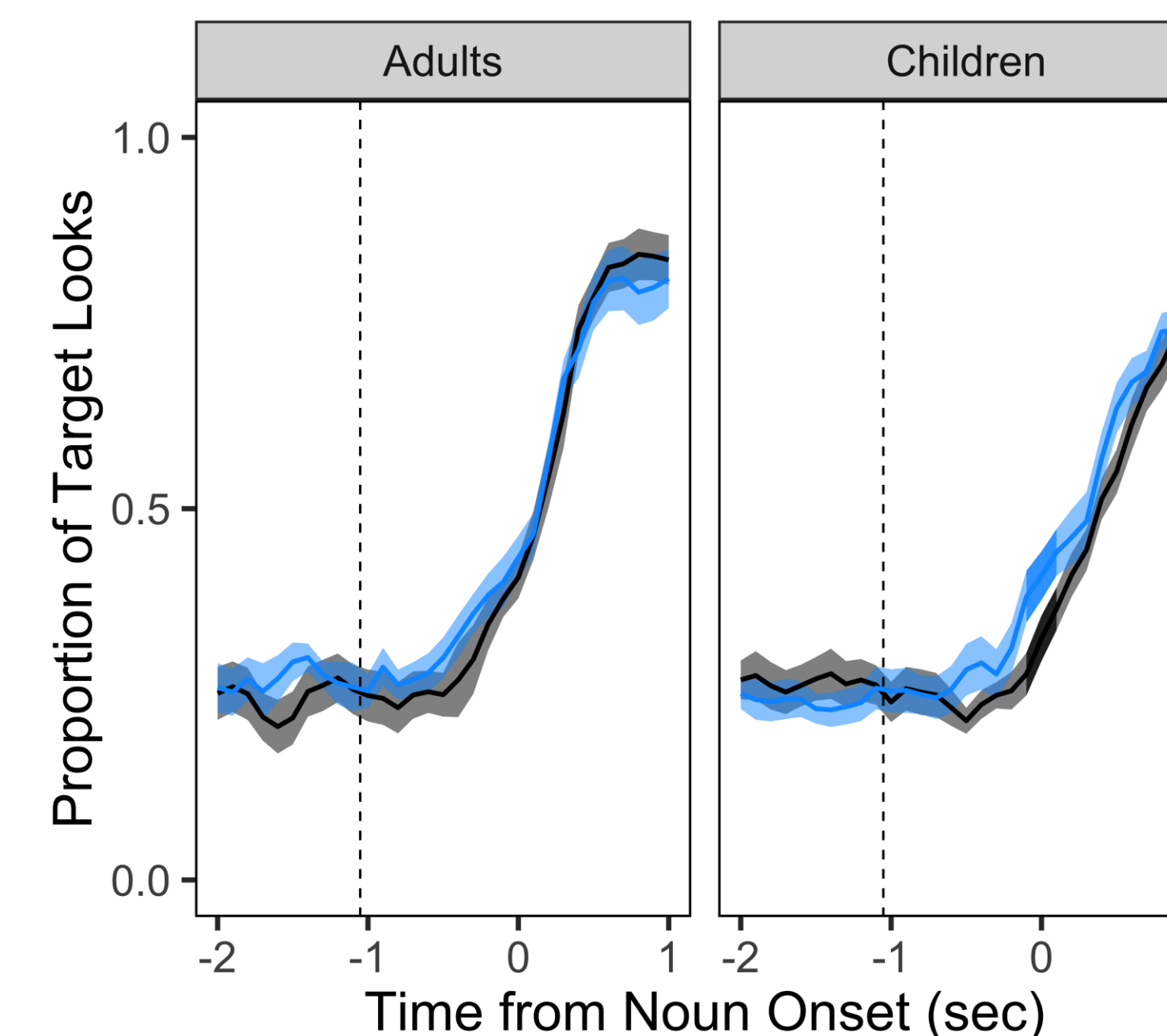


■ predictive cue ■ target object ■ neutral verb

Predictive:
1. (verb) Could Sally **eat** the red **apple**?
2. (is/are) Where **is** the red **apple**?
3. (that/those) Do you see **that** red **apple**?
4. (big/small) Can you see the **big** red **apple**?

Neutral:
Can you see the red **apple**?

When both visual and auditory stimuli are more naturalistic, adults and children may not predict robustly:



■ Neutral Sentences ■ Predictive Sentences

Summary

- We replicated prior findings with complex visual stimuli¹ and extended them to children (Exp. 1).
- We then extended past work done with auditory stimuli^{2,3,4,5} and found that adults and children can flexibly use different types of predictive cues (Exp. 2).
- Preliminary findings, however, show that **adults and children fail to predict as robustly in a more naturalistic setting** (Exp. 3).
- This suggests that prediction effects observed in past studies were linked to the constrained lab context they were produced in⁶.

Why were verbs the only consistently used predictive cue?

What parts of a visual stimulus directs the brain to use one type of predictive cue but not others?

Acknowledgements

(1) Coco et al., 2016; (2) Borovsky et al., 2012; (3) Lukyanenko and Fisher, 2016; (4) Fernald and Thorpe, 2010; (5) Reuter et al., 2018 (6) Huettig, 2015

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*Vertical dashed lines indicate time of predictive cue onset
* Proportions were measured within 100ms time bins