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# A Consonant Bias in German preschoolers' Word Recognition

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## 1. RATIONALE

### CONSONANT-VOWEL ASYMMETRY

- **Division of Labor Hypothesis:** vowels are considered relatively more important for processing grammatical and prosodic information, whereas consonants are considered more important for lexical access (Nespor et al., 2003)
- **Learned Bias?** Evidence to date suggests that the bias emerges due to a child's acquisition of acoustic-phonetic (Floccia et al., 2014) or lexical (Keidel et al., 2007) properties of its native language

## 2. METHOD

### RESEARCH QUESTIONS

- We test whether recognition of familiar words in German-learning 3- to 5-year-old children is affected more by consonant or by vowel mispronunciations
- According to the lexical and acoustic-phonetic hypotheses, we anticipate vocabulary size and/or phonological awareness to be associated to the C/V-asymmetry

### SAMPLE

- N= 35 (19F and 16M) German-speaking children
- age range: 37-70 months; mean age: 56,05 months

### PREFERENTIAL LOOKING TASK

- Each child was presented with 24 yoked target-distractor pairs → monosyllabic CV(C)C-words
- auditory presentation of a carrier sentence including the correct pronunciation (CP), a consonant mispronunciation (MP<sub>cons</sub>) or a vowel mispronunciation (MP<sub>vowel</sub>) of the target word
- MPs involved 2- to 3- feature changes of either word-initial consonants or word-medial vowels

'Tür' (door) → 'Wür' | 'Bus' (bus) → 'Bes'

### TRIAL STRUCTURE

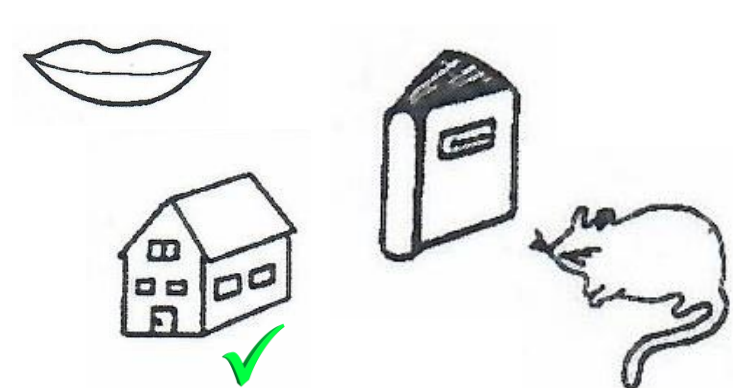


### TEST OF PHONOLOGICAL AWARENESS

Mayer (2020)

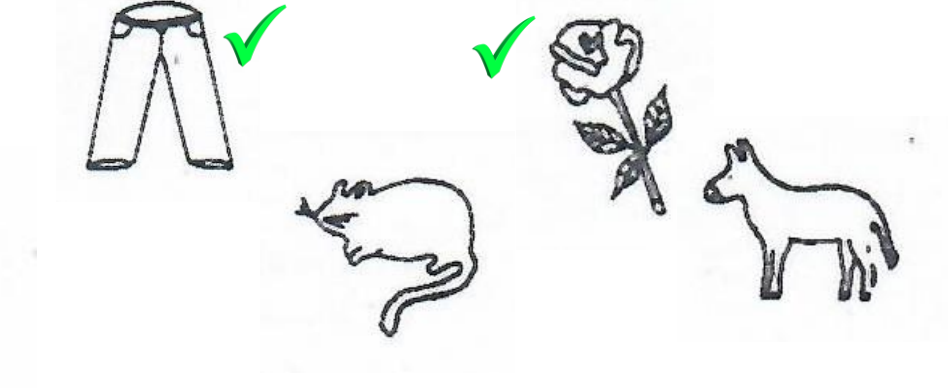
#### Onset-Rhyme Synthesis

['h - auʃ]



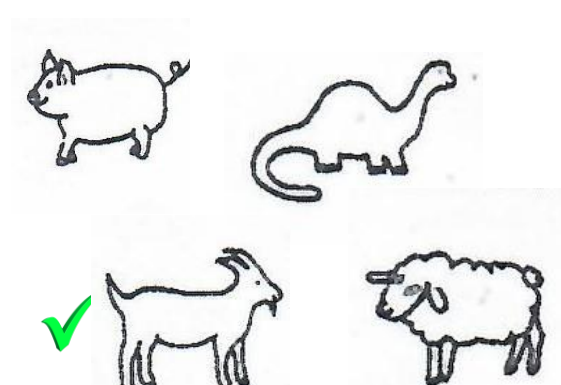
#### Rhymes

['ho:zə] [maʊʃ] [ʁo:zə] [e:zəl]



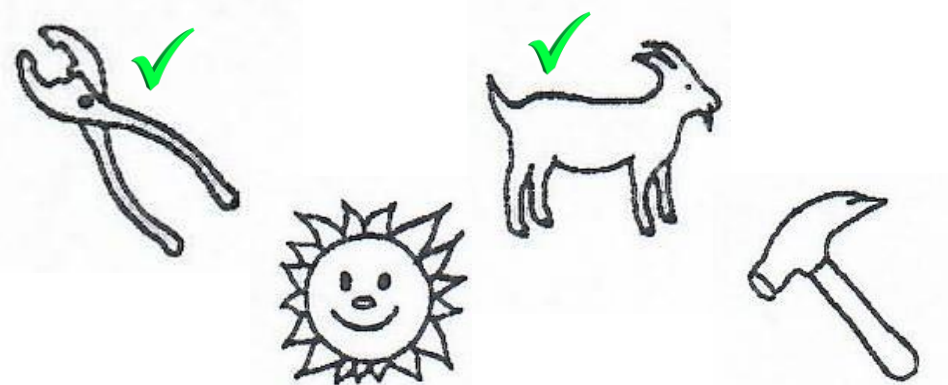
#### Phoneme Synthesis

['ts - i - g - ə]



#### Initial Sound Categorization

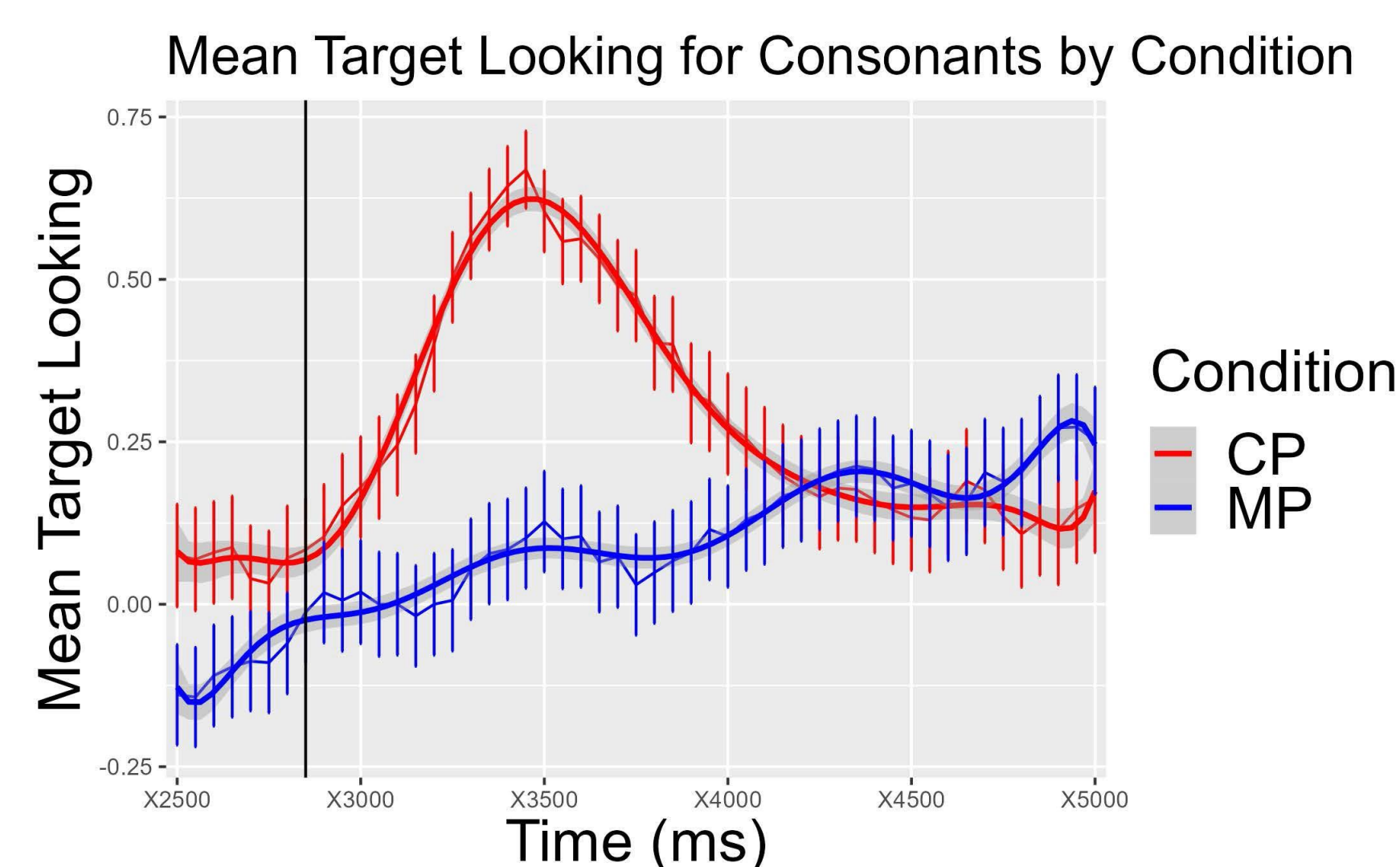
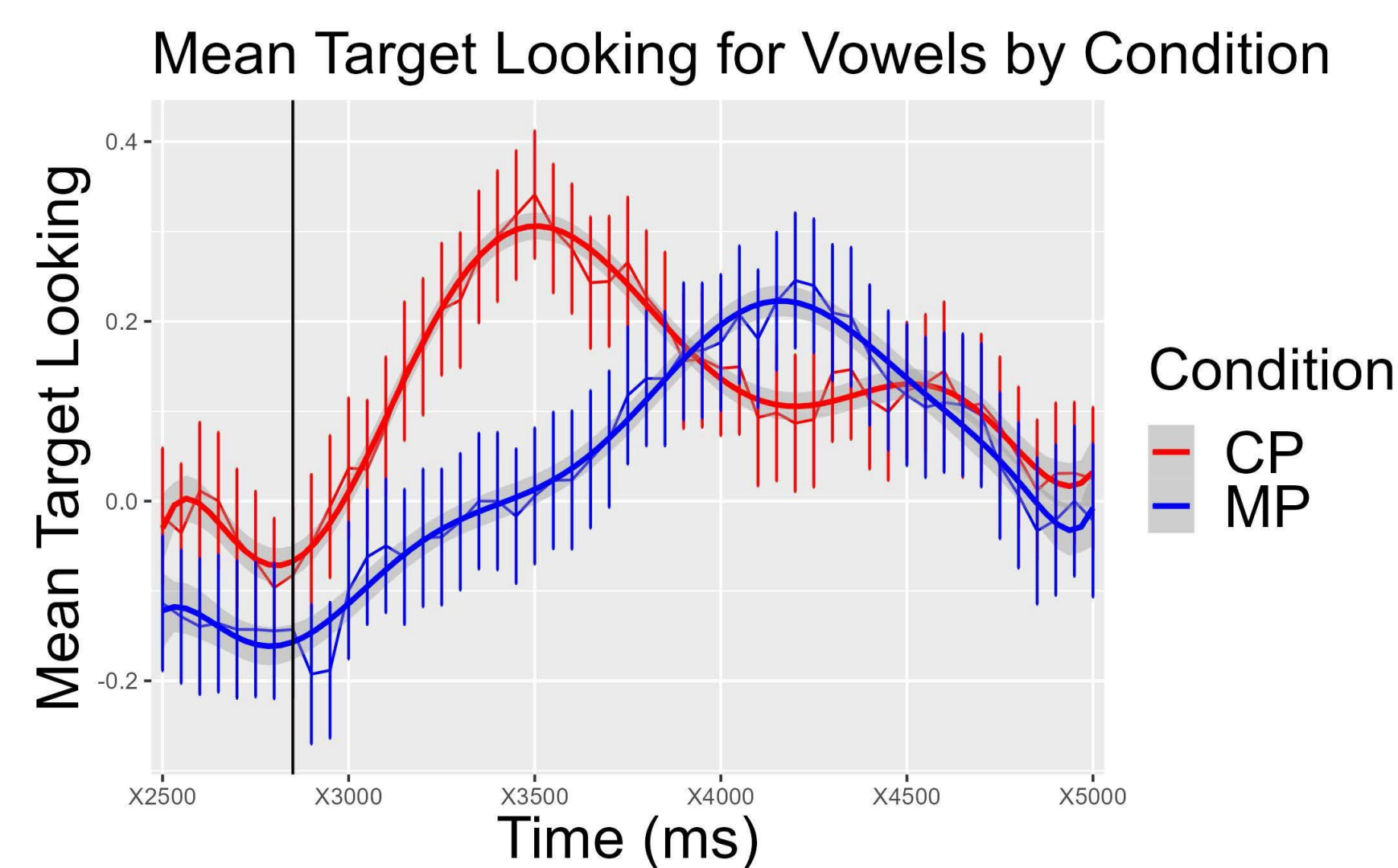
['tsaŋə] [zɔnə] ['tsi:ge] [hame]



## 3. RESULTS

### TIMECOURSE ANALYSIS

- The timecourse graphs display the mean target looking for CP and MP trials for vowels and consonants, respectively
- The naming associated increase in target looking is only present for MP<sub>vowel</sub>, not for MP<sub>cons</sub>
- Errorbars indicate ±1 SE



### DATA CLEANSING

Only subjects (subject-wise analysis) and targets (target-wise analysis) that showed a positive naming effect were retained in the final sample → exclusion of 5 subjects and the targets «Baer» (bear) and «Ball» (ball)

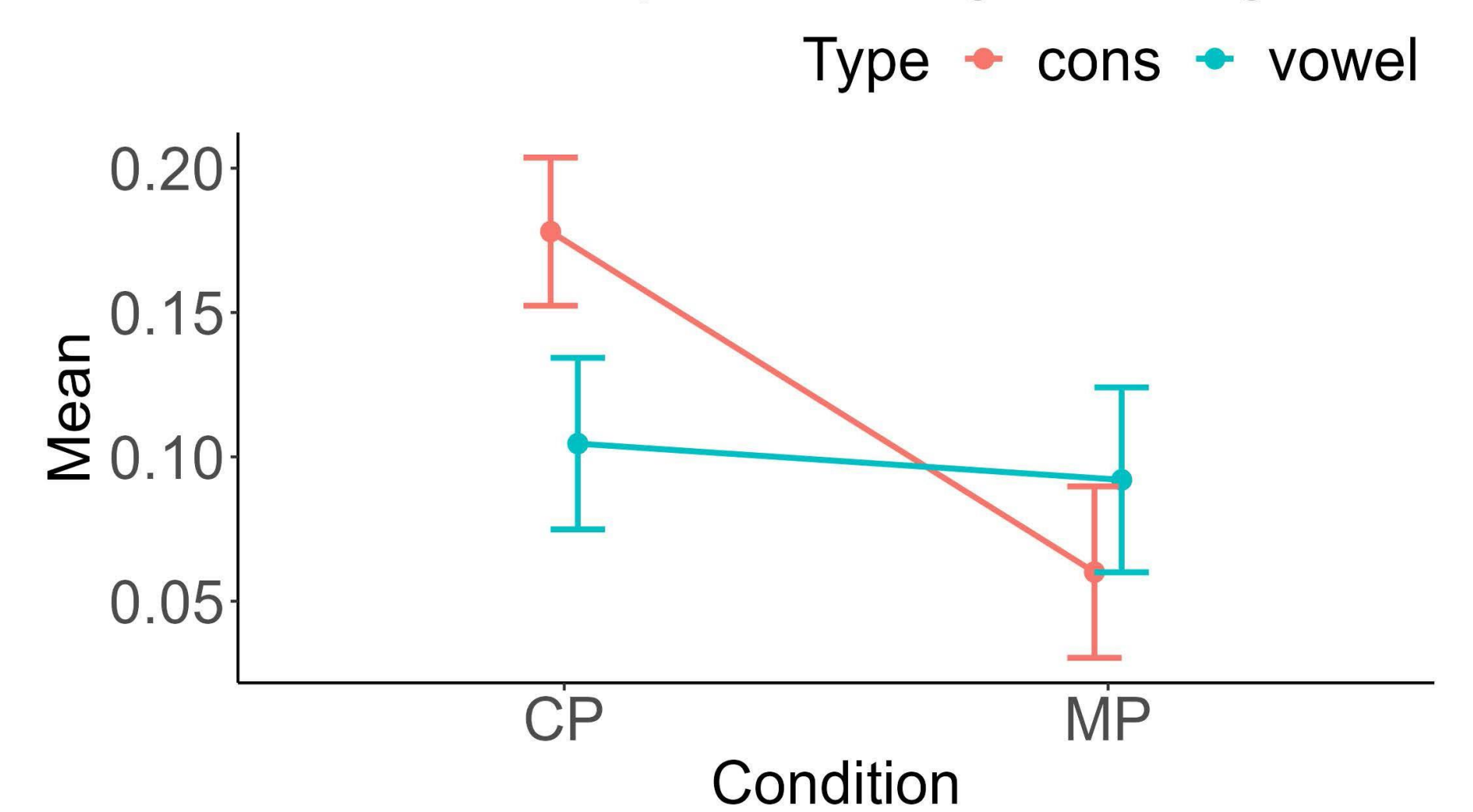
### NAMING EFFECT

The mean increase in proportional target looking from pre-naming window to the post-naming window in trials of correctly pronounced words is 17.8% for consonants and 10.5% for vowels.

### CONSONANT ADVANTAGE?

A rmANOVA with condition (CP, MP) and type (vowel, cons) as within-subject factors showed a main effect of condition ( $F(1, 29) = 4.32, p < .05, \eta^2 = 0.038$ ) of small effect size, no main effect of type ( $p = .61$ ) and an interactive effect of a small effect size between condition and type ( $F(1, 29) = 4.37, p < .05, \eta^2 = .034$ ). Errorbars indicate ±1 SE.

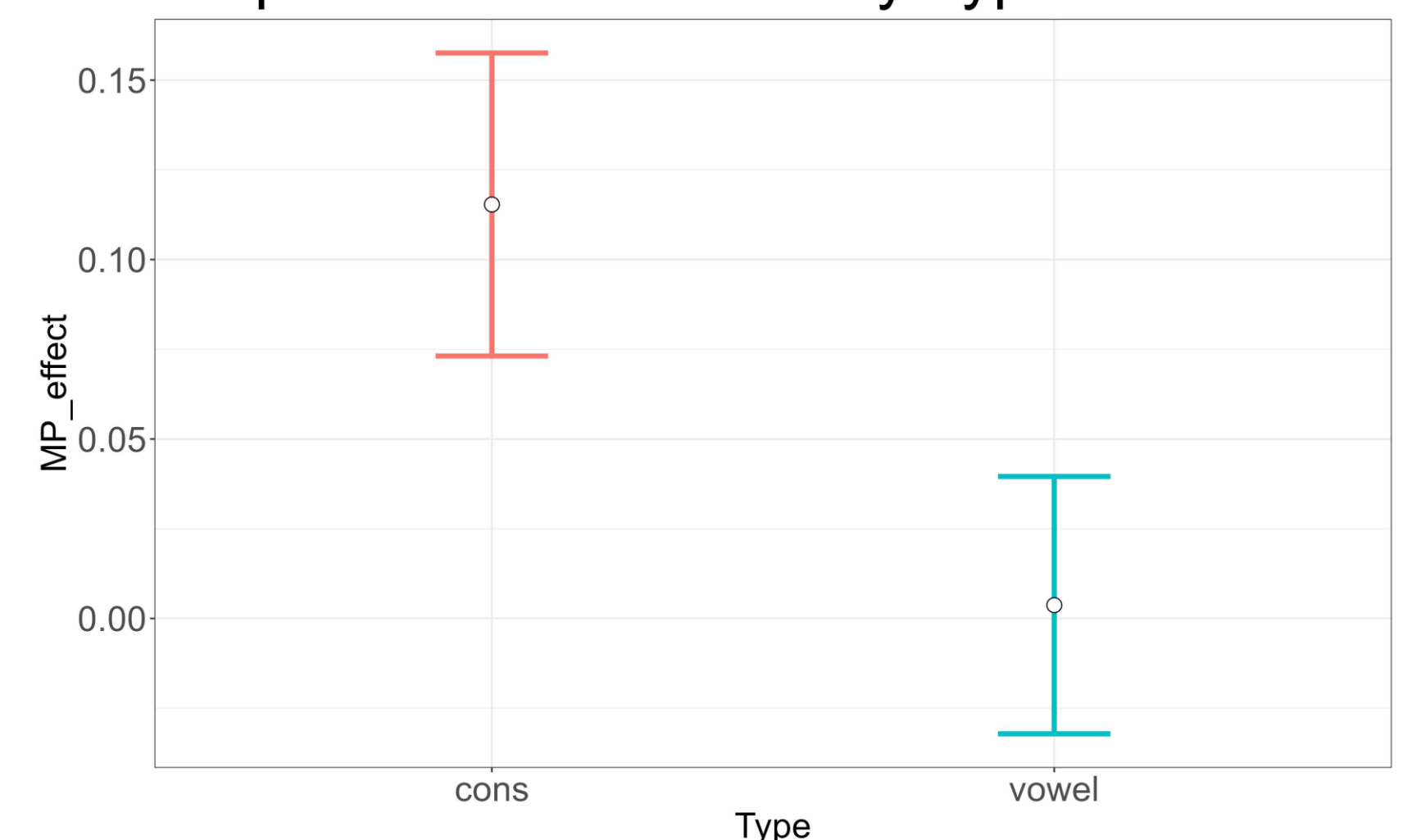
### Increase in Proportional Target Looking



### MISPRONUNCIATION EFFECTS

One sample t-tests revealed that the mispronunciation effect only occurs for trials of the consonant type ( $t(29) = 2.73, p < .02$ ), whereas word recognition in vowel trials seems to be unaffected by mispronunciations ( $p > .90$ ). Errorbars indicate ±1 SE.

### Mispronunciation Effect by Type



### ASSOCIATIONS

The consonant-bias is neither significantly correlated to phonological awareness ( $p > .33$ ) nor vocabulary size ( $p > .55$ ).

### PROPORTIONAL TARGET LOOKING (PTL)

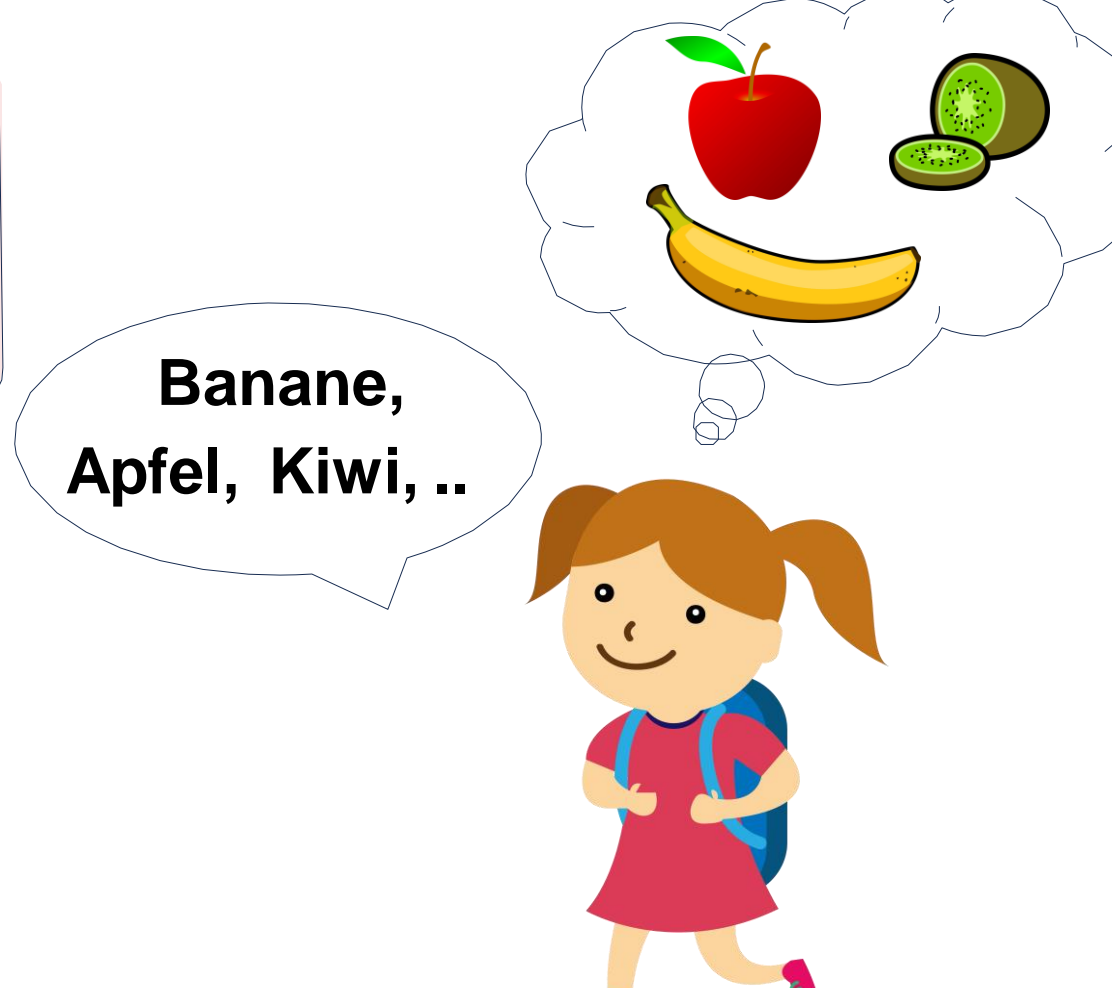
$$PTL = \frac{Target}{(Target + Distractor)}$$

$$Increase\ in\ PTL = PTL_{post-naming} - PTL_{pre-naming}$$

- Based on Swingley & Aslin (2000) we assume that word recognition is indexed by increased target looking after labelling → 'naming effect'

### VOCABULARY FLUENCY TEST

- 60 seconds per category
1. Fruits
  2. Clothes
  3. Animals



## 4. SUMMARY

- For the first time in German, a C/V asymmetry in familiar word processing is found at 3-5 years of age.
- Our findings parallel evidence of a lexicon-consonant association found in infants as young as one year old in Spanish (Bouchon et al., 2022), Italian (Hochmann et al., 2017) and French (Nishibayashi & Nazzi, 2016)
- Neither vocabulary size nor phonological awareness were associated with children's consonant bias leaving it open in how far lexicon size and/or phonological sensitivity contribute to the bias

## 5. REFERENCES

- Bouchon, C., Hochmann, J.-R. & Toro, J. M. (2022). *Journal of Experimental Child Psychology*, 221, 105444; Floccia, C., Nazzi, T., Delle Luche, C., Poltrock, S. & Goslin, J. (2014). *Journal of Child Language*, 41(5), 1085-1114; Hochmann, J.-R., Benavides-Varela, S., Fló, A., Nespor, M. & Mehler, J. (2017). *Infancy*, 23(1), 136-151; Keidel, J. L., Jenison, R. L., Kluender, K. R. & Seidenberg, M. S. (2007). *Psychological Science*, 18(10), 922-923; Mayer, A. (2020). Test zur Erfassung der phonologischen Bewusstheit und der Benennungsgeschwindigkeit (TEPHOBE): Manual (4., überarbeitete Auflage). Reinhardt; Nespor, M., Peña, M. & Mehler, J. (2003). *Lingua e Linguaggio*, 2(2), 203-229; Nishibayashi, L.-L. & Nazzi, T. (2016). *Cognition*, 155, 188-203; Swingley, D. & Aslin, R. N. (2000). *Cognition*, 76(2), 147-166.