

## 1 Background & Research Question

- Two realisations of a word are never identical in natural speech.
- What are the effects of this variability on the language-acquiring child with regard to
  - Establishing phonemic categories?
  - Word learning?
  - Vocabulary size?
- Which kind of variability supports learning and what are the underlying mechanisms?
- In a first step, we aimed to replicate the findings from a word-learning study by Rost & McMurray (2009) with the following hypothesis:

**Does speaker/intonation variation compared to zero variation aid in the formation of word-object associations in 14-month-old children?**

## 2 Method

### Participants

- Monolingual German children between 13–15 months of age

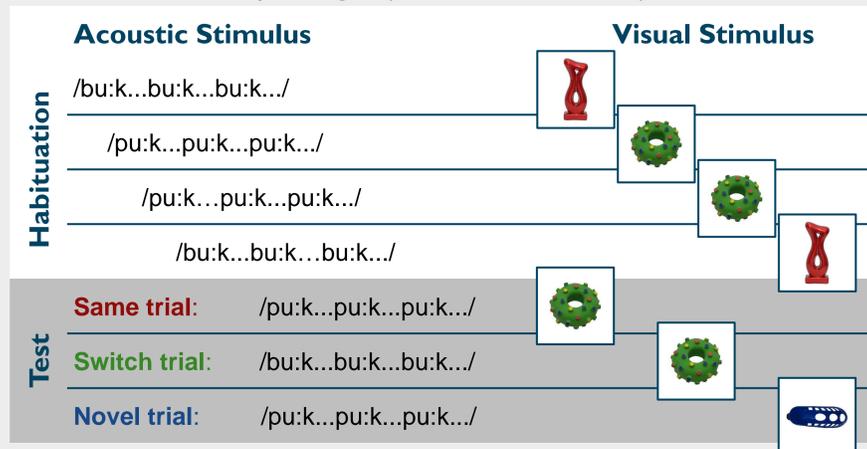
Group	N	Female/Male	Mean Age	Dropouts
No Variation	17	8/9	13.6 months	5 (25%)
Variation	17	8/9	13.9 months	12 (41%)

### Materials

- Nonwords (/bu:k/, /pu:k/) recorded from 18 native German speakers (6 male) in three different intonations:
  - Neutral: produced in isolation
  - Focused: »Look... X«
  - Question: isolated with rising pitch or »Is that a ... X«
- Between-participant factor *Variation*:
  - No Variation: 1 token (focused) from a female speaker
  - Variation: 54 tokens (18 speakers x 3 intonations)

### Procedure

- Habituation switch-paradigm (Werker et al., 1998)



- Habituation criterion: 50% drop in looking times for a window of 4 trials compared to the first 4 trials
- Maximally 30 habituation trials
- Counterbalanced assignment of words to objects and order of test trials
- One test trial for each condition (Same, Switch, Novel) for each child

### Apparatus

- Habit 2 (version 2.1.25)



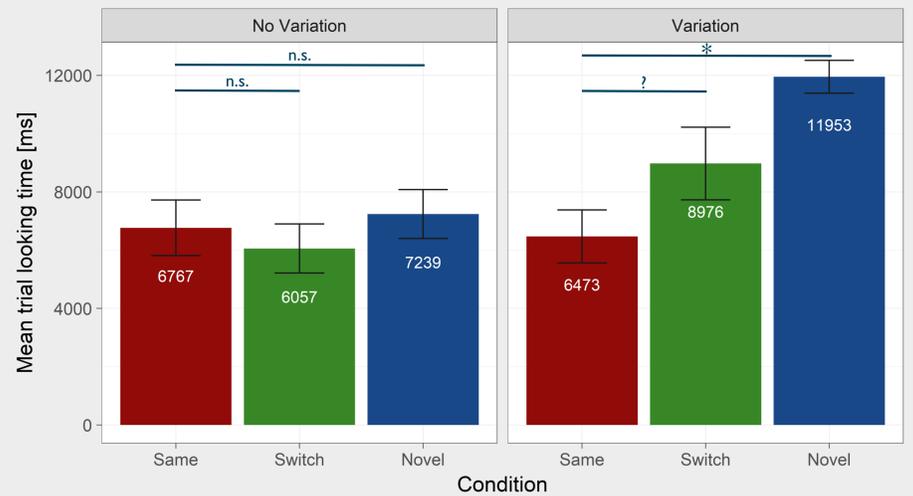
### Predictions (if variability has a beneficial effect)

- No Variation group: Looking times **Same** = **Switch**
- Variation group: Looking times **Same** < **Switch**

## 3 Results

- Number of habituation trials:
  - No Variation: Mean = 18.4 (8–28)
  - Variation: Mean = 16.8 (8–27)
- Habituation duration:
  - No Variation: Mean = 153 s (75–307)
  - Variation: Mean = 164 s (62–277)
  - No difference in habituation duration:  $t(32) = .534, p = .597, n.s.$

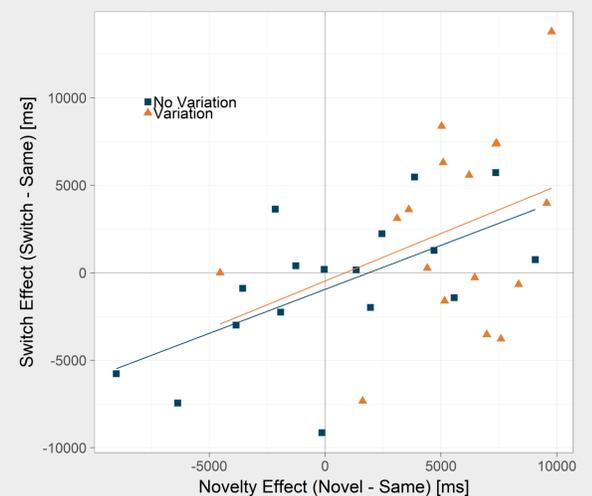
- Looking times in test trials:



- Comparison of:
  - No Variation**
  - Variation**
- Same vs. Switch:  $t(16) < 1, p = .484, n.s.$  vs.  $t(16) = 1.93, p = .071$
- Same vs. Novel:  $t(16) < 1, p = .692, n.s.$  vs.  $t(16) = 6.65, p < .001$

- Individual differences in learning novel words

- Positive correlation between Switch and Novel effect
- No Variation  $\rho = .61, p = .011$
- Variation  $\rho = .22, p = .39, n.s.$



## 4 Discussion & Future Directions

### 1. Variability plays a beneficial role in word learning.

- The findings of Rost & McMurray (2009) could be replicated (albeit with weaker effects).

### 2. Successful learning seems to be possible with zero variation.

- Individual performance patterns suggest that learning took place in the No Variation group as well and that there is a relation to looking time towards a novel object.

### 3. The nature of this variability advantage needs to be explored further.

- Is it a specific effect related to the phonetic/phonological properties or is it a domain-general effect related to attentional processes?
  - Effect of visual variation
  - Use of pupillometry in combination to habituation
  - Investigation of different linguistic variables: vowel context, variation of VOT, different feature contrasts in word learning



## 5 References & Thanks

