

# Language-dependent asymmetrical vowel perception

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## Introduction:

### Perceptual Reorganization:

Fast attunement of discriminatory abilities to specific sensory input. This process corresponds to declining discrimination for stimuli not present or relevant in the environment of the infant

### Natural Referent Vowel framework (NRV):

Better perception from a less focal to a more focal vowel than vice versa. The framework predicts a universal, language-independent vowel asymmetry (Polka & Bohn 2011).

### Native Language Magnet model (NLM):

The discrimination from a non-prototypical to a prototypical native exemplar is better than reverse. The model predicts a language-dependent asymmetry (Kuhl & Iverson 1995, Kuhl et al. 2008).

## Research Question:

### 1. When and how does language experience affect asymmetries in vowel perception?

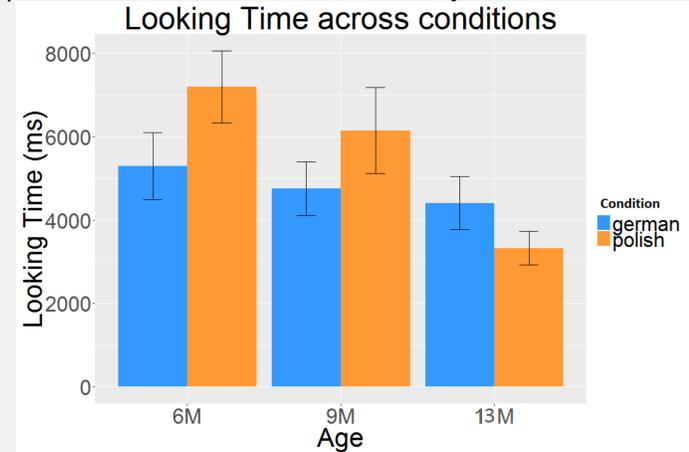
- NRV framework:** asymmetry from /i/ → /ɪ/ across all age groups because /ɪ/ as the more peripheral/ focal vowel
- NLM model:** an asymmetry from /i/ → /ɪ/, only when infants attune to the native language, since /i/ is less prototypical than /ɪ/

## Method:

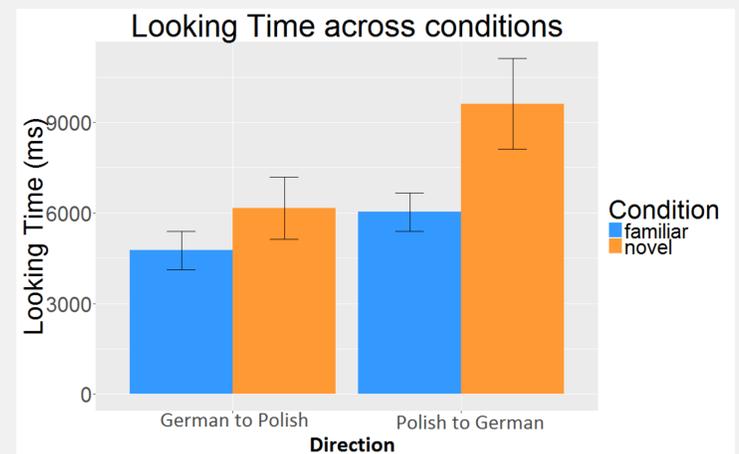
	Adults	Infants
<b>Stimuli:</b>	<p>Native German: /ɪ/-/i/</p> <p>Non-native Polish: /i/-/i/</p> <p>German-Polish: /ɪ/-/i/</p>	
<b>Participants:</b>	<ul style="list-style-type: none"> <li>20 German native listeners (21-34 years)</li> </ul>	<ul style="list-style-type: none"> <li>15 6-month-olds (M=182d)</li> <li>40 9-month-olds (M=270d)</li> <li>13 13-month-olds (M=270d)</li> </ul>
<b>Procedure:</b>	<p>Oddity discrimination task</p> <p>Which vowel in a string of three words is different than the other two (ABX, AXB, XAB)</p>	<p>Habituation</p> <ol style="list-style-type: none"> <li>Habituation: max 18 trials; criterion: LT &lt; 50% (over 3 consecutive trials)</li> <li>Test: 4 trials (2 novel, 2 familiar)</li> </ol>

## Results: Infants

### ➤ Perception of Polish and German vowel by 6- and 9- and 13-month-olds

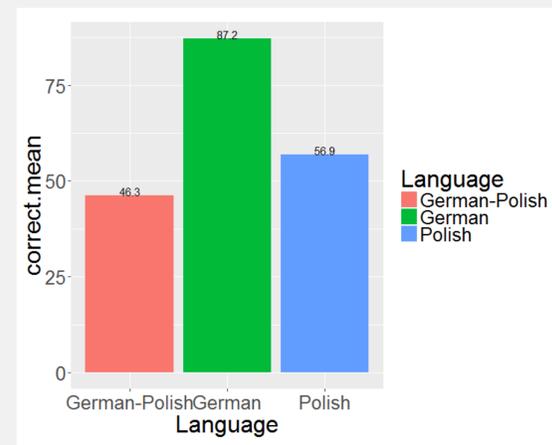


### ➤ Asymmetrical perception at 9-months



## Results: Adults

### ➤ No asymmetries observed; but different accuracy between vowel contrasts



## Conclusion:

- Infants perceive vowels asymmetrically as soon as the perceptual reorganization sets in
  - Our results favor the NLM rather than NRV
  - perceptual reorganization sets in at around 9 months
- Adults show no asymmetrical vowel perception
  - Difference between native and non-native vowel discrimination: native language influences vowel discrimination performance

## References:

Polka, L., & Bohn, O.-S. (2011). Natural Referent Vowel (NRV) framework: An emerging view of early phonetic development. *Journal of Phonetics*, 39(4), 467–478. <https://doi.org/10.1016/j.wocn.2010.08.007>

Kuhl, P. K., Conboy, B. T., Coffey-Corina, S., Padden, D., Rivera-Gaxiola, M., & Nelson, T. (2008). Phonetic learning as a pathway to language: new data and native language magnet theory expanded (NLM-e). *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 363(1493), 979–1000. <https://doi.org/10.1098/rstb.2007.2154>

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