German Preschoolers' Discrimination and Perception of Unstressed Syllables

Stefanie Radetzky (stefanie.radetzky@uni-mannheim.de)[1], Anna Schirmeisen[1], Christina Kauschke[2], Nicole Altvater-Mackensen[1]

[1]Chair of Psycholinguistics, University of Mannheim, [2]Clinical Linguistics, University of Marburg

Previous research suggests that infants and toddlers are sensitive to subtle acoustic and phonological detail in sound discrimination and word recognition [1, 2, 3]. Much of the existing work on the perception of phonological contrasts focuses on stressed elements and only few studies consider coda positions and unstressed syllables [4]. Therefore, the current study taps into the discrimination and perception of information encoded in different prosodic positions. In two experiments, we test whether German-learning preschoolers are sensitive to phonetic content of unstressed syllables as well as their detection of changes in the phonological detail of stressed and unstressed syllables.

In the first experiment, we investigate German-speaking preschoolers' phonetic discrimination (currently *N* = 39, aiming at *N* = 48), using an Oddball paradigm adapted for pupillometry (based on [5]). All participants listen to recordings of a pseudoword ([nuf**ə**] or [nuf**e**]) via headphones. After four to six repetitions of the standard stimulus, a deviant is presented with a change in the phonetic content of the unstressed syllable ([nuf**ə**] to [nuf**e**] or [nuf**e**] to [nuf**ə**]). If children are sensitive to acoustic information encoded in unstressed syllables, we expect pupil size to increase in response to the deviant. Additionally, a second deviant stimulus with a change in the phonetic content of the stressed syllable ([n**u**fə] to [n**o**fə] or [n**u**fe] to [n**o**fe]) serves as a control condition. As depicted in Figure 1, preliminary, descriptive data for the auditory standard [nuf**ə**] suggests an increase in pupil change for the experimental deviant ([nuf**e**]) as well as for the control deviant ([n**o**fə]).

In the second experiment, we test German-speaking preschoolers' (current *N* = 38, aiming at *N* = 48) sensitivity to changes in subsegmental detail of familiar words by measuring pupil sizes during a mispronunciation detection task (based on [1]). On each trial, children view a picture of a familiar object or animal on screen. The picture is either named correctly (e.g., [haːzə]) or incorrectly, introducing a change in the vowel or consonant of the unstressed (e.g., ['haːg**ə**]/['haːz**a**]) or stressed syllable (e.g., [**'b**aːzə]/['h**i**ːzə]). If children's sensitivity to changes in phonological detail depends on prosodic position, we expect differences in pupil reactions depending on whether a phoneme in the stressed or unstressed syllable is mispronounced. Preliminary data on consonant mispronunciations (Figure 2) indicates that pupil change was descriptively larger for changes in consonants of word-initial, stressed syllables compared to changes in consonants of word-final, unstressed syllables. Data collection for both studies is still ongoing, and the poster will present first findings of the full sample.

References

[1] Tamási, K., McKean, C., Gafos, A., Fritzsche, T., & Höhle, B. (2017). Pupillometry registers toddlers' sensitivity to degrees of mispronunciation. *Journal of Experimental Child Psychology*, *153*, 140-148. http://dx.doi.org/10.1016/j.jecp.2016.07.014

[2] White, K. S., & Morgan, J. L. (2008). Sub-segmental detail in early lexical representations. *Journal of Memory and Language*, *59*(1), 114–132. https://doi.org/10.1016/j.jml.2008.03.001

[3] Cheour, M., Ceponiene, R., Lehtokoski, A., Luuk, A., Allik, J., Alho, K., & Näätänen, R. (1998). Development of language-specific phoneme representations in the infant brain. *Nature Neuroscience*, *1*(5), 351–353. https://doi.org/10.1038/1561

[4] Von Holzen, K., & Bergmann, C. (2021). The development of infants' responses to mispronunciations: A meta-analysis. *Developmental Psychology*, *57*(1), 1-18. https://doi.org/10.1037/dev000114

[5] Liao, H., Yoneya, M., Kidani, S., Kashino, M., & Furukawa, S. (2016). Human pupillary dilation response to deviant auditory stimuli: effects of stimulus properties and voluntary attention. *Frontiers in Neuroscience*, *10*, Article 43. https://doi.org/10.3389/fnins.2016.00043

Figures and Tables

Figure 1: Preliminary, descriptive data on the mean pupil change in response to the auditory deviant [n**o**fə] (yellow line) and the auditory deviant [nuf**e**] (purple line) as well as mean pupil change in reaction to the respectively preceding auditory standard stimuli [nuf**ə**] (blue line).

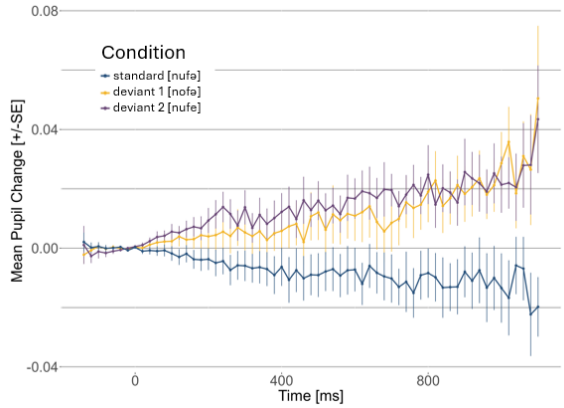

Figure 2: Preliminary, descriptive data on the mean pupil change for mispronunciations of the consonant in the stressed syllable (MPSC) and the consonant in the unstressed syllable (MPWC) as well as the pupil change in response to correctly pronounced items (CP).