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Testing the Phonemes Relevant for German Verb Morphology in Hard-of-Hearing Children

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Abstract

- Many hard-of-hearing children (HI) show delays or disorders in the acquisition of morphosyntax.
- These difficulties are connected to problems in the auditory domain. (e.g. McGuckian & Henry 2007)
- The new *FinKon-Test* evaluates the ability to discriminate consonants that function as suffixes in the German verbal inflectional system.
- A pilot study reveals significant lower discrimination scores in the HI group compared to typically developing (TD) children.

Aim of the study

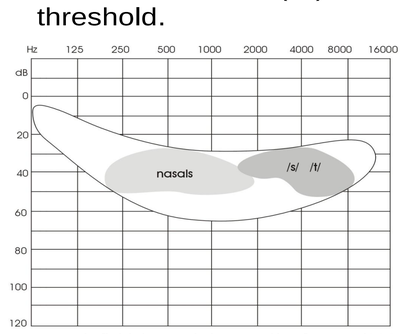
Development of a new perception test to evaluate the phonological base of the acquisition of German verbal morphology for children from the age of three onwards.

The FinKon-test

(Finale-Konsonanten-Test – 'final consonants test')

Context

- Most HI children (HI) have a sloping hearing threshold.



,speech field (speech banana)', cf. Fant (2004); Lindner (1992)

➡ they have more difficulties to perceive high pitched consonants (e.g. /s/ and /t/) than low pitched consonants (e.g. nasals)

- The coronal consonants **/s/**, **/t/** and **/n/** mark **subject-verb-agreement** in German.

	Present Tense forms of lachen (laugh)
1.Sg.	lach-(e)
2.Sg.	lach-s(t)
3.Sg.	lach-t
1.Pl.	lach-(e)n
2.Pl.	lach-t
3.Pl.	lach-(e)n

➡ perceptual difficulties might lead to problems in the acquisition of the subject-verb-agreement paradigm

➡ it is important to test the ability to discriminate these coronal consonants in word-final position

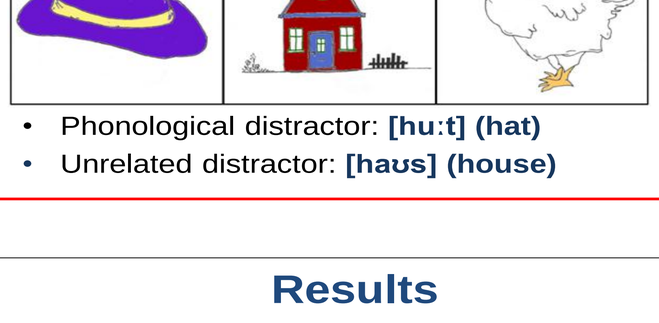
Methods

- The *Finkon-test* is constructed as **a picture-word-matching task**.
- Test words are replayed as **audio files** (65 dB).
- Subjects are presented with a **picture triplet**.
- They have to **point out** the word they hear.
- Reactions are **video-taped** and **recorded on paper** during the session.
- There are **two test blocks** with **11 test items**.
- Test items are **minimal pairs** contrasting in the **word-final position**.
- Eight monosyllabic word pairs are differing in **/s/**, **/t/**, or **/n/** resp. **/m/** in the **syllable offset.**
- Three disyllabic word pairs are differing in **-en** and **-el** in the **second syllable**.
- Words are part of **children's lexicon** (countable nouns that can be easily depicted).

First testblock

- Each triplet depicts the test item and two distractors:

Test item 10: **[huːn] (chicken)**

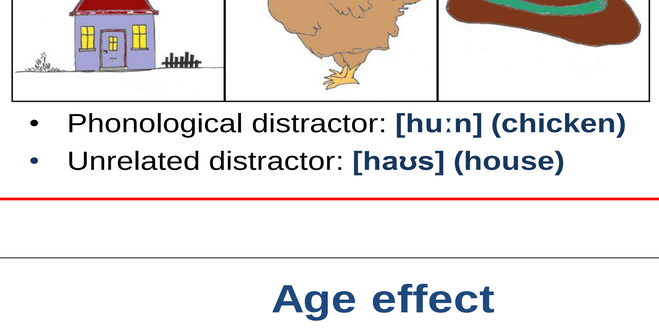


- Phonological distractor: **[huːt] (hat)**
- Unrelated distractor: **[haʊs] (house)**

Second testblock

- Here, the other part of a minimal pair serves as item:

Test item 15: **[huːt] (hat)**



- Phonological distractor: **[huːn] (chicken)**
- Unrelated distractor: **[haʊs] (house)**

Subjects

22 Hearing impaired (HI) children:

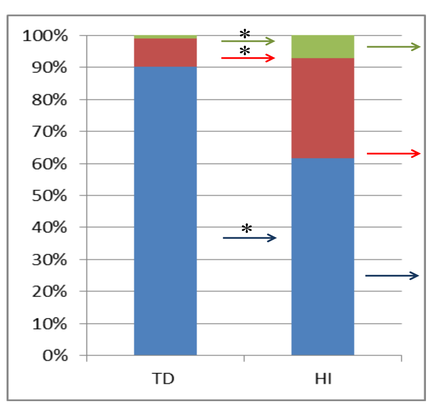
- 11 three year olds (3;2-3;10)
- 11 four year olds (4;2-4;11)
- moderate sensorineural hearing loss (38-78 dB)
- monolingual German, no sign language input
- no other physical or cognitive impairments

15 Typically developing (TD) children:

- 7 three year olds (3;1-3;11)
- 8 four year olds (4;1-5;0)
- monolingual German
- no physical or cognitive impairments

Results

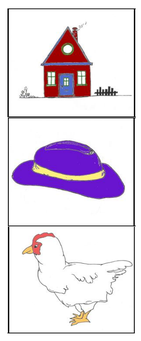
Significant differences in all categories: TD vs. HI



unrelated distractor (e.g. [haʊs])

phonological distractor (e.g. [huːt])

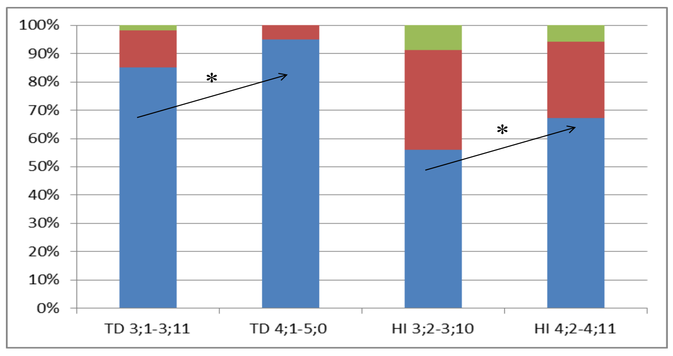
test item (e.g. [huːn])



(MWU, p< .05)

Age effect

Correctness scores increase significantly with age in TD and HI children



(MWU, p< .05 ;Pearson's r, p< .05)

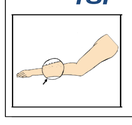
Discrimination between obstruents and nasals

/t/; /s/; /st/ vs. /n/; /m/ **TD: 96%** **HI: 65%**

e.g.:

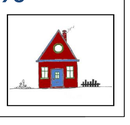
[vʊʁst] (sausage) vs. [vʊʁm] (worm)

/s/ vs. /t/ **TD: 82%** **HI: 50%**



e.g.:

[haʊt] (skin) vs. [haʊs] (house)



➡ HI children do not discriminate minimal pairs constrasting in /s/ and /t/ above chance level.

Factors within the HI group

❖ significant correlations (Pearson's r)

% Choice of	(unaided) hearing level	aided hearing level	age of hearing aid supply	duration of hearing aid use	IQ*
test item	✖	✖	✖	✖	✖
phonological distractor	✓ r(20)=.48, p= .02	✖	✖	✖	✖
unrelated distractor	✖	✖	✖	✖	✓ r(19)=-.62, p= .003

➡ **Unaided hearing level is the only factor that correlates with problems in the phoneme discrimination task**

➡ Children having general problems with the *Finkon-test* only reach low results in the IQ-Test (due to cognitive reasons or overall test performance problems)

Summary & Discussion

- HI children have problems discriminating coronal consonants in word-final positions.
- Test results correlate with the unaided hearing level.
- Since these affixes also serve as subject-verb-agreement-markers in German, we might expect deficits in the acquisition of the s-v-agr paradigm.
- The *FinKon-test* allows to investigate the impact of auditory restrictions on the acquisition of verb-morphology.

The *FinKon-test* serves as a tool in research and clinical work to investigate the phonological base for the acquisition of German verb morphology in HI children.

Acknowledgements

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