

## **A computer-based, wordfree phoneme identification test Teetahtoo – adaptation into Polish**

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### Introduction

The auditory processing of different phonemes is an important listening skill, which is usually already acquired in early childhood (Kuhl, 2004). These developments, in turn, affect a variety of other skills as speech development and normal acquisition of literacy skills (Eimas, 1985). Early detection and intervention of hearing disorders as well as advanced technology of auditory prosthesis like digital hearing-aids and cochlear implants improve the auditory capabilities of hearing impaired children. The achievement of skills like auditory discrimination and identification of phonemes become realistic objectives in the therapy of hearing-impaired children (Coninx and Moore, 1997). There is a lack of a well-defined and internationally comparable paediatric tests, assessing phoneme identification, in different languages as closely as possible comparable to each other. The aim of this work is to adopt to Polish language a computer-based, wordfree phoneme identification test Teetahtoo, which evaluates a child's ability to discriminate and identify different phonemes. The Teetahtoo test was developed for German language by Frans Coninx (Coninx and Stumpf, 2005).

### 2.2 Material and Method

The Teetahtoo test material contains only consonant-vowel syllables (like tee – tah – too), that means it is not dependent on the proband's lexicon. In order to avoid inferences with articulation problems, the test evaluates only decoding skills; the proband doesn't have to

repeat the test stimulus. The test contains six subtests: in two sets, the consonant is always the same, but the vowel changes, large vs. small contrasts. For Polish version the following phonemes were selected: vowels-A large contrast [vu] [va] [vo] [vy] [vɔ̃] [v'i], vowels-B small contrast [va] [vɔw] [vo] [ve] [ven] [vɔ̃n]. In four sets the variation is in the consonants while the vowel remain constant: large contrasts vs. small contrasts on different phoneme categories: cons-A large contrast [ga] [la] [ma] [va] [ʃa] [ta]; cons-B1 small contrast: plosives [ba] [da] [ga] [ka] [pa] [ta]; cons-B2 small contrast: nasals, laterals, liquidae [ja] [la] [ma] [na] [ra] [vua]; kons-B3 small contrast: fricatives and affricates [fa] [za] [sa] [ʃa] [ʒa] [wa].

The actual test screen presents a game where the testee has to uncover a hidden background image. The testee clicks on the blue hexagon in the middle. This hexagon contains the task: the target syllable is presented audially. Several orange hexagons adjoin the blue one. Only one of them contains the solution of the task: the same target syllable as associated with the blue hexagon. The testee has to find this orange hexagon and then drag the blue onto the orange hexagon. Regardless whether the answer has been right or wrong, the blue hexagon dissolves and uncovers a part of the background image. All hexagons may be clicked on as often as the testee likes. When each of the six test syllables has been presented for two times, the test stops. The remaining hexagons dissolve, and the background image is wholly visible.

For test set-up we used a quiet room and the following equipment: laptop and Logitech S-0155A loudspeakers placed in front of the person. The testee had to be familiar with using the mouse if he was not, then the examiner handled the mouse. He had to do what the child indicated by saying or pointing. In order to collect norm data for the Polish version of Teetahtoo 40 normal hearing children in the age from 4 to 7 years and 20 normal hearing adults between 20 and 30 years were tested with Teetahtoo. The native language for tested groups was Polish. To facilitate comparison of results between the children and adults ANOVA single-factor test was used. For the post hoc comparisons, the Tukey-Kramer honestly significant difference (Tukey-Kramer HSD) was used.

## Results

Results from the Polish version of the Teetahtoo test conducted with the normal hearing subjects both children and adults are presented separately for six subtests. Mean scores and

standard deviations are shown on the figure 1. For all subtest results in children were significantly different comparing to adults.

### Discussion and conclusions

It has been proven that it is possible to evaluate children as young as 4 years old using the Teetahtoo test. Adult's phoneme identification scores are statistically different from children's scores for all subtests. Standard deviations are larger in the group of children. The obtained results are age dependent. Due to substantial differences in children's development we are going to separate the age groups by half-year time periods and collect age norm data.

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Fig. 1. Age-based norm data

