Developmental courses and communicative abilities in childhood dysarthria: A longitudinal study

Elisabet Haas, Wolfram Ziegler & Theresa Schölderle

Research Group Clinical Neuropsychology (EKN) | Institute of Phonetics and Speech Processing | LMU Munich | Contact: elisabet.haas@ekn-muenchen.de

Background

Many children with neurological diseases show symptoms of dysarthria. To date, however, studies on the clinical characteristics of the disorder are scarce [1].

Little is known about the developmental course of childhood dysarthria [2].

The impact of childhood dysarthria on communication has not been investigated comprehensively.

We present a longitudinal study on children with neurological conditions. Two aims were defined:

1. To investigate age-normalized developmental trajectories.

2. To identify predictors of communicative abilities among dysarthria dimensions.

Methods

Participants

14 children (10 boys, 4 girls; 5½ - 8½ years) with different neurological etiologies

Design: longitudinal study

Materials

Computer game for the elicitation of standard speech samples:

BoDyS

Scales:

1. Respiration
2. Voice level
3. Voice quality
4. Voice stability
5. Articulation
6. Resonance
7. Articulation rate
8. Fluency
9. Prosodic modulation

Calculation of age norms

standard sample (144 TD children; age: 3½ - 9½, 72 boys, 72 girls)

- nonlinear modelling of the norm range
- calculation of standard scores ≤ 1 unimpaired = norm ≥ 1 impaired

Auditory-perceptual analyses

Scales:

Intelligibility

Naturality

Ratings:

0 = “very severe”
4 = “unremarkable”

Rating:

In the BoDyS scales:

Intelligibility: sentence transcription

Percentage of well-articulated words

Naturality: rating on visual analogue scale (0 – 100)

% intelligibility (predicted)

Listening experiment

For the assessment of communicative parameters: 240 naïve listeners (120 m, 120 f; median age 26 [18-60] years)

- intelligibility: sentence transcription
- averaged across 20 listeners

Results

Independent of the severity of dysarthria, the longitudinal analyses revealed three different patterns:

1. boy, 7½ years

- no/marginal improvement on selected speech parameters
- distance from respective age norm increases over time

2. girl, 8½ years

- significant, more generalized improvement
- gradual approach towards respective age norm

3. girl, 5½ years

- performance below age norm at first
- developmental course resembles that of typically developing children
- rather stable distance from age norm

Discussion

Intelligibility and naturality scores covered a wide range with most children being substantially impaired (mean intelligibility: 57% [3-100%], mean naturality: 44 [16-81] at T1). Intelligibility was predicted mainly by articulation, and, to a lesser extent, by other functional deficits.

Regarding naturality, articulatory as well as prosodic dysfunctions proved to be predictive.

Children with dysarthria constitute a heterogeneous group regarding severity, characteristics and developmental course.

- Profound knowledge about clinical characteristics against the background of typical speech motor development can contribute to a more valid clinical diagnosis.

- Correlations between functional and communicative speech parameters can offer indications on how therapists may find more efficient ways to improve intelligibility and naturality.

Our study is one of the first longitudinal investigations on childhood dysarthria. It may pave the way towards a standardized assessment and support a deeper understanding of the disorder, with the ultimate objective of increasing the effectiveness of a communication-oriented treatment for the affected children.