

Nonword repetition in children with Childhood Apraxia of Speech (CAS) and Speech Motor Delay (SMD) – does it reflect oral motor or linguistic difficulties

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Introduction

Reproducing novel words i.e. nonword repetition (NWR), is a well-known and frequently used task in both research and clinical practice. NWR tasks have been used to measure a range of linguistic, speech and motor abilities and has been found to be a sensitive marker for a range of speech and language disorders.

Aim

The overall aim was to investigate NWR in children with Childhood Apraxia of Speech (CAS) and Speech Motor Delay (SMD) in relation to linguistic and oral motor performance and also to compare those results to a group of children with Typical Speech Development (TSD).

Method

- 57 children with SSD aged 6:0-16:7 years (mean age 8:4), 12 girls and 45 boys, 34 children with CAS; 23 with SMD
- 39 children with TSD aged 6:0-12:2 years (mean age, 8:8), 18 girls and 21 boys
- A phonetic transcription of a word naming test and video recording of spontaneous speech was performed. Checklist for CAS (Iuzzini-Seigle & Murray 2017) was used for differential diagnostics together with Shriberg's classification system (Shriberg et al., 2010).
- A questionnaire including anamnestic information of pre-linguistic skills, heredity, and reading and writing ability
- Non-word repetition of 18 nonwords, two – four syllables. Percentage Consonants Correct (PCC) was calculated.
- Auditory discrimination was assessed with nine of the included nonwords presented in two pairs.
- Oral motor performance was assessed using a screening test for orofacial function (NOT-S) (Bakke et al., 2007).

Conclusion

Results indicate that children with CAS had more severe SSD and more difficulties related to auditory discrimination and reported reading and writing difficulties than children with SMD. Both children with SMD and CAS had orofacial dysfunction according to the screening test. To identify both strengths and weaknesses in different domains is important when planning for interventions. Assessing and analyzing both linguistic and oralmotor skills in relation to NWR is important since results indicates that these skills are intertwined.

Table 1. Background information, number of CAS features, orofacial function assessed with NOT-S, percentage consonant correct (PCC) in word naming (W) and nonword repetition (NWR) and result from auditory discrimination assessment in children with typical speech development (TSD), childhood apraxia of speech (CAS) and speech motor delay (SMD).

| | TSD n=43 | CAS n=34 | SMD n=23 |
|---|-----------|----------|----------|
| Age, year:month mean ± SD | 8:8 ±1:6 | 8:1 ±2:9 | 8:8 ±2:6 |
| Sex, Females/ Males | 18/21 | 6/28 | 6/17 |
| Heredity for speech- language disorders % | 8 | 73.5 | 67 |
| Babbling frequently % | 62 | 15 | 27 |
| Babbling poor or none % | 23 | 65 | 50 |
| Babbling missing info % | 15 | 20 | 23 |
| Reading and writing as expected for age % | 95 | 32 | 59 |
| Number of CAS features, mean ± SD | n.a. | 6 ±2 | 3 ±1 |
| NOT-S Total, mean ± SD | 0.28 ±0.5 | 4 ±2 | 4 ±2 |
| PCC-W, mean ± SD | n.a. | 56 ±22 | 78 ±15 |
| PCC-NWR, mean ± SD | 98 ±3 | 39.5 ±20 | 58 ±20 |
| Auditory discrimination, mean ± SD | 9 ±0.3 | 6 ±3 | 8 ±1.5 |

Results

- The results showed a difference between children with SSD and children with TSD on all anamnestic and assessed variables (Table 1).
- Children with CAS had a lower PCC on NWR and a lower result on auditory discrimination task compared to children with SMD (Table 1).
- There were also more children with CAS that reported difficulties with reading and writing ability than in children with SMD (68% vs 41%) (Table 1).
- No difference was found in oral motor performance assessed with NOT-S between children with CAS and SMD, 88% of the participants had an orofacial dysfunction according to NOT-S results (Table 1).
- A multiple regression analysis was conducted to further investigate associations between the variables (Table 2).

Table 2. Linear regression analysis. How age, number of CAS features, results of auditory discrimination performance and NOT-S examination result affect the variability in PCC in NWR in respective models 1-4. PCC in NWR is the dependent variable and the other variables are the independent variables (n=57).

| Model | Independent (predictor) | p | R ² adjusted | Explanation of variability in NWR |
|-------|-------------------------|--------|-------------------------|-----------------------------------|
| 1. | Age | 0.001 | 0.163 | 16% |
| 2. | Age | <0.001 | 0.378 | 37.8% |
| | Number of CAS features | <0.001 | | |
| 3. | Age | 0.006 | 0.276 | 27.6% |
| | Auditory discrimination | 0.004 | | |
| 4. | Age | 0.013 | 0.247 | 24.7% |
| | NOT-S examination | 0.012 | | |



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