A central issue in studies on developmental speech disorders, especially with regard to childhood apraxia of speech (CAS) and phonological disorder (PD) is the distinction between phonological and motor processes. Acoustic studies suggest that children with CAS produce incorrect realizations of correctly selected phonemes, whereas the opposite is postulated for children with PD. Thus conceived, the underlying impairment is located at different levels of speech production in these two groups of children.

**Aim of the present study**

Characterize phonological and motor processes in developmental speech disorders using kinematic and dynamic pattern analyses of speech motor behavior.

**Method**

Participants:
- 14 participants (6 female; 8 male) in 4 groups: CAS (n=4, 6-07-8-09) vs. Mix (n=5, 6-07-8-09), PD (n=1, 6-02), and Controls (n=6, 6-3-9-7).
- Task: Repeat /pa:/ and /spa:/ at a normal speaking rate.
- Data collection:
  - Electro-Magnetic Articulography (EMMA; Carstens AG100).
  - Acoustic analysis [van Lieshout et al., 2007]

- Tongue tip and lower lip closing movements:
  - Kinematics: amplitude, velocity, duration;
  - Dynamics: stiffness (peak velocity/amplitude) and cSTI (cyclic spatio-temporal index) (Fig. 1).
- Intra- and intergestural coordination:
  - Intra: upper-lower lip (bilabial closure); inter: bilabial closure-tongue tip;
  - Dynamic patterns: mean relative phase and phase variability (Fig. 1).

**Kinematics (Fig. 2, 3)**

- The CAS and Mix groups tend to larger amplitudes, velocity and duration in the closing movements of tongue tip and lower lip.

**Dynamics (Fig. 2, 3; Table 1)**

- The CAS group shows a larger stiffness than controls for /pa:/, but not for /spa:/.
- The Mix and PD children show a stiffness that is equal or less than controls.
- The CAS group shows less variability than controls on the cSTI-index.

**Results**

**Discussion**

**Future research**

- Task: Repeat /pa:/ and /spa:/ at a normal speaking rate.
- Conditions: Controls, Mix, PD, CAS.
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