



# Speech Characteristic of French-Speaking Children with Dysarthria: Pilot Study

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## Background

- Cerebral Palsy (CP) is a common cause of disability among children but few studies exist on the speech abilities of these children, particularly in languages other than English (Miller & Lowit, 2014).
- Although French is among the top 20 most spoken languages worldwide, there are few published studies describing speech sound or prosodic characteristics of children with dysarthria who are acquiring French.
- There are also few studies that examine speech intervention for children with this disorder (Pennington, Miller, & Robson, 2009).
- Speech-language pathologists (SLPs) have a weak research base to guide their assessment and intervention strategies for improving the children's communication.

## Speech Characteristics of Children with Dysarthria Due to CP

- Vocal intensity and articulatory working space are reduced in many children with dysarthria due to cerebral palsy (CP).
- Small treatment studies have suggested that targeting vocal intensity improves aspects of vocal functioning in this population (Fox & Boliek, 2012; Levy, Ramig, & Camarata, 2012), although less is known about the consequences for intelligibility.
- Cueing and modeling hyperarticulated speech can elicit hyperarticulation in typically developing children (Eaton & Ratner, 2013), but it is not clear that this is also true for children with dysarthria, whose motor restrictions may limit their abilities to imitate speech styles.

## Speech Characteristics Study

- For typically developing children, research has shown that cross-linguistic differences can impact the accuracy of speech production.
  - For example, French-speaking children master the speech sound /s/ at an earlier age than their English-speaking peers (MacLeod et al., 2011).
- In addition, prosodic differences, such as intonation and stress, between French and English may impact children's intelligibility.
- Thus, it is important to include cross-linguistic descriptions of dysarthria among children with CP to ensure that key clinical markers are generally observed, and not specific to English speakers.
- This may shed light on universal speech characteristics of dysarthria, as well as language-specific ones.

## Treatment Study

- Reduced speech intelligibility is a primary disability in children with cerebral palsy (CP) with dysarthria (Kennes et al., 2002).
- Extension of treatment study previously conducted with American-English speaking children (Levy, 2014; Levy, Ramig, & Camarata, 2012) to French speaking children
- Treatment based on **Speech Systems Intelligibility Treatment (SSIT)** (Levy, 2014), consisting of instruction on articulatory posture and phonation.
- Levy, Chang, Ancelle and McAuliffe (2016) found greater durations when American-English speaking children with dysarthria were prompted to speak with a "Big mouth," and higher intensity when they were prompted to speak with "Strong voice." Sentence and word intelligibility increased as a function of both prompts.

## References

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## Overview of Study

### Research Questions

- What are the language-specific and universal speech characteristics of children with dysarthria due to CP?
- What are the effects of prompting children to use a "big mouth" and "strong voice" in improving the intelligibility of children with dysarthria who speak French?
- What is the treatment outcome and maintenance of SSIT among English, French and bilingual children?

### Participants

12 native Belgian French-speaking children with CP

Age range: 5;6-17;0 years (mean=10;2)	9 w. spastic dysarthria (mild to moderate-severe)	3 w. dyskinetic dysarthria (mild to moderate-severe)
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### Measures (Pre-/Post-Intervention)

#### Non-Speech Tasks

- Diadochokinesis
- Oral mechanism exam

#### Phonological Tasks

- Speech sound accuracy at word and sentence levels
- Error patterns at word and sentence levels

#### Experimental Tasks

- Minimal pairs task to explore specific phonemes
- Words embedded in sentence to explore specific phonemes

### Treatment Study Design

#### Pre-Intervention

All children were tested twice before intervention.

#### Intervention

Children were randomized to SSIT treatment or fine motor treatment.

6.5 h of treatment over 13 days and 25 minutes of homework daily

Total of 90 hours of treatment

#### Post-Intervention

Same assessment protocol as pre-test (all children)

Immediately after last intervention session

3 weeks after last session

6 months after last session

## Preliminary Analyses and Results

### Task

- From the experimental tasks: Children repeated recorded utterances produced by an adult native French speaker. The 17 words were contrastive (based on Ansel & Kent, 1992) and uttered in the carrier phrase "Elle dit CVC(C) peut-être".
- A Shure headset-microphone was 8 cm from lips. Calibration was completed with a played 8 cm from microphone. Experimenter noted sound-pressure level (SPL) on Galaxy SP-meter adjacent to microphone.
- Changes in Sound Pressure Level (SPL) and duration were measured acoustically across three conditions

### "Habitual" Condition

Children were asked to repeat what they heard

### "Grande bouche" Condition

Children were asked to "speak with a big mouth."

SPL: ↑ from habitual by mean of 3.7 dB SPL

Duration: ↑ from habitual by mean of 35 ms

### "Grosse voix" Condition

Children were asked to "speak with a strong voice."

SPL: ↑ from habitual by mean of 6.5 dB SPL

Duration: ↑ from habitual by mean of 72 ms

Children were stimulative to the prompts of "grande bouche" and "grosse voix". Greater change was observed in both SPL and duration for "grosse voix".

### Future Directions

- Within-subject and between group comparisons of acoustic analysis (eg, vowel contrasts); perceptual analyses; and articulation assessments.
- Examine children's results on pre and post phonological tasks to identify particular phonemes that are in error to suggest potential clinical implications.
- In addition, similarities to and differences from research on English-speaking children will be examined.
- Continue the treatment "camp" in Summer 2016.

Clearly, in languages such as French, efficacy of intervention could be assessed only with further understanding of this population's speech characteristics.

Many thanks to the children and their families for participating in this research!