**ABSTRACT**

The purpose of this study was to extend Byrd, Conture, and Ohde’s (in press) empirical assessment of behavioral effects of holistic/incremental phonological priming on picture naming in children who stutter (CWS) and do not stutter (CWNS) by also employing electrophysiological (event-related potential, ERP) measures.

Participants were preschool-age CWS as well as age- and gender-matched CWNS split into two age groups, younger (39-50 months) and older (56-71 months).

Preliminary findings indicate that CWS rely more on holistic (word-like) compared to incremental (sound-like) processing and neutral primes than CWNS during picture naming. Holistic processing is thought to be a less mature, efficient means of processing and as such may contribute to the difficulties CWS have in establishing normally fluent speech-language production.

**INTRODUCTION**

**Phonology and Childhood Stuttering**

- Survey of 1184 SLPs revealed (across 46 USA states) 33.5% of CWS had articulation disorders.
- 12.7% of CWS had phonological disorders (Blood, Ridenour, Qualls, & Hammer, 2003).
- Persistent CWS more delayed in phonology compared to spontaneously recovering CWS (Paden & Yairi, 1996; Paden, Yairi, and Ambrose,1999).
- CWS encode phonological information in a subtly different manner than CWNS (e.g., Melnick, Conture, & Ohde, 2003).

**Incremental vs. Holistic Processing**

(Byrd, Conture & Ohde, in press)

- Both 3-year old CWS and CWNS were fastest with holistic (word-like) primes.
- However, by 5 years of age, CWS are fastest when presented with incremental (sound-like) primes whereas CWNS remained fastest with holistic primes.
- Therefore, CWS appear to be delayed in establishing more mature/advanced phonological encoding processes.

**METHOD**

Participants

- 12 CWS and 12 CWNS were divided into two age groups: young (39-50 months) and old (56-71 months).
- To date, 3 of the 12 preschool CWS studied received speech-language treatment for their stuttering (between 3 to 12 months duration).

Measures

- Picture-Naming Task (Byrd, Conture & Ohde, in press)
- Three prime conditions:
  1. Holistic: Almost the entire target word (e.g., “ed” prior to seeing the picture “bed”).
  2. Incremental: Onset of target word (e.g., “buh” prior to seeing the picture “bed”).
- Speech reaction times (SRTs) - a mean time in milliseconds.
- Naming errors - speech sound misarticulations, misarticulations, non-responses, and off-task behaviors, based on fluent responses.
- Event-related potentials (ERPs), during 700 ms epochs associated with fluent, accurate productions.

**RESULTS**

**Purposes**

- First main finding: All children - whether CWS, CWNS, younger or older - named pictures faster given holistic compared to incremental and neutral primes.
- Second main finding: Younger CWS, were more accurate in holistic compared to incremental and neutral conditions than either older CWS or either age group CWNS.
- Third main finding: Younger CWS, in particular, had lower ERP amplitudes in the holistic compared to the incremental and neutral conditions.
- Fourth main finding: Older CWS, but not older CWNS, had lower ERP amplitudes during holistic and incremental compared to neutral primes. Older CWS show greater ERP amplitudes in given holistic versus incremental primes.

**DISCUSSION**

There were four main findings, summarized below:

- **First main finding**: All children - whether CWS, CWNS, younger or older - named pictures faster given holistic compared to incremental and neutral primes.
- **Implication**: Picture-naming speed of preschool children is facilitated by holistic priming, suggesting they process, in terms of naming speed, in a less well-developed (“holistic”) way.
- **Second main finding**: Younger CWS, were more accurate in holistic compared to incremental and neutral conditions than either older CWS or either age group CWNS.
- **Implication**: Picture-naming accuracy of younger CWS is facilitated by holistic priming, suggesting they process, in terms of accuracy, in a less well developed (“holistic”) way.
- **Third main finding**: Younger CWS, in particular, had lower ERP amplitudes in the holistic compared to the incremental and neutral conditions.
- **Implication**: For younger children, especially younger CWS, less cognitive-linguistic effort is required given holistic primes, suggesting they phonologically process using this less mature strategy.
- **Fourth main finding**: Older CWS, but not older CWNS, had lower ERP amplitudes during holistic and incremental compared to neutral primes. Older CWS show greater ERP amplitudes in given holistic versus incremental primes.

Preliminary findings are consistent with Byrd et al. (in press) and suggest that preschool CWS phonologically encode differently than CWNS, using a less efficient, less mature means of phonological encoding than CWNS.

**CONCLUSION**

This method of phonological processing, which is not well matched to the increasing cognitive, linguistic, and motoric conversational requirements CWS face as they develop, may contribute to difficulties they have in establishing reasonably fluent speech-language production.

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