

Diadochokinetic Rate performance and variability in 5–12-Year-Old Children in Scotland

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Diadochokinesis (DDK), is a maximum performance task involving the rapid repetition of syllables. It is commonly used to evaluate the speed, regularity, and accuracy of speech motor function in children and adults^[1]. Whilst DDK rates typically increase and become more accurate with age^[1–2], substantial within-and between-child variability has been reported^[1,3]. Importantly, no study to date has explored what strategies children adopt to complete the DDK task that may contribute to the observed variability. This study investigated this aspect of variability in 275 typically developing children in Scotland aged 5–12 years, as part of a larger longitudinal project on speech variability^[4].

Two trials of the DDK task were recorded using a custom iPad app. Children were asked to repeat monosyllabic (/pɛ/, /tɛ/, /kɛ/) and trisyllabic (/petɛkɛ/) sequences “as fast as you can in a single breath.” An initial pilot analysis (77 children) was completed. Mean syllable duration was extracted in Praat^[5], DDK rate was computed ≥ 6 syllables, and the Coefficient of Variation (CoV) was calculated. Pilot DDK rate results reported previously^[6] showed increasing DDK rates with age^[1–2]. Full dataset analyses are ongoing and will be presented.

Visual inspection of the spectrogram was carried out to determine the strategies children employed to complete the DDK task. Analyses focused on the potential variability regarding the phonetic *realisation*, e.g. clear plosive burst vs. presence of incomplete closures. Alternative strategies that impacted performance, e.g. merging of syllables, were also identified.

Table 1 summarises the results for the pilot data for /p/: 19 children produced all syllables with a clearly visible plosive burst (‘perfect productions’); 32 children showed at least one instance of incomplete closure; 26 children showed at least one other strategy such as voicing, merging, and speed/rhythm variation. Children with ‘perfect productions’ showed the slowest but most stable performance (lowest CoV), whereas those using multiple strategies were faster but more variable in their performance. These findings show that children employ different production strategies during DDK tasks, suggesting that DDK rate alone, is not enough to interpret variability in oral-motor performance in typical populations.

Table 1. Results of /p/ DDK productions in the pilot dataset.

Metric	Perfect production N = 19	Incomplete closures N = 32	One other strategy N = 17	Multiple strategies N = 9	Pilot group N = 77
DDK Rate (Syll./ sec)	4.09 (range = 2.74-5.47)	4.47 (range = 3.03-5.77)	4.09 (range = 2.43-4.85)	4.38 (range = 3.62-4.93)	4.28 (range = 2.43-5.77)
CoV (%)	11.15 (range = 5.99-21.50)	12.15 (range = 7.16-24.07)	14.08 (range = 6.80-32.21)	16.14 (range = 10.22-24.24)	12.80 (range = 5.99-32.21)
No. of Syll	32.16 (range = 6-74)	37.13 (range = 6-78)	32.00 (range = 10-63)	46 (range = 27-87)	35.81 (range = 6-87)

References

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