

Intervention for word-finding difficulty for children starting school who have diverse language backgrounds

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Abstract

Children who have word-finding difficulty can be identified by the pattern of disfluencies in their spontaneous speech; in particular whole-word repetition of prior words often occurs when they cannot retrieve the subsequent word. Work is reviewed that shows whole-word repetitions can be used to identify children from diverse language backgrounds who have word-finding difficulty. The symptom-based identification procedure was validated using a non-word repetition task. Children who were identified as having word-finding difficulty were given phonological training that taught them features of English that they lacked (this depended on their language background). Then they received semantic training. In the cases of children whose first language was not English, the children were primed to use English and then presented with material where there was interference in meanings across the languages (English names had to be produced). It was found that this training improved a range of outcome measures related to education.

Introduction

Various disfluencies occur in the speech of young children attending UK schools. Some of these (e.g. stuttering) can require intervention by speech and language therapists whereas others (e.g. word-finding difficulty, WFD) can be addressed in school. WFD can happen irrespective of language background but is frequently seen in children who use English as an Additional Language (CwEAL) if their vocabulary is not well developed. One question that arises is whether speech difficulties and WFD lead to different patterns of disfluency that allow them to be distinguished. Once children with either form of difficulty have been distinguished, appropriate interventions can be given. A procedure that separates children with WFD (in CwEAL and children with English Only, CwEO) from both children who are fluent and also from those who have serious speech difficulty is reviewed below. Then research on an in-school intervention that addresses the best way to improve the English vocabulary acquisition of children with WFD is reported.

Identification of children with WFD

Fluent children have, by definition, low rates of all types of disfluency in their speech (Howell & Davis, 2011; Howell, 2013; Howell et al., in press; Mirawdeli & Howell, 2016). Children with serious speech difficulty have high rates of symptoms that fragment words (prolongations, word breaks and part-word repetitions) which are used to assess stuttering severity in Riley's (2009) test. Campbell (2014) showed that this set of symptoms also identified pediatric speech problems such as dyspraxia. Whole-word repetitions are not considered 'disfluent' by Riley (2009). However, whole-word repetitions are used as a diagnostic sign in the standard test for WFD (German, 1991) because children who are affected often repeat the words prior to the one they are trying to retrieve. Consequently, as whole-word repetitions are not used in Riley (2009), high rates of whole-word repetitions can be used as a selective indicator of WFD. However, whilst considerable evidence shows that whole-word repetitions are not indicative of serious fluency problems (see Howell, 2010 for review), DSM-5 maintains that whole-word repetitions are a sign of stuttering. Hence, use of whole-word repetitions as an indication of WFD, not speech difficulty, requires external validation. Also, since WFD is common in CwEAL, an appropriate validation procedure needs to work equitably whatever language a child speaks.

Non-word repetition occurs frequently in the speech of children who have serious speech difficulties (Bakhtiar, Ali & Sadegh, 2007), but happens less often in the speech of children who are fluent (Gathercole et al., 1994). Non-word repetition should also be unaffected in CwEAL who have WFD because they often have to produce unfamiliar English phoneme sequences which makes similar demands to non-word repetition (Bialystok, Majumder & Martin, 2003). CwEO who have WFD should not have non-word repetition problems if the problem is due to limitations of vocabulary, rather than articulation (Ellis Weismer et al., 2000). In summary, for children showing disfluencies, only those with high rates of Riley's (2009) symptoms should show non-word repetition problems which provides an alternative way of

distinguishing them from children with WFD (who should not have non-word repetition problems).

A further issue to address before this prediction could be tested arose because non-word repetition tasks designed for one language may not be appropriate for other languages. For instance, Masoura and Gathercole (1999) reported that Greek children who learned English at school performed better on a Greek than an English non-word repetition test. Therefore, a task that applies equitably across languages was required for assessing non-word repetition ability in heterogeneous language samples. The Universal Non-Word Repetition test was developed for this purpose (Howell et al., in press). The Universal Non-Word Repetition test employs a common core of syllabic phonotactic constraints. Non-words generated according to these constraints are phonologically well-formed for all of these languages. Howell et al. (in press) administered the Universal Non-Word Repetition test to 96 4-5 year old children attending UK schools (20.83% of whom had English as an additional language). The children's speech samples in English were assessed separately for disfluency and whole-word repetitions. Regression models showed Riley's (2009) symptom score predicted Universal Non-Word Repetition test performance, which indicated that the Universal Non-Word Repetition test scores depended on whether there was speech difficulty. Whole-word repetitions did not predict Universal Non-Word Repetition test scores, which showed that Universal Non-Word Repetition test scores did not depend on whether there was WFD. The results for both speech and WFD applied whatever language was spoken; there were no effects of language group in the analyses.

Intervention for WFD

Wing (1990) determined that both phonological and semantic training were necessary when treating people with WFD whereas Ebbels et al., (2012) reported success with semantic training alone; both studies used participants who spoke English only. CwEAL do not use all phonological constructions employed in English in their native language and can encounter lexical interference when individual sound patterns result in different meanings in English and the alternative language. To design appropriate phonological training material, note that the Universal Non-Word Repetition test involves material that is easy to produce as the constraints apply to many languages. Conversely, the material excluded from the Universal Non-Word Repetition test stimuli is 'difficult' (forms that are idiosyncratic to particular languages). The phonological material

that is challenging depends on the language(s) children speak. For example, Polish does not use h and θ and Urdu does not have s-consonant and s-consonant-consonant clusters. Hence material that included these forms would pose problems when children speaking these languages learn English. Improving performance on unfamiliar phonological constructions that are used in English should improve access to English vocabulary items that apply these constraints (Wing, 1990). To date, appropriate material has been developed for Polish, Urdu, Lithuanian and Mandarin.

A problem specifically faced by CwEAL is that sound forms may occur in both their languages and activate either the same semantic representation (true friends, e.g. 'cat' has the same meaning in both English and Polish), or different semantic representations (false friends, e.g. 'pet' means 'cigarette stub' in Polish but 'tame household animal' in English). False friends cause semantic interference.

Phonological and semantic training material was developed for English, Polish and Urdu. These were used to assess and then train the children. The impact of the training on a battery of educational outcomes was established to see whether training for WFD improved their school performance in general.

Method

Participants

The phonological and semantic training was delivered in group sessions over three weeks (one session per week). (The intervention takes five weeks in total, including baseline and end of intervention assessments.) Groups consisted of 38 English seven Polish and six Urdu children.

Intervention

Phonological training involved repeating a non-word that corresponded in phoneme type to an actual English word that had voicing and place on consonants changed. Participants repeated the non-words (which served as primes), and in subsequent tests saw pictures of the corresponding word items which they were required to name.

In the semantic procedure true friends and items that were only words in English were presented first to prime the children in employing their English lexicon. Then false friend materials were presented. For true friends and words with meaning in English alone, the English meaning would be primed, and it was hypothesized that this training would induce children to continue producing English words when faced with false friend material.

Assessment battery made at baseline and follow-ups

Educational impact of the training was measured before and after the intervention period, as well as at follow-up. First, children with speech difficulties other than WFD were identified (Mirawdeli & Howell, 2016). These children may have WFD as well as speech difficulties, but the remaining children have WFD only. After children with speech difficulties were excluded, children who have WFD in the remaining sample were identified based on rate of whole-word repetition symptoms.

The children with WFD underwent a battery of assessments. The assessments collected specific measures expected to be affected by the intervention (word-finding and fluency) and a selection from the Get Ready for Learning assessment (Bowyer-Crane et al., 2008). Inclusion of Get Ready for Learning assessment tasks ensured that a comprehensive set of language and literacy outcomes were obtained and allowed comparison with other studies. All children received all baseline, post-treatment and follow-up assessments individually.

Procedure

Children’s entire performance was audio-recorded, allowing the appropriate parts to be selected for analysis. At least one test from the three skill areas (language, literacy, and phonological skills) examined in Get Ready for Learning assessment was included, with modifications made to achieve efficiency and to ensure CwEAL were assessed equitably. The assessments chosen from Get Ready for Learning assessment were: language: narrative comprehension; literacy: letter-sound knowledge and early word recognition; phonological assessment: was made using the Universal Non-Word Repetition test (Howell et al., in press).

Additional language tests were: conducted For fluency, Riley (2009) was used; two measures of WFD were employed (whole-word repetition rate and tests from German’s Test of Word Finding Difficulty (German, 1991), standardised from age 4;6). The phonological and semantic components of the intervention were also assessed.

Intervention

A picture-naming task was given after both phonological and semantic training had taken place. The picture-naming tasks that were given after phonological (non-word training) and semantic training (training to produce English words) were conducted using picture material not seen during intervention. These picture-naming tasks allowed the effects of long-term changes due to training and any retention over time to be assessed.

Results and discussion

The following table gives the effect sizes (differences pre- and post-treatment) for the three language groups (English, Polish, Urdu). Effect sizes are given for four assessment categories with several measures within each category. These are: 1) Language (narrative comprehension, disfluency rate, whole-word repetitions rate, test of word-finding difficulty score (%T-units)); 2) Literacy (letter-sound knowledge, early word recognition); 3) Phonological (scores on Universal Non-Word Repetition test); 4) Picture-naming tasks corresponding to those used in the intervention (phonological and semantic).

Table 1 Results of assessment for the language groups.

Lang.	Assessment category	Measure	Cohen's D*	
English	Language	Narrative comp.	0.155	
		Disfluency rate	0.409	
		WWR r whole-word repetitions ate	0.452	
			Test of word-finding difficulty score	0.502
	Literacy	Letter-sound	0.295	
		Early word	0.407	
Phonological		Universal Non-Word Repetition test score	0.417	
Picture naming	Phonological	0.552		
	Semantic	0.496		
Polish	Language	Narrative comp.	0.127	
		Disfluency rate	0.455	
		WWR whole-word repetitions rate	0.858	
			Test of word-finding difficulty score	0.749
	Literacy	Letter-sound	0.633	
		Early word	0.590	
Phonological		Universal Non-Word Repetition test score	0.398	
Picture naming	Phonological	0.497		
	Semantic	0.502		
Urdu	Language	Narrative comp.	0.135	
		Disfluency rate	0.448	
		WWR whole-word repetitions rate	0.508	
			Test of word-finding difficulty score	0.489
	Literacy	Letter-sound	0.462	
		Early word	0.324	
Phonological		Universal Non-Word Repetition test score	0.563	
Picture naming	Phonological	0.525		
	Semantic	0.511		

* Modulus is given as gains due to training are indicated by positive and negative values.

The results generally show moderate to good effect sizes for all measures and language groups with the exception of narrative comprehension (mean without narrative comprehension is approximately 0.5).

Whilst effects on literacy could be because of schooling or the intervention (there was no control group at present – a delayed treatment group is being run), the lack of effects on narrative comprehension suggests otherwise (this should have improved over this period too if the effects were due to schooling). Literacy showed greater effects than in Get Ready for Learning assessment for letter sound and positive effect on word reading arose (they found a negative effect).

Even CwEO may have difficulty with advanced English phonology which is a property of the material designed for training for the individual languages. Hence performance differences between CwEO and CwEAL language groups would be reduced and new ways of generating material are being developed that should increase these differences.

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References

- Bakhtiar, M., D. A. A. Ali & S. P. M. Sadegh. 2007. Non-word repetition ability of children who do and do not stutter and covert repair hypothesis. *Indian Journal of Medical Sciences* 61:462–470.
- Bialystok, E., Majumder, S. & Martin, M. M. 2003. Developing phonological awareness: Is there a bilingual advantage? *Applied Psycholinguistics*, 24(1):27–44. DOI: 10.1017/S014271640300002X
- Bowyer-Crane, C., M. J. Snowling, F. J. Duff, E. Fieldsend, J. M. Carroll, J. Miles, K. Gotz & C. Hulme. 2005. Improving early language and literacy skills. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 49 (4):422–432.
- Campbell, A. 2014. *The separation of spoken communication disorders based on symptoms in speech of four and five year old children*. Unpublished Master's thesis. University College London, United Kingdom.
- Ebbels, S. H., H. Nicoll, B. Clark, B. Eachus, A. L. Gallagher, K. Horniman & G. Turner. 2012. Effectiveness of semantic therapy for word-finding difficulties in pupils with persistent language impairments: a randomized control trial. *International Journal of Language & Communication Disorders*, 47(1), 35–51. DOI:10.1111/j.1460-6984.2011.00073.x
- Ellis Weismer, S., B. Tomblin, X. Zhang, P. Buckwalter, J. Chynoweth & M. Jones. 2000. Non-word repetition in school-aged children with and without language impairment. *Journal of Speech, Language and Hearing Research* 43(4):867–878.
- Gathercole, S. E., C. S. Willis, A. D. Baddeley & H. Emslie. 1994. The Children's Test of Nonword Repetition: A test of phonological working memory. *Memory* 2:103–127.
- German, D. J. 1991. *Test of Word Finding in Discourse*. Austin, TX: PRO-ED.
- Howell, P. 2010. *Recovery from Stuttering*. New York: Psychology Press. ISBN-13: 978-1-84872-916-2
- Howell, P. 2013. Screening school-aged children for risk of stuttering. *Journal of Fluency Disorders* 38:102–123.
- Howell, P. & S. Davis. 2011. Predicting persistence of and recovery from stuttering at teenage based on information gathered at age eight. *Journal of Developmental and Behavioral Pediatrics* 32:196–205.
- Howell, P., K. Tang, O. Tuomainen, K. Chan, K. Beltran, A. Mirawdeli & J. Harris. In press. Identification of fluency and word-finding difficulty in samples of children with diverse language backgrounds. *International Journal of Language & Communication Disorders*.
- Masoura, E. & S. E. Gathercole. 1999. Phonological short-term memory and foreign vocabulary learning. *International Journal of Psychology* 34:383–388.
- Mirawdeli, A. & P. Howell. 2016. Is it necessary to assess fluent symptoms, duration of dysfluent events and physical concomitants when identifying children who are at risk of speech difficulties? *Clinical Linguistics & Phonetics* 30:696–719.
- Riley, G. 2009. *The Stuttering Severity Instrument for Adults and Children (SSI-4)* (4th ed.). Austin, TX: PRO-ED.
- Wing, C. S. 1990. A preliminary investigation of generalization to untrained words following two treatments of children's word-finding problems. *Language, Speech, and Hearing Services in Schools* 21(3), 151–156.