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Screening English and Arabic children for speech fluency and treating word-finding difficulty

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Background

Andrews and Harris (1964) reported that the incidence of stuttering is 4.9% and Yairi and Ambrose (2005) confirmed that approximately 5% of pre-school age children exhibit episodes of stuttering. Such speech disfluencies need to be identified at an early age so that effective and appropriate intervention can take place before the problem becomes acute. This applies in countries like the UK and Saudi Arabia where both English and Arabic are spoken by some children. When children are not speaking their native language, their speech would include many instances of whole-word repetitions, which is an indication of word-finding difficulty (WFD). The latter is a type of communication difficulty that can occur in the speech of monolingual children, but it is particularly frequent in the speech of children who use English as an additional language (EAL) (Howell et al., 2017). Thus, it is important to have brief tests that can discriminate children with WFD from children who stutter (CWS) when they first enter school. CWS may then be referred for speech language therapy (SLT) to receive the right type of intervention.

Aims

The aims of this study included (1) separate children with speech dysfluencies from children with WFD using simple procedures that apply equally to English- and Arabic-speaking children; (2) treat WFD in monolingual English children and Arabic children with EAL. Non-word training materials were specifically designed to include patterns not used in the speaker's native language but that are required if that speaker is to use another targeted language (English or Arabic). The goal is to use them as interventions that train phonemic sequences that are exercised infrequently, or probably not at all, within the additional language used, either English or Arabic. For example, a native Arabic speaker learning English would be expected to struggle most on those phonotactic patterns not used in Arabic but required for English. It is hypothesized that phonological priming which involves repeated exposure to the unfamiliar sequences would increase familiarity with such structures and improve overall fluency. To support that, NWR performance should improve initially, which should generalize to lexical performance (less WFD, improve speech rate and fluency) and improve language skills.

Methods

Participants

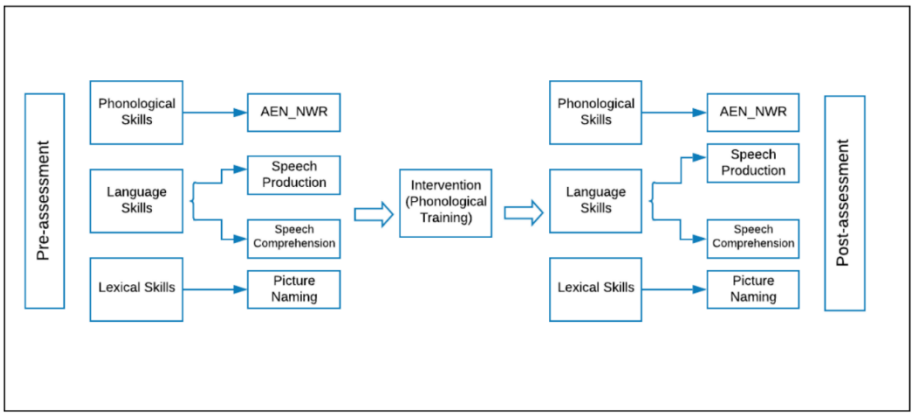
All children from reception classes and year 1 at King Fahad Academy in London whose parents consented to participation were tested. Twenty-six 4-6-year-old Arab-speaking children were assessed pre- and post-intervention. None of the children had hearing impairments. Language history information was obtained from the children and verified by teachers.

Procedure

Children were tested individually in a quiet room in 15-minute sessions. All sessions were audio recorded using a Sennheiser SC 660 USB ML wired headset and Audacity software for subsequent analysis. In the pre-test, a spontaneous speech sample of 200 syllables (minimum) was recorded and used to obtain measures of speech dysfluency according to Riley's (1994) Stuttering Severity Instrument (SSI-3) and word-finding difficulties. Characteristics of word-finding difficulty included unnecessary repetition of words and empty words that add no content or specificity to the message. Children's phonological skills were assessed based on their accuracy in repeating non-words of

different syllable lengths from the Arabic-English non-word repetition (AEN_NWR) task. The AEN takes the phonotactic constraints of Arabic and English and generates materials that are phonologically well-formed and are appropriate to children who speak either of the two languages. Presenting children with those non-word materials can aid in identifying production difficulties and facilitate separating children who are fluent from those who have WFD and from children who are dysfluent (Howell et al., 2017). Additional language tests included a narrative comprehension task to measure a child's comprehension abilities after being narrated a story based on a picture they were presented with and had to answer questions about. A picture-naming task was also conducted where children named pictures of English words with selected phonological structures that corresponded to those in the intervention materials. Pictures were selected from CBeebies; a sub corpus of the SUBTLEX (Van Heuven at al., 2014) British English corpora. CBeebies was built using children spoken language and has a word frequency scale ranging from 1 to 6 to indicate the number of times every word has appeared in the corpus (1=low frequency and 6=high frequency). Only words with a Zip scale higher than 4.60 were selected to minimize the number of errors due to not knowing the picture. Reaction time (RT) was calculated from the onset of the picture to the participant's voice onset. During the intervention, children repeated the English set of non-words (which served as primes) that were designed to expose them to English phonotactic structures that are challenging for them because they represent patterns of English not found in Arabic. The stimuli were presented starting with the least phonologically complex materials, like vowels and consonant phonemes that occur in monosyllables and progressed through complex clusters word initially and word finally. Children were exposed to all intervention materials and no feedback was given. Children were told prior to the non-word tests (screening and intervention) that they would hear made-up words that they should repeat. Measures were taken pre and post the intervention (see Figure 1) to establish any improvements as a result of the intervention. All stimuli were pre-recorded by a native British male speaker who is phonetically trained in English and Arabic.

Figure 1. *Study design outlining the different tasks during pre and post tests and the intervention*



Outcome and results

Three repeated-measures ANOVAs were conducted with one within group factor (two levels, before and after the intervention) using RT, picture-naming accuracy or NWR scores as the main dependent variables. As expected, a main effect of training was found, indicating that RT significantly decreased across pre and post assessment sessions ($F(1,25) = 9.719$, $p<.000$). In the second analysis, the mean picture-naming accuracy increased significantly after the treatment ($F(1, 25) = 8.77$, $p=.007$). The third analysis also determined that NWR scores increases significantly across pre and post assessment sessions ($F(1, 24) = 14.298$, $p<0.000$). A slight reduction was found in the rate of whole-word repetition and the percentage of speech syllables, but these were not significant.

Conclusion and Implications

The results of this study suggest that phonological priming has promise for treating WFD and associated fluency problems for Arabic children with EAL. The intervention procedure is fast and easy to administer by schoolteachers. The improvements relative to baseline occurred immediately post-intervention but follow-up tests are needed to examine whether there are sustained improvements. Future work should consider the recruitment of a control group to show whether any training effects are due to teaching input rather than the intervention. In ongoing work, we are testing a larger number of children with diverse language backgrounds including monolingual English and English children with Arabic as additional language. Differences between the groups are to be examined and reported at the conference.

Acknowledgment

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