Speech supplementation techniques for dysarthria: a systematic review  
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CRD summary
This review assessed the effects of speech supplementation techniques on dysarthric speech. The authors concluded that speech supplementation may help speakers with any type of severe or profound dysarthria, but more research is required. The evidence was based on small studies of unknown quality in a variety of patients, hence any conclusions are suggestive rather than definitive.

Authors' objectives
To assess the effects of speech supplementation techniques on dysarthric speech.

Searching
PsycINFO, MEDLINE and CINAHL were searched from inception to January 2003; the search terms were reported. Relevant books were handsearched and reference lists in identified studies were checked.

Study selection
Study designs of evaluations included in the review
Studies with at least one participant were eligible. Studies that provided only general descriptions of the strategies used were excluded. There were no other inclusion criteria for the study design.

Specific interventions included in the review
Studies of speech supplementation techniques were eligible for inclusion. The review assessed the effects of alphabet cues, semantic cues, gestures, combinations of strategies, and syntactic cues. In most of the included studies, speakers read prepared sets of words and/or sentences. The studies used various electronic modes to present stimuli from a variety of sources (details were reported). All studies were conducted in experimental situations.

Participants included in the review
Studies of patients with dysarthria were eligible for inclusion. Studies of patients with unintelligible speech due to hearing impairment or other disorders were excluded. The included studies were of patients with a variety of medical diagnoses, the most common being cerebral palsy, cerebrovascular accident and traumatic brain injury. Other diagnoses were amyotrophic lateral sclerosis and Parkinson's disease. The participants had different types of dysarthria, including flaccid, mixed, spastic, athetoid and hypokinetic (reported in 12 studies). Most of the participants were adults but the age range was great (9 to 87 years). The reviewers considered most participants to have severe or profound speech unintelligibility.

Outcomes assessed in the review
Inclusion criteria for the outcomes were not specified. The included studies most commonly measured outcomes by assessing intelligibility using the accuracy of the listeners' transcription of the speakers' message. Studies also assessed speaking rate, speech duration and comprehension. Listeners were most commonly undergraduates or graduate level students; none of the listeners were members of the general public.

How were decisions on the relevance of primary studies made?
Two authors reviewed the identified studies.

Assessment of study quality
The authors did not state that they assessed validity.
Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. For each study, the numbers of speakers and listeners and details of the interventions and outcomes were extracted.

Methods of synthesis
How were the studies combined?
The characteristics of the studies were described under the following headings: speaker characteristics and tasks, mode of presentation, and listeners and listening task. The studies were then grouped according to intervention type (alphabet or semantic cues) and combined in a narrative. Word and sentence intelligibility were assessed with and without alphabet cues and with and without semantic cues.

How were differences between studies investigated?
Differences between the studies were discussed in the text.

Results of the review
Nineteen studies (89 speakers and 785 listeners) were included. No details of the study designs were given.

All studies showed improvements in outcome measures.

Three of the six studies examining gestures used the same speaker.

Alphabet cues.
Six studies assessed this outcome and reported results for the individual patients. Compared with no cues, alphabet cues increased word intelligibility for all speakers (mean gain 11.3%, range: 5 to 25; based on 11 speakers) and sentence intelligibility (mean gain 25.6%, range: 5 to 69; based on 21 speakers). Greater improvement was found for speakers with greater severity of disability, but there was increased variability in the results among severely impaired patients.

Semantic cues.
Nine studies assessed this outcome, six of which reported results for the individual patients. Compared with no cues, semantic cues increased word intelligibility for all speakers (mean gain 28.1%, range: 3 to 48; based on 33 speakers) and sentence intelligibility (mean gain 10.7%, range: 0 to 52; based on 26 speakers).

Authors’ conclusions
The results suggested that speech supplementation techniques may help speakers with any type of severe or profound dysarthria and any underlying medical condition. More research is required.

CRD commentary
The review addressed a broad research question encompassing a wide range of participants. Inclusion criteria were not specified for either the outcomes or study design. Three relevant databases, books and reference lists were searched, but no attempts were made to locate unpublished studies, thus raising the possibility of publication bias. It was unclear whether any language restrictions had been applied. Two authors reviewed the studies but, as it was not stated whether this was done independently, it is not known whether any efforts were made to reduce errors and bias. Validity was not assessed, and there were no details of the study designs or of the agreement among multiple listeners assessing outcomes.

Given the variability among the studies, a narrative synthesis was appropriate. The authors discussed some of the limitations of the review. Since the quality of the included studies and the methods used to conduct the review were not reported, it is difficult to comment on the strength of the evidence underpinning the authors’ conclusions. The evidence was based on small studies in a variety of patients, hence any conclusions must be viewed as suggestive rather than
Implications of the review for practice and research
Practice: The authors stated that speech supplementation techniques may be useful for speakers with severe or profound dysarthria, regardless of the type of dysarthria or medical diagnosis. The patients likely to receive most benefit have dysarthria limiting communication in natural settings, and have adequate pragmatic and cognitive abilities and sufficient motor function to generate the cues. The authors stated that the choice of which strategy to use must be made on an individual basis and that listener training should be incorporated into the interventions.

Research: The authors stated that there is an urgent need to assess various speech supplementation strategies in more natural communication settings using well-controlled experimental studies. They stated that future studies should adequately describe the process of assessment and training of speakers and listeners, describe communication partners, and assess other outcome measures.

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