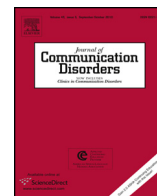




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## Journal of Communication Disorders



Research paper

## The efficacy of the cycles approach: A multiple baseline design

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## ARTICLE INFO

## Article history:

Received 3 September 2013

Received in revised form 22 December 2013

Accepted 23 December 2013

Available online 3 January 2014

## Keywords:

Cycles approach

Phonological intervention

Speech sound disorder

Children

## ABSTRACT

The purpose of this study was to evaluate the efficacy of the Cycles Phonological Remediation Approach as an intervention for children with speech sound disorders (SSD). A multiple baseline design across behaviors was used to examine intervention effects. Three children (ages 4;3 to 5;3) with moderate-severe to severe SSDs participated in two cycles of therapy. Three phonological patterns were targeted for each child. Generalization probes were administered during baseline, intervention, and follow-up phases to assess generalization and maintenance of learned skills. Two of the three participants exhibited statistically and clinically significant gains by the end of the intervention phase and these effects were maintained at follow-up. The third participant exhibited significant gains at follow-up. Phonologically known target patterns showed greater generalization than unknown target patterns across all phases. Individual differences in performance were examined at the participant level and the target pattern level.

**Learning outcomes:** The reader will be able to: (1) enumerate the three major components of the cycles approach, (2) describe factors that should be considered when selecting treatment targets, and (3) identify variables that may affect a child's outcome following cycles treatment.

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## 1. Introduction

The Cycles Phonological Remediation Approach (Hodson, 2010; Hodson & Paden, 1991; Prezas & Hodson, 2010) is a prominent intervention method for treating severe speech sound disorders (SSD) in preschool and school age children. Not only is it one of the most frequently implemented phonological methods in clinical practice (Rvachew, Nowak, & Cloutier, 2004), but it has also been accepted as a standard method for treating SSDs in research studies. In particular, it has been combined with stuttering therapy (Conture, Louko, & Edwards, 1993), phonological awareness intervention (Gillon, 2005), and speech perception and stimulability training (Rvachew, Razaat, & Martin, 1999, Study 2) in studies investigating subpopulations and subcharacteristics of children with SSDs.

The major components of the cycles approach were derived from principles of developmental phonology, cognitive psychology, and research in phonological acquisition (see Hodson, 2010, p. 109). These principles led to the hypothesis that children with SSDs would benefit most from a program that included (1) pattern-focused selection of intervention targets and stimuli, (2) cyclical targeting of problematic patterns, and (3) use of focused auditory input in combination with production–practice activities during treatment sessions. Hodson (e.g., Hodson & Paden, 1991) strongly emphasizes that all three of these components are essential aspects of cycles therapy. Previous experimental studies exploring the efficacy of the

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cycles approach have used modified versions of this treatment method (see Baker & McLeod, 2011). These modifications have involved the elimination or substantial alteration of one or more of the three principal components, and no two studies have implemented the same treatment procedures. Clinicians interested in using the cycles approach are faced with the difficult choice of either attempting to implement one of the several cycles modifications for which efficacy has been established, or using the approach as described by Hodson knowing that it has not been fully validated within the context of an experimental design. The decision is further complicated by the fact that the details of the modifications are not always reported in published studies, whereas Hodson has articulated her methods in books, book chapters, and manuscripts, removing much of the guesswork for clinical professionals.

This study aimed to provide preliminary evidence for the efficacy of the cycles approach as described by Hodson and colleagues using an experimental single-subject research design. In particular, we examined whether the combination of pattern-based target selection, cyclical treatment, focused auditory input, and production–practice activities would result in generalization of trained sounds to non-treatment stimuli. In this way, we endeavored to make evidence-based practice more accessible for professionals intending to use the unmodified cycles approach in clinical practice.

### 1.1. Previous research

A recent review (Baker & McLeod, 2011) identified only four studies that examined the efficacy of cycles-based procedures in experimental or quasi-experimental designs. Tyler, Edwards, and Saxman (1987) compared the cycles approach to the minimal pairs procedure in a multiple probe AB design. Four participants were assigned to one of the two intervention methods based on the nature and severity of their errors. For the cycles group, therapy targets were selected according to Hodson's recommendations, treatment sounds were presented in facilitative phonetic environments, each participant received at least two cycles of therapy, and sessions consisted of auditory bombardment with production–practice activities. The only modification from the original cycles protocol involved discontinuing treatment of certain sounds (or patterns) if they were incorrect more than 50% of the time, and substituting less problematic targets in their place. The authors found that both intervention methods resulted in improvements for targets over non-targets, but that cycles resulted in remediation of three to five processes in the time it took to remediate one process with the minimal pairs procedure.

Tyler and Watterson (1991) used a between-subjects design with semi-random allocation to compare the efficacy of the cycles approach to that of a script-based language intervention approach in children who exhibited both language and speech sound disorders. These researchers modified the cycles approach to fit the study's group treatment design. Modifications included targeting processes that were not characteristic of all participants and use of non-focused auditory bombardment. The children participated in only one cycle of therapy; therefore, problematic patterns were not recycled for additional treatment. These researchers found no significant differences between pre- and post-treatment measures of consonant accuracy (i.e., percentage consonants correct in single words) for either experimental group.

Almost and Rosenbaum (1998) examined the efficacy of phonological intervention in a randomized controlled trial. Thirteen participants were assigned to an immediate treatment group and thirteen to a delayed treatment group. The authors reported using a modification of the cycles approach when scheduling treatment of target patterns; however, other aspects of treatment were not cycles-specific. After four months of intervention, the immediate treatment group showed significantly greater accuracy in both single word and conversational contexts than the delayed treatment group suggesting that treatment resulted in meaningful improvements in speech sound accuracy.

Using a within-subjects design, Rvachew et al. (1999) examined whether progress and improvement during cycles treatment might be affected by individual differences in stimulability and speech perception ability. Because the authors were primarily concerned with these two characteristics, the unit of observation was individual sounds rather than individual children. As a result, the treatment protocol was modified from the original cycles approach – only one training sound was selected to teach each target pattern. Over 50% of stimutable sounds and over 60% of well-perceived sounds showed improvement; however, unstimulable sounds and poorly perceived sounds showed little improvement. Their results indicate that speech perception and stimulability may play a role in intervention progress.

The results of these four studies appear quite mixed with two suggesting little to no improvement following cycles training and two indicating that the cycles approach facilitates large and significant improvements in speech sound accuracy. Methodological differences across the studies could explain, to some degree, the variability in observed outcomes. For example, the number of sessions per participant ranged from 9 to 29, some studies used group therapy while one-on-one therapy was provided in others, and the outcome measures were different in each case (e.g., percentage occurrence of phonological processes vs. percentage consonants correct vs. performance on an articulation test). Furthermore, each study implemented a 'modified' version of the cycles approach. As the components of an intervention method are modified, the underlying nature of the method is also modified. For example, Stoel-Gammon, Stone-Goldman, & Glaspey (2002) suggest that teaching only one sound per process changes an approach from one that is pattern-based to one that is phoneme-based. As a result, the successes and failures noted in previous studies may be attributable to study-specific intervention procedures rather than to the cycles approach itself – a valid concern for professionals interested in implementing the cycles approach as described by Hodson (e.g., Hodson, 2010).

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