

International Journal of Childhood and Development Disorders

E-ISSN: 2710-3943

P-ISSN: 2710-3935

IJCDD 2022; 3(1): 04-06

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www.rehabilitationjournals.com

Received: 04-11-2021

Accepted: 08-12-2021

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Evidence based efficacy of linguistic approach to phonological intervention: A case report

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Abstract

Developmental Phonological Disorders (PD) are common among children. In spite of having number of approaches for treating phonological disorder, a Speech Language Pathologist (SLP) still faces the problem of choosing one. The purpose of this study was to investigate the effectiveness of linguistic approach for treating the phonological processes. A six year old female child diagnosed with PD received an individually adjusted intervention; whereby depalettisation (dp) and velar fronting (vf) were the target processes while deaspiration (da) and cluster reduction (cr) were the control ones. While the target process was treated throughout the course of intervention, control process remained untreated. Though the child received intervention at a frequency of twice a week, but the monitoring for all the processes were done once on each week through administration of generalization probe. It was observed that over a period of twenty sessions, the target processes improved in accuracy whereas no improvement were observed for the control process, thus indicating the effectiveness of linguistic approach.

Keywords: Evidence based practice, Phonology, Linguistic Intervention, Single subject design, generalization probe

Introduction

Phonological disorders are characterised by failure to use developmentally appropriate speech sounds based on the child's age and dialect. This was formerly called "Developmental Articulation Disorder". However, current thinking suggests a newer and broader term, "Phonological Disorder" that includes additional perceptual and cognitive aspects of speech sound production and understanding (Hulit & Howard, 2002) [7]. A phonological disorder is thus said when a child possess a phonological process in his/her language more than the age of extinction of that process in his/her developmental age. In other words, processes exist in a child's language even after he/she crossed the limits of age when that particular process is expected to disappear. (Pena-Brooks & Hedge, 2007) [9]. Developmental phonological disorders are a common problem in children, affecting approximately 10% of American population (Gierut, 1998) [6], 15% of Italian population (Longoni & Aiello, 2004) [8], and 16% of Chinese population (Siok, Perfetti, Jin & Tan; 2004) [10]. Gender and socioeconomic status might influence the acquisition of phonological skills (Cavalherio, Brancalioni & Keske-Soares, 2012) [4].

Most practising SLPs still use the traditional articulation therapy methods focusing on the correction of one phoneme at a time, but strategies that enable such children learn several phonemes, would speed up the remedial process. Moreover, if a child's problem is linguistically based, teaching him to produce isolated phonemes may not help him discover the phonological rules that will allow him to match the adult system. A newer method, i.e., "Linguistic Approach" is being used now a day and is claimed to be an efficient procedure for remediation of error patterns and generalisation to other contexts, situations and listeners. This approach, also known as patterned based approach uses behavioral treatment techniques to remediate articulation and phonological disorder. It includes behavior treatment procedure that consist of target behavior specification, modeling, imitation, evocation (without modeling), positive reinforcement for corrective production (motor production), corrective feedback for in corrective production, shaping, and techniques to promote maintenance. The target treatment elements chosen are in the form of phoneme, syllable, words, phrases and sentences (Pena-Brooks & Hedge, 2007) [9]. "All linguistic and language based approach accomplish their goals only by their behavior treatment techniques" (Bankson & Bernthal, 2004) [2].

Need of the Study

Literature has widely acknowledged the efficiency of various treatment approaches, but SLPs still face the challenge to understand and recognize the particular approach which is best and suitable for the individual clients. According to evidence-based practice (EBP), to consider the individual is a central concept. Thus the present study was an attempt to address the newer avenue of multiphonemic correction issue in Indian context.

Objective

The present study aims on the following goals: (a) effectiveness of an individually adjusted intervention (linguistic approach) which targets the phonological processes of velar fronting and depaetalisation, in a Hindi speaking preschool child, and (b) to find out the number of therapy sessions needed to achieve generalisation in therapy that target the untreated stimuli.

Methodology

Participant: The participant of the study was a six year old female exhibiting moderate-severe phonological impairment, from the department of speech language pathology at Sri Aurobindo Institute of Medical Sciences, Indore, Madhya Pradesh.

Research Design: Single subject research with multiple baseline design

Procedure: Four behaviors of the participant were base-rated. Two of them were the dependent variables which included the treated phonological processes, i.e., velar fronting; vf and depaetalisation; dp, while the control variables comprised the untreated phonological processes, i.e., deaspiration; da and cluster reduction; cr (over the time period taken to remediate the dependent variables). The dependent variables were measured using word, sentence and paragraph lists, while the control variables were measured only through the word lists (of twenty stimulus

each) to obtain the generalization of the probe data. This study was divided into three phase namely pre-treatment phase, treatment phase and post-treatment phase. In the pre- treatment phase, baselines (B) were established by measuring the dependent and control variables on three occasions (once a week). Treatment (I) was given twice a week (sessions lasted for an hour) to both the dependent variables and measurements were done once a week. During these sessions, remediation started at the word level (W) which progressed through the performance-based criteria of 80% from sentence (S) to paragraph (P) level (through exemplars that were not the part of generalization probe). Post Interventions (PI), were reassessed on three occasions which was once a week followed by an interval of 2 months (F). On each occasion the generalization probe data was obtained by a non-treating SLP, to avoid any bias from the treating clinician. All these measurements were video-recorded with a Sony Digital Handycam.

Statistical Analysis: Descriptive and inferential (d-index; d_i to calculate the effect size of intervention) statistical analyses were done using the collected data to determine whether intervention was effective in remediating the target phonological processes, and to ascertain if any statistically significant change happened without intervention for the untreated processes.

Results and Discussion

The child made a significant progress in 20 sessions as evidenced by the diminished occurrence of depaetalisation and velar fronting because of an individually adjusted linguistic intervention. The generalization probe data guided the SLP's to treat and decide when to modify or stop intervention by targeting the dependent variables. Approximately 8 sessions were required to attain both the dependent variables in word level, while additional 4-6 sessions were required for its generalisation to paragraph level. The results are presented graphically below (Figure 1).

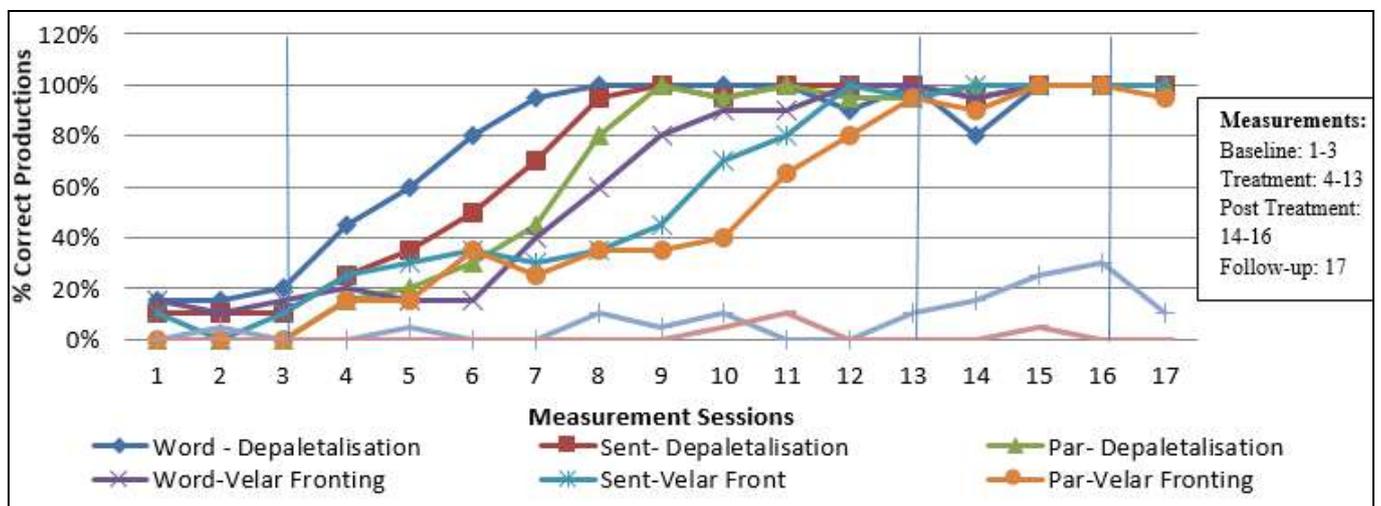


Fig 1: Baseline, intervention, post intervention, and follow up measurements for generalisation probe words, phrases, and sentences and control words for six year old subject. During the intervention phase measurements were made once in every week.

All the d -indexes that could be calculated to target phonemes had positive values, which reflected the efficiency of the intervention. However a remarkable observation was that, once the targeted process had

diminished in word level, lesser number of sessions were required to generalise the same till paragraph level. The same could be ascertained statistically as a gradually lower positive d-index score was obtained from word level to

paragraph level [$d_i (W_{dp}) = 25.1 > d_i (S_{dp}) = 6.1 > d_i (P_{dp}) = 4.7$ and $d_i (W_{vf}) = 20.9 > d_i (S_{vf}) = 4.2 > d_i (P_{vf}) = 3.7$] across both the treated processes, thus indicating a progressively lesser effect size of treatment. Proponents of “linguistic approach” found that generalization does occur from trained to untrained words and also across linguistic contexts (Blache & Parsons, 1980; Weiner, 1981)^[3, 11]. Elbert (1990)^[5] also reported that response generalisation will occur when children are active in learning process and learning a few new sounds has the potential to affect the child’s whole phonological system.

Though therapy was continued (once a week) for the untreated phonological processes (in the post treatment phase of dependent variables, i.e., probe session 14-16) the expectation that these processes would remain unaffected (as the control variables showed no developmental trend throughout the study period) was confirmed. (as the use of untreated processes remained between 0%- 10% over the time period of intervention). Also, the d - indexes that was calculated for control variables had either a negative [$d_i (W_{da}) = -0.21$] value or could not be calculated [$d_i (W_{cr})$] because of a stable baseline resulting in a standard deviation of zero. In a comparative study of two groups of pre- school children by Almost & Rosenbaum (1998), it was found that the group which was enrolled for speech intervention showed a significant improvement as compared to the group of children who did not received any active treatment.

Conclusion

This paper focuses on the importance of evidence-based management of linguistic approach to intervention among phonological impaired children. The necessity to consider the evidences along with the child’s responses is being highlighted in order to take appropriate decisions individually, not only at the end, but also during the course of intervention. Though theoretically the linguistic approach to intervention is based on the assumption that generalization will occur, but SLP must always be aware of testing success through periodic probes. It is suggested that probes should be designed with large number of test stimuli to measure small improvement in the specific phonological process. Moreover, it is difficult to conclude when a phonological ability has reached to a satisfactory level of generalization through the conventional test batteries (that includes examples of phonemes across word positions). Based on the results of single case study, we cannot decide in advance about the number of therapy sessions needed for remediation of individual processes, since a vast heterogeneity has been reported to be existing among children with PD.

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