



Naturalistic intervention in cleft palate children

Ma. Carmen Pamplona, Antonio Ysunza*, Paloma Ramírez

Hospital Gea González, 4800 Calzada de Tlalpan, 14000 México, D.F., Mexico

Received 12 February 2003; received in revised form 9 September 2003; accepted 11 September 2003

KEYWORDS

Cleft palate;
Speech;
Therapy

Summary *Aim:* To compare two modalities of speech intervention (SI) in cleft palate children with compensatory articulation disorder (CAD). The first modality was a phonologic based intervention, the second modality was a naturalistic intervention. The main purpose was to study whether a naturalistic intervention may reduce the total time of speech therapy necessary for correcting CAD in cleft palate children as compared to a phonologic intervention. *Materials and methods:* A prospective, comparative, and randomized trial was carried out. Cleft palate children with velopharyngeal insufficiency and CAD were included in the study group. Only patients with an age ranging from 3 to 7 years were included. A total of 30 patients were selected and were divided randomly into two groups. Fifteen patients were included in the first group (control) and received phonologic SI. The other 15 patients were included in the second group (active) and received naturalistic SI. The speech pathologist in charge of the SI was the same in all cases. A blind procedure was utilized whereby each patient was evaluated independently by two speech pathologists every 3 months until both examiners were convinced that CAD had been completely corrected. The mean total time of SI required for the normalization of speech in the two groups of patients was compared. *Results:* Median age in the control group was 54.5 months, and 57.5 months in the active group. A Mann–Whitney rank sum test demonstrated a non-significant difference ($P = 0.803$). The mean total time of SI in the control group was 14.53, and 16.27 in the active group. A student's *t*-test demonstrated that the total time of SI was not significantly reduced ($P = 0.331$) when a naturalistic intervention was utilized. *Conclusions:* Naturalistic based SI did not reduce the time necessary for correcting CAD in cleft palate children.

© 2003 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

Speech outcome in cleft palate patients depends on articulation and nasal resonance. Cleft palate patients may be at risk for articulation disorders. Certain articulation disorders are generally regarded as compensatory behaviors secondary to velopharyngeal insufficiency (VPI). These articulation patterns are known as compensatory articulation disorder (CAD) (Figs. 1–4).

Articulation disorders in children may be either phonetic or phonologic in nature.

Several authors have described that cleft palate patients are at risk for phonetic based problems due to the structural deviations associated with clefting [1–3]. However, cleft palate children may be also at risk for phonologic disorders [4,5].

Chapman, in 1993, described the speech disorders in cleft palate patients. She stated that CAD may initially occur as a consequence of the cleft, producing a phonetic based disorder. Over time, these errors become incorporated into the child's developing rule system producing a phonologic disorder [4].

*Corresponding author. Fax: +52-55-55-68-50-86.

E-mail address: amysunza@terra.com.mx (A. Ysunza).

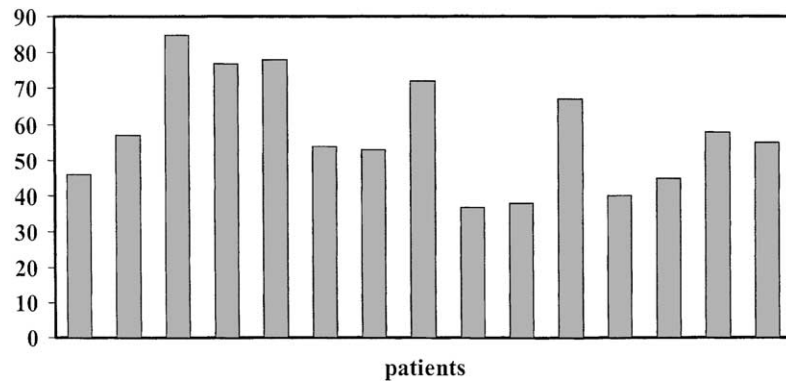


Fig. 1 The graphic illustrates the age at the onset of speech therapy (expressed in months of age) in each of the patients [15] included in group 1 (treated with a phonologic approach).

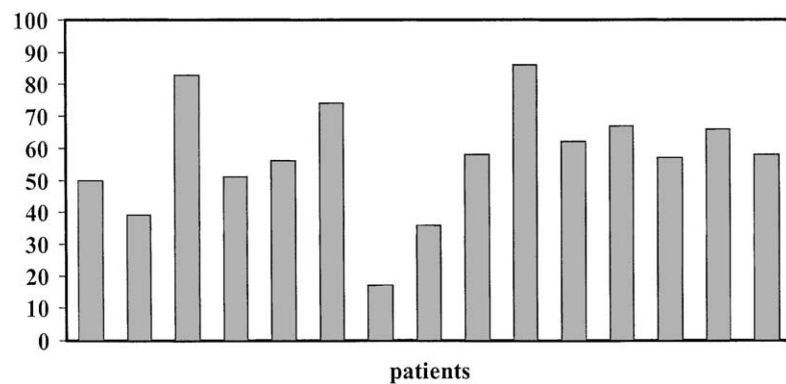


Fig. 2 The graphic illustrates the age at the onset of speech therapy (expressed in months of age) in each of the patients [15] included in group 2 (treated with a naturalistic approach).

Speech intervention in cleft palate children with a phonetic approach considers articulation learning as a specific time of motor learning. Moreover, errors in articulation must be seen as disruptions at some level of the relatively peripheral articulatory processes. Consequently, some therapy procedures are based almost exclusively on the notion that articulation errors are due to faulty control of

the articulators [6,7]. In contrast, in a phonologic approach the children must learn more than just a set of complex articulatory patterns associated with words. They must learn a complete phonology. Furthermore, several authors have proposed that some central, cognitive-phonological processing must be included in any description of phonological acquisition [8].

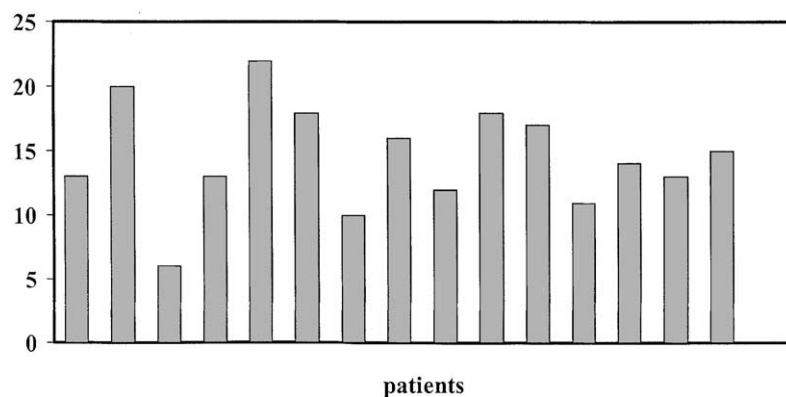


Fig. 3 The graphic illustrates the total time of speech therapy (expressed in months) in each of the patients [15] included in group 1 (treated with a phonologic approach).

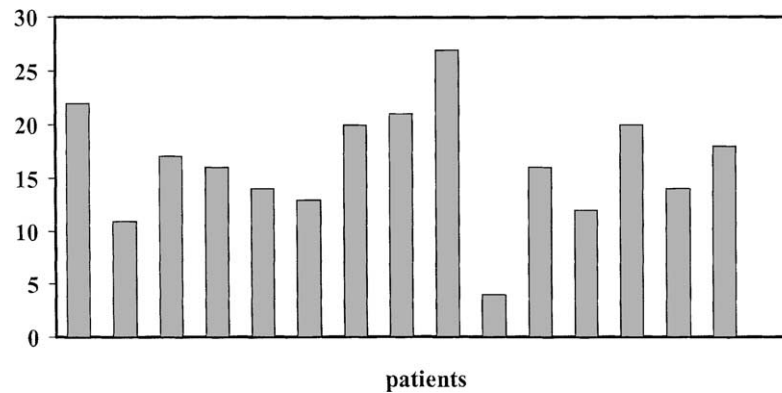


Fig. 4 The graphic illustrates the total time of speech therapy (expressed in months) in each of the patients [15] included in group 2 (treated with a naturalistic approach).

Pamplona and Ysunza [5], compared two different approaches for speech intervention in cleft palate children with compensatory articulation disorder, a phonetic approach, and a phonologic approach. Results indicated that the total time of speech intervention necessary for correcting children compensatory articulation disorder associated with cleft palate, was critically reduced when a phonological approach was used [5].

This finding suggested that many of the articulation problems in children with repaired cleft palate currently viewed as phonetic may actually be phonological.

Because the phonological system is integrated with the language system, and because faster progress was made when treatment for CAD was under phonologic approach, it was also suggested that the language of children with CAD should also be assessed. Hoffman, in 1992, stated that children's speech sound production and perception errors are related not only to phonological knowledge, but also to higher organizational levels of language processing. He also mentioned some research findings indicating that children who have difficulty learning phonology also show similar difficulties for learning morphological, syntactic, and semantic regularities of language as well [8].

Other researchers have identified language problems in children with cleft palate, including syntax (i.e., grammar), morphology, and vocabulary [2,9]. These findings suggest that many of the language problems actually exhibited by children with CAD may be overlooked when the speech disorder is viewed from a phonetic rather than a phonological perspective. In many cases, there is an interaction between the phonological rules and other language rule systems, so that an articulation problem is really far more complex in nature than a phonetic analysis would suggest.

Moreover, Pamplona and Ysunza [10] studied the relationship between CAD and the child's language system. They found that children with CAD differ in their overall development of language, and not just speech productions, from children with repaired cleft palates who do not show the CAD speech patterns [10].

Hence, if we assume that children present with CAD show linguistic organization disorders, an intervention aimed to correct CAD should include a simultaneous approach for enhancing cognitive linguistic organization.

Whole language principles propose that phonologic information should not be separated from the other areas of language, such as pragmatics or syntax. Thus, within the same activity, several pieces of information about all areas of language, including phonologic are provided. By the same token, phonologic information is provided as a whole within a significant event. The production of speech sounds is not itself a goal. In a naturalistic intervention, the production of relevant speech sounds is taught and reinforced within the situation. Speech sounds are not selected previously.

The purpose of this paper is to study and compare two different approaches for speech intervention in cleft palate children with compensatory articulation disorder, a phonologic approach, and a naturalistic approach based in whole language philosophy.

2. Materials and methods

Sample size was calculated at an alpha 95% confidence interval, and a Beta power of 80% for a comparative study of two groups. The frequency of compensatory articulation disorder in cleft palate children, and the mean period of time of speech therapy necessary for correcting this disorder were

considered. According to these data, at least 14 patients should be included in each group.

All cleft palate patients attending the cleft palate clinic of the Hospital Gea González in Mexico city from January 1999 to December 1999 were evaluated. To qualify for the study group for this paper, the patients had to meet the following criteria:

1. Unilateral, complete cleft of primary, and secondary palate [11]. The patients had to be normal in all respects otherwise.
2. Cleft palate width had to be grades I or II [12].
3. Palatal repair of the UCLP had to be performed according to the surgical routine of the Cleft Palate Clinic. This routine includes: surgical repair of the lip and primary palate between 1 and 3 months, and surgical repair of the secondary palate between 12 and 18 months with a minimal incision palatopharyngoplasty [12].
4. Velopharyngeal insufficiency (VPI) after palatal repair had to be demonstrated by phoniatric assessment, videonasopharyngoscopy, and multi-view videofluoroscopy [13].
5. Compensatory articulation disorder in association with VPI had to be demonstrated by phoniatric assessment during isolated and connected speech.
6. Absence of postoperative fistulae.
7. Chronological age between 3 and 7 years of age at the time of selection for the study.
8. Normal hearing demonstrated by conventional pure-tone audiometry.
9. No identified language disorders.
10. Patients with other neurological deficits other than the speech disorders were excluded.
11. Parents had to agree to participate in the study, and attend to the speech therapy sessions, two times per week for as long as necessary.

The study protocol was authorized by the Bioethics & Research Committee of the Hospital Gea González.

Thirty children met the criteria mentioned herein and participated in the study. The children were randomly divided into two groups. The two groups were assessed at the beginning and at the end of the study to determine their level in language development and to identify the phonological rules present in the phonological system of each child with special attention in compensatory articulation patterns. For this purpose, the children were videotaped interacting with a trained speech pathologist during free play and storytelling for 30 min. A 10 min segment was selected where a high level of verbal interaction occurred. The 10 min of interaction were transcribed verbatim to analyze the child's linguistic and phonological system and the

presence of compensatory articulation. Linguistic development was analyzed using the situational–discourse–semantic model [14]. The SDS model provides age norms for each level of development based on typically developing children.

In this model, the level of representation present in the activity is specified in the situational context. The discourse was scored according to the highest level of organization shown in the play and story telling. And, semantic context was scored for the level of meaning expressed during story telling or play. The samples were evaluated for the highest level of meaning expressed by the child. The coding resulted in one level assigned for Situation, one for discourse, and one for semantics for each subject.

A blind procedure was utilized, whereby all analysis were independently conducted by two speech pathologists who were trained in the procedures. Both speech pathologists participating in this study had been performing phonological transcriptions of cleft palate children for the last 5 years.

Both groups received speech therapy aimed to correct compensatory articulation. The speech pathologist providing therapy was the same for all patients from both groups.

The first group received therapy according to a phonologic approach including the following aspects: (a) the treatment goals were set depending on the phonological rules that are active in the child's system [15], (b) the intervention program was focused on the modification of groups of sounds that seemed to be treated by the child in a similar fashion. In other words, errors were attacked at the rule level, rather than at the phonetic level (e.g. all plosives substituted by glottal stops), and (c) emphasis was placed on the establishment of previously neutralized phonological contrasts. For example, the child who replaced all fricatives with stops could receive a positive response from the clinician when any fricative was used, even if place of articulation or voice errors persisted.

The goal can be conceived as establishing and maintaining new contrasts. With such goal in mind, correct production is not essential. There is much greater emphasis on the use of speech sounds for communicative purposes, rather than on the correct production of sounds as a goal in itself [6].

The second group received therapy according to the Whole Language principles [16]. Play and story books were the main context for intervention; and all the speech sounds affected by CAD were treated indistinctly. Intervention was aimed to reinforce correct speech sounds while enhancing cognitive linguistic organization.

Children from both groups were placed in small groups (of similar age, similar level of play, similar

linguistic development (as determined by the SDS model), and similar speech characteristics) to provide opportunities for peer interaction and socialization. Only two to three children were placed in one group to maximize individual opportunities for adult modeling and other intervention prompts. Children attended the speech therapy sessions accompanied by their mothers. The purpose of including the mothers is to change their styles of communicative interaction of the mothers, to enhance their skills for providing reinforcements useful for therapy, and to try to encourage the mothers to provide this reinforcement at home as most as possible.

Intervention consisted of one-hour sessions, two times per week. All patients were followed until both examiners had agreed that compensatory articulation disorder (CAD) was completely eliminated.

The following variables from both groups were compared: age at the onset of speech therapy, and total time of speech therapy.

Total time of speech therapy was considered as the time from the onset of speech therapy until the complete normalization of articulation as assessed in a phonological analysis from a free speech sample (videotape). Once articulation was corrected, all the patients underwent additional videonasopharyngoscopy and multi-view videofluoroscopy for pre-operative surgical planning, if necessary.

Two-hundred and seventy-eight cleft palate children were considered. A total of thirty patients met the inclusion criteria and were included in the study group. Fifteen patients were randomly selected using a table of random digits and were included in the first group. The other 15 patients were included in the second group. The first group underwent a phonological intervention program of speech therapy. The 15 patients included in the second group started a naturalistic intervention speech therapy program.

3. Results

A blind procedure was utilized whereby all analysis of child utterances were independently conducted by two speech pathologists who were trained in the procedures. Language performance and the phonological rules (compensatory articulation) present in each child's system were classified before and after the follow-up period and a concordance value was obtained.

Results showed a 97% agreement at pre-test, and a 96% level of agreement at post-test. In the small percentage of cases in which there were disagree-

Table 1 Age at the onset of speech therapy (in months)

Patient number	Group 1 ^a (phonologic approach)	Group 2 ^b (naturalistic approach)
1	46	50
2	57	39
3	85	83
4	77	51
5	78	56
6	54	74
7	53	37
8	72	36
9	37	58
10	38	86
11	67	62
12	40	67
13	45	57
14	58	66
15	55	58

Mann–Whitney rank sum test (median) $T = 239$, $P = 0.803$.

^a $n = 15$, median = 54.5, $X = 57.47$, S.D. = 15.33, S.E. = 3.96.

^b $n = 15$, median = 57.5, $X = 57.33$, S.D. = 17.86, S.E. = 4.61.

ments, the observations were discussed until a consensus was reached.

Age ranged from 36 to 86 months. Mean age in group 1 (phonologic approach) was 57.4 months, and mean age in group 2 (naturalistic approach) was 57.3 months. Median age in group 1 was 54.5 months. Median age in group 2 was 57.5 months. A Mann–Whitney rank sum test revealed a non-significant difference in the age at the onset of speech therapy between both groups (Table 1).

It should be pointed out that although the range of age was significantly wide in both group of patients, the patients were placed in small groups with similar linguistic development, similar level of play and similar speech characteristics. Also, since the mothers usually participated during the speech therapy sessions, the patients were placed in groups according to the educational level of the mothers. Moreover, therapy sessions were planned according to the level of play, linguistic level and speech characteristics of each group of patients.

At the onset of the speech therapy period, all patients included in both groups demonstrated glottal stops and pharyngeal fricatives. In addition, other types of compensatory articulation patterns (i.e., pharyngeal stops, mid-dorsal contacts, posterior nasal fricatives) were found in less than 11%

Table 2 Total time of speech therapy (in months)

Patient number	Group 1 ^a (phonologic approach)	Group 2 ^b (naturalistic approach)
1	13	22
2	20	11
3	6	17
4	13	16
5	22	14
6	18	13
7	10	20
8	16	21
9	12	27
10	18	4
11	17	16
12	11	12
13	14	20
14	13	14
15	15	18

Student's *t*-test, $P = 0.331$, $t = 0.98$.

^a $n = 15$, $X = 14.53$, median = 14, S.D. = 4.12, S.E. = 1.06.

^b $n = 15$, $X = 16.27$, median = 16, S.D. = 5.23, S.E. = 1.40.

of the patients. The distribution of the types of compensatory articulation patterns across the two groups of patients was similar.

Table 2 shows total time of speech therapy from both groups. The total time necessary for correcting compensatory articulation disorder in the patients from group 1 (phonologic approach) ranged from 6 to 22 months (mean = 14.5 months). In the patients included in group 2 (naturalistic approach), the total time of speech therapy ranged from 4 to 27 months (mean = 16.2 months). A student's *t*-test demonstrated a non-significant difference between both groups in the total time of speech therapy for correcting CAD.

4. Discussion

The purpose of this study was to compare two different approaches for speech intervention in cleft palate children with compensatory articulation disorder, a phonologic approach, and a naturalistic approach. Children with CAD differ in their overall development of language, and not just speech productions, from children with repaired cleft palates who do not show the CAD speech patterns [10]. This led us to hypothesized that speech intervention should need to address language needs as well as the speech production.

Pamplona and Ysunza [5] compared two modalities of speech intervention for treating CAD,

phonologic approach versus articulatory approach. In this study, the total time of speech intervention necessary for correcting children compensatory articulation disorder associated with cleft palate was reduced when a phonological approach was used. The reduction in the total time of speech intervention necessary for complete correction of CAD using the phonological approach with cleft palate patients suggests that the study of the phonologic system in these patients is relevant [5].

Moreover, it is important to emphasize that in order to comprehend the linguistic system of each child we have to consider the speech sound production as an integral component of higher levels of language organization such as pragmatic, syntactic, and semantic knowledge. It has been described that children's speech sound production and perception errors are related not only to phonological knowledge, but also to higher organizational levels of language processing [8].

Whole language philosophy considers phonology as an integral component of language. Intervention should address speech sound production in significant and relevant events.

All patients included in this study corrected CAD in a period of time between 4 and 27 months. It was hypothesized that providing phonologic information simultaneously with higher levels of language organization would reduce the total time required for elimination CAD. The results of this study showed that the time for correcting CAD was not reduced when a naturalistic intervention was used as a method for providing speech therapy. Nonetheless, it was also expected that the most significant change would be concerning the phonologic system. This was not true for the changes observed in this study. However, patients from the experimental group, who received therapy according to a naturalistic approach, changed dramatically their overall language performance.

Norris and Hoffman [14] stated that children with linguistic organization problems have difficulty deriving meaning at more abstract semantic levels.

The results from this study seem to support this statement. All patients with CAD showed linguistic organization below the expected level according to chronological age in all three contexts considered by the model used for assessing linguistic performance in this study, i.e. situational–discourse–semantic.

Pamplona and Ysunza [10] also found that children with CAD differ in their overall development of language, and not just speech productions, from children with repaired cleft palates who do not show the CAD speech patterns.

Hence, even though the time necessary for correcting CAD was not significantly reduced when a whole language approach was used, it appears reasonable to provide children with CAD with a more global treatment including linguistic aspects. Treating only the articulation disorders does not seem enough for these patients. It seems more appropriate to consider higher levels of language including abstract thought and reading and writing activities [10].

With limited time and resources, intervention that simultaneously addresses both the CAD and the language delay promises greater efficacy.

In the last few years, Golding-Kushner has described several procedures for speech therapy in cleft palate patients. She has reported good results involving drills with a focus on frequent and rapid repetition, frequency of therapy and frequently reinforcement at home several times a day [17]. As mentioned herein, in our center we provide speech therapy addressing articulation but also considering higher levels of language. About our position regarding speech therapy, it is necessary to consider that most of the patients attending the Hospital Gea Gonzalez in Mexico City, come from families with very low educational levels and severe social and economical limitations. Moreover, as reported previously linguistic development delays are quite frequent in our patients [10]. Therefore, although we try our best to obtain family support for participation during therapy as well as for reinforcement at home, it seems quite understandable that these families find very difficult to cooperate enough in the patient's therapeutic process. These are other reasons for trying to provide an intervention as complete as possible, that is, we try to address both articulation and higher levels of language.

It should be pointed out that the small number of patients and the homogeneity of the sample [18] included in this study does not allow definite conclusions, but the results obtained seem promising.

It will be necessary to use whole language intervention and the phonologic approach in a larger number of patients including different conditions, i.e., different kinds of cleft, and different levels of linguistic development, in order to further assess its efficiency for correcting CAD associated with cleft palate.

References

- [1] K.R. Bzoch, Articulation proficiency and error patterns of preschool cleft palate and normal children, *Cleft Palate J.* 2 (1965) 340–349.
- [2] B. McWilliams, R. Musgrave, Diagnosis of speech problems in patients with cleft palate, *J. Commun. Disord.* 26 (Spring) (1977) 241–274.
- [3] D. Van Demark, Patterns of articulation abilities in speakers with cleft palate, *Cleft Palate J.* 16 (1979) 230–239.
- [4] K. Chapman, Phonologic processes in children with cleft palate, *Cleft Palate J.* 30 (1993) 64–71.
- [5] M. Pamplona, A. Ysunza, J. Espinosa, A comparative trial of two modalities of speech intervention for compensatory articulation in cleft palate children, phonologic approach versus articulatory approach, *Int. J. Pediatr. Otorhinolaryngol.* 49 (1999) 21–26.
- [6] M. Fey, Clinical forum: phonological assessment and treatment. articulation and phonology: an introduction, *Lang. Speech Hear. Serv. Schools* 23 (1992) 224–232.
- [7] P. Hoffman, R. Daniloff, Evolving views of children's disordered speech sound production from motoric to phonological, *J. Speech Lang. Pathol.* 14 (1990) 13–22.
- [8] P. Hoffman, Clinical forum: phonological assessment and treatment. Synergistic development of phonetic skill, *Lang. Speech Hear. Serv. Schools* 23 (1992) 254–260.
- [9] G. Powers, Speech analysis of four children with repaired cleft palate, *J. Speech Hearing Disord.* 55 (1990) 542–550.
- [10] M. Pamplona, A. Ysunza, M. González, E. Ramírez, C. Patiño, Linguistic development in cleft palate patients with and without compensatory articulation disorder, *Int. J. Otorhinolaryngol.* 54 (2000) 81–91.
- [11] D.A. Kernahan, R.B. Stark, A new classification for cleft lip and palate, *Plast. Reconstr. Surg.* 22 (1958) 435–443.
- [12] M. Mendoza, C. Azzolini, F. Molina, A. Ysunza, Minimal incision palatopharyngoplasty, *Scand. J. Plast. Reconstr. Hand Surg.* 28 (1994) 199–205.
- [13] K. Golding-Kushner, R. Argamaso, A. Ysunza, et al., Standardization for the reporting of videonasopharyngoscopy and multi-view fluoroscopy. A report from an international working group, *Cleft Palate J.* 27 (1990) 337–347.
- [14] J. Norris, P. Hoffman, *Whole Language Intervention for School-Age Children*, Singular Publishing Group, San Diego, CA, 1993.
- [15] B. Hodson, E. Paden, *Targeting Intelligible Speech*, College Hill Press, San Diego, CA, 1983.
- [16] J. Norris, J. Damico, Whole language in theory and practice: implication for language intervention, *Lang. Speech Hear. Serv. School* 21 (1990) 212–220.
- [17] Golding-Kushner, *Therapy Techniques for Cleft Palate Speech & Related Disorders*, San Diego, Singular, 2000.
- [18] R.J. Shprintzen, Fallibility of clinical research, *Cleft Palate-Craniofacial J.* 28 (1991) 136–140.