

# Efeitos da amplificação sonora sobre as modalidades comunicativas utilizadas pelos pais\*\*\*

## Effect of sound amplification on parent's communicative modalities

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### Abstract

Background: auditory rehabilitation in deaf children users of sign language. Aim: to verify the effects of sound amplification on parent's communicative modalities when interacting with their deaf children. Method: participants were twelve deaf children, aged 50 to 80 months and their hearing parents. Children had severe or profound hearing loss in their better ear and were fitted with hearing aids in both ears. Children communicated preferably through sign language. The cause-effect relation between the children's auditory skills profile (insertion gain, functional gain and The Meaningful Auditory Integration Scale - MAIS) and the communicative modalities (auditive-oral, visuo-spacial, bimodal) used by parents was analyzed. Communicative modalities were compared in two different experimental situations during a structured interaction between parents and children, i.e. when children were not fitted with their hearing aids (Situation 1) and when children were fitted with them (Situation 2). Data was analyzed using descriptive statistics. Results: the profile of the deaf children's auditory skills demonstrated to be lower than 53% (unsatisfactory). Parents used predominately the bimodal modality to gain children's attention, to transmit and to end tasks. A slight positive effect of sound amplification on the communicative modalities was observed, once parents presented more turn-takings during communication when using the auditory-oral modality in Situation 2. Conclusion: hearing parents tend to use more turn-takings during communication in the auditory-oral modality to gain children's attention, to transmit and to end tasks, since they observe an improvement in the auditory skills of their children.

**Key Words:** Hearing Aids; Deafness; Communication; Mother-Child Relations; Father-Child Relations.

### Resumo

Tema: reabilitação auditiva em crianças surdas usuárias de língua de sinais. Objetivo: pesquisar os efeitos da amplificação fornecida pelas próteses auditivas sobre as modalidades comunicativas utilizadas pelos pais, durante a interação com seus filhos surdos. Método: participaram deste estudo 12 crianças surdas na faixa etária de 50 a 80 meses de idade, cuja modalidade preferencial de comunicação era a viso-espacial (língua de sinais) e seus pais ouvintes. Eram crianças com perda auditiva de grau severo ou profundo na melhor orelha e usuárias de próteses auditivas nas duas orelhas. Foram estudadas a relação de causa-efeito entre o perfil das habilidades auditivas das crianças surdas (medidas de inserção, ganho funcional e a Escala de Integração Auditiva Significativa) e as modalidades comunicativas (auditivo-oral, viso-espacial, bimodal) utilizadas pelos pais. As modalidades comunicativas foram analisadas e comparadas em duas situações diferentes de interação estruturada entre os pais e os filhos, ou seja, quando as crianças não estavam utilizando as próteses auditivas (Situação 1) e quando as crianças estavam utilizando as próteses auditivas (Situação 2). A análise dos dados foi realizada por meio da estatística descritiva. Resultados: o perfil das habilidades auditivas das crianças surdas mostrou-se inferior a 53% (insatisfatório). Predominantemente, os pais utilizaram a modalidade bimodal para ganharem a atenção, transmitirem e finalizarem as tarefas. Evidenciaram-se discretos efeitos positivos da amplificação nas modalidades comunicativas, pois os pais utilizaram mais turnos na modalidade auditivo-oral na Situação 2. Conclusão: os pais ouvintes tendem a utilizar mais turnos comunicativos na modalidade auditivo-oral para ganharem, transmitirem e finalizarem as tarefas à medida que observam melhora no perfil das habilidades auditivas em seus filhos.

**Palavras-Chave:** Amplificadores; Surdez; Comunicação; Relações Mãe-Filho; Relações Pai-Filho.

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## Introduction

Deaf children's auditory rehabilitation follows the stages of otorhinolaryngological and audiological evaluations, hearing aid adaptation (which includes the selection of electro-acoustic characteristics of the hearing aid, the verification of the selected parameters and the evaluation), and speech-language therapy. In the last stage of the amplification in the adaptation process, the speech language therapist evaluates and determines the benefits and limitations of the child's auditory skills with the use of the hearing aids. Therefore, amplification's effects are verified in child's quality of life (American Academy of Audiology, 2003).

Basically, the speech and language therapist uses the following procedures to verify the benefits of amplification in children who are in the pre-linguistic period or in the initial linguistic period of oral language (Lewis, 2000):

- . to observe the child's behavior in response to the amplified signal provided by the hearing aid, such as increase of vocalizations or parent's comments that "child seems better" when using the hearing aids. Includes situations in which child's auditory responses are observed in a natural environment (outside the clinic) by parents and teachers.
- . to quantify child's behavioral responses using hearing aids through the functional gain and speech perception tests (direct measures).
- . to analyze indirect measures of the child's performance obtained during interviews with parents, caretakers and/or teachers using a questionnaire designed for this purpose.

In Brazil, several studies providing information about the consistency of the amplification use and results regarding the speech sound perception by deaf children were developed. Some of them focus direct measures (Lopes et al., 2000) and others, indirect (Castiquini & Bevilacqua, 2000). Studies about amplification effects on communicative behavior of both, the user and his interlocutor are still scarce.

Recent studies in communication, language and/or oral language fields are more directed towards children with cochlear implant (Tait et al. 2001; Crosson & Geers, 2001; Tye-Murray, 2003). However, this population is rare in the United States (around 18%, according to Easterbrooks & Mordica, 2000) and in Brazil (around 7,2% according to Meyer, 2003). It is assumed that the remaining deaf children should be getting benefits from the use of hearing aids as the amplification system.

When the child's communication behavior is observed, it should be taken into account the effects of the interlocutor's interpretation of the child's language (Alcântara, 2000). Therefore, it is also necessary to observe, to quantify and to analyze the interlocutor's communicative behavior. Several authors analyzed the interaction between deaf children and their hearing parents (Pereira, 1989; Pratt, 1991; Lederberg & Everhart, 1998; Alcântara, 2000; Lichtig et al., 2001; Janjua et al., 2002; Medeiros e Bevilacqua, 2002; Goldfeld & Chiari, 2005). Those studies show relevant information on deaf child's communicative behavior and on adult's representation of the child as an interlocutor during interaction activities, sharing objects. Nevertheless, they did not focus the effects of the child's amplification on his interlocutor's communicative behavior.

In pediatric speech language intervention programs for deaf children, parents face different communication modalities permeated by different educational philosophies. Communication modalities may be expressed and categorized as auditory-oral, visospatial and bimodal, according to sensorial input and motor output components information (Reamy & Brackett, 1999). Intervention programs with deaf children based on a bilingual philosophy propose sign language teaching (in Brazil, the Brazilian Sign Language - Libras) as the first language, and the second language should be learned consecutively or simultaneously to the first one (in Brazil, the Portuguese language) in its auditory-oral or written modality (Lichtig et al., 2004a). Hearing parents should be exposed to sign language learning, too. In this context, the speech and language therapist needs to understand several phenomena that occur in the communication between hearing parents and their deaf children in order to plan the intervention program, properly.

The purpose of this study is to verify sound amplification effects upon the communicative modalities used by hearing parent with their deaf children users of hearing aids and sign language. In this study, the terms users of and fitted with hearing aids will be differentiated. Users of hearing aids will refer to the amplification without clinical validation of consistency and benefits expected; while fitted with hearing aids will refer the person which utilizes amplification consistently and with benefits improved by validation procedures.

It is hypothesized that sound amplification effects upon communicative skills will increase

communicative turn takings in the auditory-oral modality, without orofacial reading clues.

## Method

This study was approved by the Ethics Commission for Research Projects Analysis (CAPPes) of the Clínicas Hospital of the Medical School of University of São Paulo (no. 531/01) and the Informed Consent Term was signed by children's parents.

### Participants

Participants were selected from six special schools for deaf children located in São Paulo city and Cotia city. Seventy one preschool children were enrolled but only 29 (40,8%) fulfilled the inclusion and exclusion criteria, which were:

- . aged 4 to 6 years and 11 months old, regardless sex;
- . bilateral sensorineural hearing loss of severe and profound degrees in the better ear (average of 500, 1000 and 2000Hz worse than 71dBHL);
- . users of hearing aids in both ears;
- . sign language user as his/hers preferable communication modality, with at least 12 months of experience;
- . born to hearing parents.

Only 12 parents and their children took part in the study as seventeen parents did not respond to the invitation.

Children's age varied from 50 to 80 months (mean of 64,5 months); there were eight boys (66,7%) and four girls (33,3%) (Table 1). Five children (41,7%) presented severe hearing loss in the better ear (average of hearing thresholds at 500, 1000 and 2000 Hz = 82,5dB HL; standard deviation = 0,7 dB); three children presented a flat audiometric configuration and two presented a descending configuration. The other seven children (58,3%) presented profound hearing loss in the better ear (average of hearing thresholds at 500, 1000 and 2000 Hz = 106 dB HL; standard deviation = 4,2 dB). One child presented a flat audiometric configuration and six presented a descending configuration. All 12 children presented tympanometric curve type A (within normality) and absence of ipsilateral acoustic reflex.

Children were deprived from hearing stimulation about 42,1 months (varying from 10 to 64 months). The average time of hearing aid use was shorter than the sensory privation time,

average of 22,4 months, varying from 2 to 66 months. Eight children (66,7%) were enrolled in a speech-language intervention program for the development of hearing and oral linguistic skills in an average period of 26 months (variation from 12 to 48 months); other four children (33,3%) were not enrolled.

Eight children (66,7%) received hearing aids through donation and four (33,3%), through financing. Information and characteristics of hearing aids are found in Table 2 Each child used both hearing aids of the same manufacturer and model, with the same regulations. Regarding hearing aids technology, it was verified that 91,7% were analogical, with adjustments for gain, maximum output and frequency response. Only one child among the 12 ones (8,3%) used digital hearing aids.

Auditory skills were evaluated, during 90 minutes, in average. The following procedures were carried out by the first author, only:

- . real-ear insertion gain, by using MS40 Interacoustics Hearing Aid Analyzer in order to verify whether the acoustic gain obtained with the hearing aid reached the prescribed goal. It was registered whether the insertion gain totally or partially reached (at low and/or middle frequencies), or did not reach the prescribed gain at any frequency (Table 3). In order to determine whether the pre-established values were reached or not, it was considered acceptable a difference of 10 dB between the prescribed gain and the obtained one at each frequency;
- . functional gain, using GSI - 61 Audiometer for obtaining children's hearing thresholds with and without bilateral hearing aids. The following sound stimuli were used: /a/, /i/, /u/, /s/, /ʃ/, /m/. Results were categorized as: totally detects, partially detects, or does not detect sounds from the speech spectrum (Table 3). The intensity established for the detection of each phoneme was 50 dB HL;
- . Meaningful Auditory Integration Scale - MAIS (Robbins et al., 1991 - adapted for Portuguese Language by Castiquini and Bevilacqua, 2000), to ascertain the auditory skills performance of the selected children with severe and profound hearing loss in daily situations. Parents were asked to describe child's behavior in a specific situation. Responses for each item were registered in a scale from 0 to 4, based on the frequency of the reported behavior, that is, 0 = never, 1 = rarely, 2 = sometimes, 3 = frequently, 4 = always. The sum of scores obtained in all 10 questions was the final result of each child's auditory skill performance (Table 3).

Auditory skills assessment was performed where hearing aids were adjusted as established by the child's clinician, responsible for the selection and initial verification. The researcher did not alter children's hearing aids regulations, however, when it was verified that the amplification was not reaching the prescribed goal, parents were referred to a hearing aid specialized technical service for a revision. Batteries were changed by the research, when necessary, being this the only interference done.

The global percentage of MAIS showed that five children used the hearing aid in a period from 11 to 15 hours a day (S1, S3, S6, S10 and S12); three children, in a period of 6 to 10 hours a day (S2, S5, e S9); three, from 1 to 5 hours a day (S4, S7 and S8) and one, for less than one hour (S11). Parents of children who used hearing aids from 6 to 10 daily hours explained that their children used them mainly at school, in the speech-language therapy and from one to two hours at home; while the other children only used hearing aids at school. Parents reported that: they didn't know how to fit the hearing aids, they had financial difficulty and couldn't buy batteries, or simply didn't offer batteries to the child.

Hearing parents who took part in the study were composed by nine mothers (75%) and three fathers (25%); nine were married (75%) and three were single or divorced (25%). Parents' socioeconomic profile was determined in three levels according to families' income, as follows:

- . up to three minimum salaries;
- . between four and five minimum salaries;
- . above nine minimum salaries.

In this study, five families were in the first level, four in the second and three in the last level. Parents' educational level were: four (33,3%) didn't finish primary school; one (8,3%) finished primary school; six (50%) finished secondary school; and one (8,3%) finished university. Five parents (41,7%) worked all day, one (8,3%), half-time and six (50%) did domestic work. Therefore, families had varied socioeconomic and educational constitution (Table 4), however they needed both educational and public health services (including speech and language treatment).

#### Place

This study was carried out in the Speech and Hearing Clinic in the Clinical and Educational

Audiology Sectors of the Physiotherapy, Speech and Hearing and Occupational Therapy Department of Medical School - University of São Paulo.

#### Equipment and Material

. Communicative Abilities Evaluation protocol - Second Part (Lichtig et al., 2004b) aiming to analyze the performance of four tasks by the dyad, the frequency of occurrence and the communicative modalities used by parents during the interaction with their children. Two identical sets of colored bricks (blue, red and yellow) of different sizes (big and small) were used: one for the parent and the other for the child. The choice of a structured interaction situation was due to keep the communication between the dyad, as parents may be passive sometimes in the clinical practice. Colored bricks were used, based on Mogford (2002) study which pointed that the deaf children's highest cognitive maturity in the beginning of language acquisition was manifested in qualities related to size, color and number;

. a tripod Panasonic (NV-VJ66PN) video recorder to register the interaction between parents and children;

. Panasonic (NVDH665BR) videocassette player and Panasonic (TC 21V50) television for transcription and analysis of recorded data during interactions.

Data collected from each dyad were registered separately in the protocol of Deaf Children Communicative Abilities Evaluation.

#### Procedure

During the interaction session between parents and children, parents were requested to play with the child, that is, a non-structured ludic activity was proposed using miniature toys. This activity lasted in average for ten minutes and aimed to make parent and child comfortable for the evaluation situation.

Next, the researcher proposed a structured interaction activity between the dyad in which the parent requested the child to perform four tasks. Two requesting orders were simple and of short extension - "Give me the small brick" (Task 1) and "Give me the blue brick" (Task 2) - and two of medium extension were more complex - "Put the small brick under the big brick" (Task 3) and "Put the yellow brick on the blue brick" (Task 4). The researcher guided each parent to

interact with his child, communicating in his/her habitual way. This activity was performed during the necessary time for the parent to transmit all tasks and for the child to execute them. During the interaction between parent and child, the following aspects were observed and registered:

- . the tasks performed by the dyad;
- . the number of turntakings during each task transmission;
- . parents' communication modality during communicative turns, categorized as auditory-oral, or visospatial, or bimodal, or others (action, bimodal associated with pointing or action, auditory-oral associated with action, visospatial associated with action).

Interaction procedures occurred in two experimental situations: during the first one, the child didn't use hearing aids (Situation 1), and in the second one, the child used hearing aids (Situation 2). In Situation 2, it was also evaluated the functional gain, the insertion gain and parents were interviewed with the MAIS questionnaire. There was a mean interval of 65,4 days between the two situations (varying from 24 to 166 days), in order to avoid the learning of the tasks.

The interaction activity was video recorded in a proper room, using a video camera positioned in front of the table where parent and child were interacting, in an angle of 90 to 180 degrees. The space was restricted, however allowed the manipulation of material by the dyad.

The communicative turns recorded in the videotape of each dyad were transcribed and coded by only one evaluator (the first author). Only the communicative turns of tasks successfully transmitted by parents and performed by children were considered, independently of the communicative modality and/or strategies used by parents and children. Tasks that parents gave up transmitting or that children refused to perform were not considered.

#### Statistical Analysis

Trata-se de uma pesquisa avaliativa e analítica, pois foram comparadas duas situações do grupo, na qual houve controle das situações experimentais, com o propósito de averiguar a relação de causa e efeito entre o perfil das habilidades auditivas das crianças e as modalidades de comunicação utilizadas pelos pais.

A técnica utilizada na sistematização, organização, descrição e interpretação dos dados observados neste estudo foi a estatística descritiva. Realizada a análise individual de cada transcrição, foi obtida a média da frequência de ocorrência de cada modalidade comunicativa do grupo de pais, nas Situações 1 e 2. Em seguida, examinou-se a relação entre o perfil da habilidade auditiva, por meio do resultado percentual da MAIS (variável independente), e o percentual da modalidade auditivo-oral utilizada por cada pai (variável dependente). Para tanto, fez-se uso do diagrama de dispersão, para verificar a associação entre os dois resultados; o coeficiente de correlação, para quantificar a tendência - R2; e a reta de regressão dos resultados, para verificar se a relação é positiva ou negativa.

#### Results

In Situation 1 (children without hearing aids), 100% of Tasks 1 and 2 were transmitted by parents and performed by children. Task 3 was performed by 11 dyads (91,7%) and Task 4, by ten (83,3%) dyads. The remaining tasks (8,3%) were not performed due to the lack of interest in communication maintenance either by parent or child.

In Situation 2 (children with hearing aids), Tasks 1 and 2 were transmitted and performed successfully by 100% of dyads. Concerning Task 3, two children (16,7%) refused to perform it showing a non-collaborative behavior. Task 4 was performed by eight dyads (66,7%). The remaining children refused to perform the task, showing lack of interest since they wanted to explore other materials and also presented irritability after several unsuccessful attempts to perform the task.

The performance of most of the tasks in Situations 1 and 2 (91,7% and 87,5% respectively), indicates that communication was effective, independent of the communicative modality used by parents to transmit orders.

Concerning the parents communicative turns, 337 turns were analyzed in Situation 1 and 345 in Situation 2. As a result, the mean time of tasks transmission in Situation 2 was also shorter. All four tasks were transmitted by parents and performed by children in an average time of 135,6 seconds (or in two minutes and fifteen seconds) in Situation 1 and of 117,3 seconds (or in one minute and fifty seven seconds) in Situation 2.

In general, there was an efficient interaction between the dyads, and hearing parents mainly

presented bimodal communicative modality (Graph 1) to gain their deaf children's attention in both experimental situations, independently of attending or not a speech and language intervention program.

During the interaction, five parents (S2, S3, S4, S7 and S8) in Situation 1 and three parents (S4, S10 and S11) in Situation 2 communicated with their children using the category action (not associated with gestures or speech): parents performed the task (e.g., they put the small brick under the big one) and asked the child to do the same, indicating difficulty to transmit the order to their child.

Graph 1 presents similarities in the distribution of frequency of occurrence of communicative modality in Situation 1 (without hearing aid) and in Situation 2 (with hearing aid). A discrete increase in the frequency of occurrence was observed in Situation 2, since parents used 4,3% more communicative turns in the auditory-oral modality.

Graphs 2 and 3 illustrate the relation between results of the Meaningful Auditory Integration Scale (MAIS) and communicative turns used by parents in the auditory-oral modality in both situations. In Situation 1, parents of S5 and of S11

showed the same results and therefore, the points in the graph were superposed. The regression coefficients (R2) and the tendency lines are illustrated in Graphs 2 and 3. In these graphs the regression coefficient is lower than the unit which indicates that there is a tendency of association, but not all percentage variation of MAIS is concomitant to the use of the auditory-oral modality by parents. The results of the equations differed in both graphs: In Graph 2 the equation, and therefore the line, is negative indicating that the tendency of the two variables decreases concomitantly, while in Graph 3 the equation is positive. Results showed that especially in Situation 2 (children with hearing aids), parents who used more turns in the auditory-oral modality tended to report that their children were more benefited with amplification (positive tendency).

Analyzing Graph 3, it was verified that the R2 value was influenced by the results of S12 mother. The new analysis without the participation of this mother showed that the tendency remained positive, but the regression coefficient was even more distant from the unit, as shows Graph 4.

TABLE 1. General characteristics of deaf children

Subject	Sex	Age (months)	Suspicion age in months	Diagnostic age in months	Etiology	Time of hearing aid use in months	Degree of hearing loss in the better ear	Speech language Therapy
1.PDS	F	50	19	24	Undetermined	02	Severe	Yes
2. KHR	M	57	01	17	Undetermined	04	Profound	No
3. MPR	M	52	24	24	Undetermined	03	Profound	No
4. RHR	M	72	09	21	Hyperbilirubinemia	08	Severe	No
5. MGC	F	67	12	18	Undetermined	13	Profound	No
6. DJS	M	80	12	17	Undetermined	48	Severe	Yes
7.MSD	M	55	12	14	Undetermined	15	Profound	Yes
8.PSA	M	58	04	07	Meningitis	48	Profound	Yes
9.HRC	F	72	03	07	Genetic	20	Profound	Yes
10.PGL	M	79	30	36	Undetermined	32	Profound	Yes
11.GMV	F	53	15	24	Rubella	10	Severe	Yes
12.AAS	M	79	08	13	Undetermined	66	Severe	Yes

Legend: F = female; M = male

TABLE 2. Information about hearing aids

Subject	Fabricant	Model
S1	Siemens	Phoenix104
S2	Danavox	155PPAGCI
S3	Danavox	155PPAGCI
S4	Siemens	284PPAGCI
S5	Danavox	155PPAGCI
S6	Danavox	155PPAGCI
S7	Philips	S46-OL
S8	Danavox	145DFSGeniusII
S9	Danavox	145DFSGeniusII
S10	Danavox	155PPAGCI
S11	Widex	L32E
S12	Unitron	US80-PPL

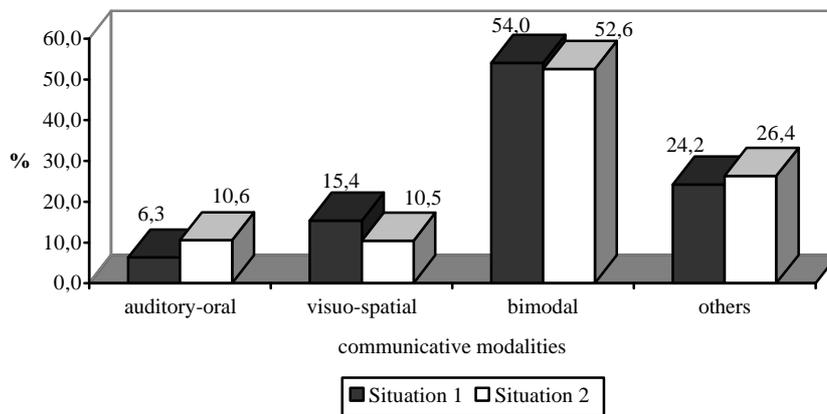
TABLE 3. Results of insertion gain, functional gain and of MAIS scale in 12 deaf children

Subjects	Insertion gain		Detection of speech sounds	% MAIS
	Right ear	Left ear		
S1	Partial	Partial	Partial	50,0
S2	Partial	No	Partial	27,5
S3	Partial	Partial	No	17,5
S4	Partial	Partial	Total	25,0
S5	Partial	Partial	No	10,0
S6	Partial	Partial	Total	42,5
S7	Partial	Partial	No	15,0
S8	Partial	Partial	Partial	12,5
S9	No	Partial	No	5,0
S10	Partial	Partial	Partial	37,5
S11	Partial	Partial	No	10,0
S12	Partial	Partial	Total	52,5

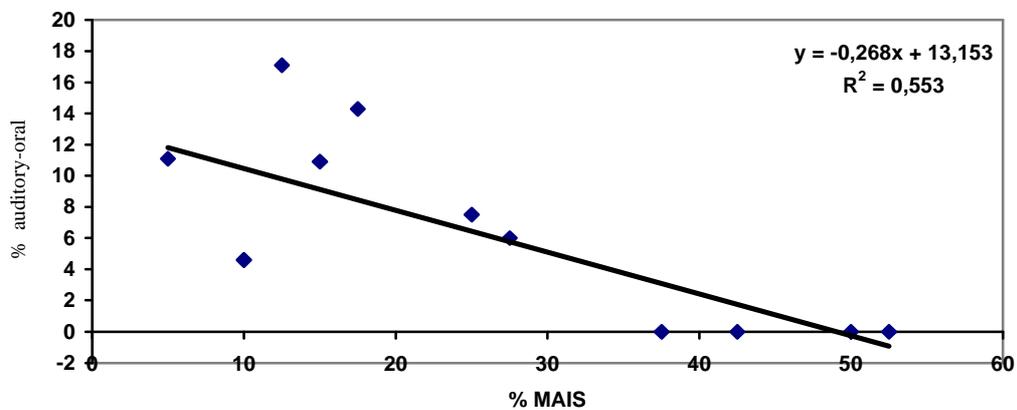
TABLE 4. General characteristics of hearing parents

Child	Who participated in the interaction	Education	Profession	Family income
1.PDS	Father	Incomplete primary school	dismissed	B
2. KHR	Mother	Incomplete primary school	dressmaker	A
3. MPR	Mother	Complete secondary school	production assistant	A
4. RHR	Mother	Complete secondary school	domestic	C
5. MGC	Mother	Complete secondary school	cleaner	B
6. DJS	Father	Complete primary school	seller	B
7.MSD	Father	Complete secondary school	driver	A
8.PSA	Mother	Incomplete primary school	domestic	A
9.HRC	Mother	Incomplete primary school	domestic	A
10.PGL	Mother	Complete secondary school	domestic	B
11.GMV	Mother	Complete secondary school	receptionist	C
12.AAS	Mother	University	domestic	C

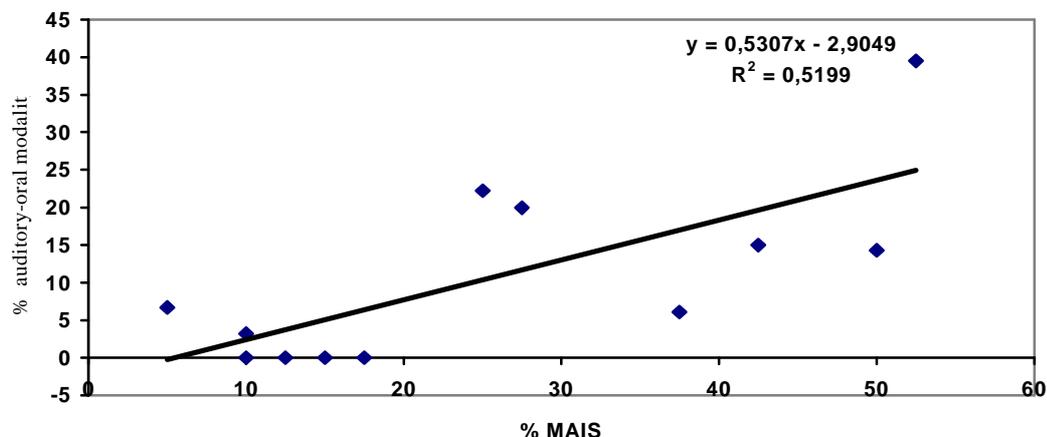
GRAPH 1. Comparison between the average percentage of communicative modalities used by parents in both situations



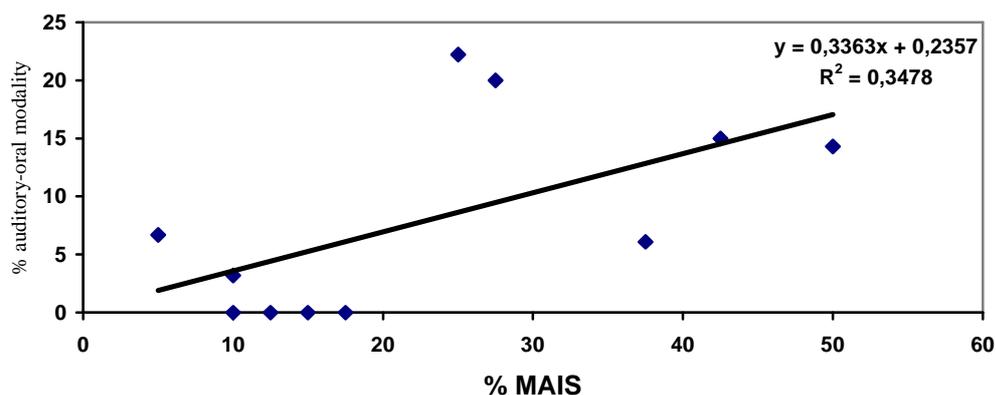
GRAPH 2. Correlation between MAIS and the percentage of auditory-oral modality used by parents in Situation 1.



GRAPH 3. Correlation between MAIS and the percentage of auditory-oral modality used by parents in Situation 2.



GRAPH 4. Correlation between MAIS and the percentage of auditory-oral modality used by the 11 parents without the participation of S12, in Situation 2.



## Discussion

Deaf children's oral language may be developed simultaneously or consecutively to sign language in a bilingual program. For the learning of oral language, the first specific goals include tasks such as fitting hearing aids, development of auditory skills through sound amplification, and improvement of communication between hearing parents and the deaf child in the auditory-oral modality.

The present study analyzed the amplification effects provided by hearing aids in communicative modalities used by parents, observed during interaction between hearing parents and their deaf children users of sign language.

Based on results of MAIS, it was observed that only three parents reported that their children presented some benefit with the use of amplification (index above 40%), which made difficult the verification of the hypothesis: that the amplification effects in communicative skills of parents resulted in the increase of communicative turns in the auditory-oral modality without orofacial reading cues.

Results analysis referring to communicative modalities of the 12 dyads showed that either parents attending a bilingual intervention program, as described by Carnio et al. (2000), Sass-Leher & Bodner-Johnson (2003) and Lichtig et al. (2004a), or

those who did not attend any program used preferably bimodalism in both evaluation contexts. It was a productive interaction by the bimodal modality as a whole. When there was an asymmetry in the interaction parent-child there was an attempt of the parent (fluent in oral language) to adjust his actions with the child's (sign language user) ones, where specific elements of each repertoire were negotiated to be transformed in elements of common knowledge, corroborating the study of Lier et al. (1991).

Critics of bimodalism point that when signing and speaking occur at the same time, the structure of both languages are not respected (Swisher & Christie, 1989; Reamy & Brackett, 1999). However, it was verified that in this study during dyads interaction, bimodalism allowed a more efficient communication. The methodology used in the present study did not aim to observe the efficiency of different languages modalities use, however it evidenced that bimodalism used by parents facilitated the transmission of information to their small deaf children and allowed them to communicate more easily than if adults used only the auditory-oral modality.

Results referring to bimodalism (communication improvement and the interference of evaluation of amplification) lead to the reflection on the interface between bimodalism and second language acquisition. Studies about bimodalism in auditory-oral modality, as described by Genesee (2002), may help to explain what was observed in the clinic when parents used different modalities: auditory-oral and visospacial. When hearing parents need to learn a second language (successive bilingualism) they may present a greater degree of difficulty than hearing children and teenagers. And this gets worse when the second language is of a different modality, such as Libras (Caporali et al., 2005). This fact indicates that parents consider the interaction with their deaf children more important than the message itself, establishing a social relation. In this sense, they used speech associated to signs and/or gestures suggesting that they could "talk" to their deaf children by using sketches of sign language. This can be considered as the first stage of learning a second language (Genesee, 2002). Probably some parents were already using Libras' linguistic units. This was verified by the turns in the visospacial modality. More studies with dyads fluent in different modalities of language are necessary to corroborate this hypothesis.

Findings of this study corroborate Sass-Leher (2004) ones, who reported that hearing parents are more worried about communicating with their children than about using an unique language modality

(visospacial or auditory-oral). Results of the mentioned study suggest that both speech language pathologists and parents are responsible for the polarization of opinions and feelings that permeate the controversies of communication modalities.

Studies comparing communicative behaviors between hearing mothers and their deaf children and between deaf mothers and their deaf children evidence that hearing mothers need to develop new communicative behavior patterns in order to improve the interaction and the maintenance of interaction flux with their deaf children (Swisher & Christie, 1989; Pratt, 1991). Other authors discuss hearing mothers' difficulty to learn sign language, since the auditory-oral modality is deep-rooted in them (Prendergast; McCollum, 1996). As observed by Yoshinaga-Itano (2000) and Janjua et al. (2002), parents who take part in bilingual programs and in family centered programs, even receiving guidance to improve the interaction with their children and showing positive effects, find difficulty to understand the new patterns of communication in their daily lives.

The analysis of the auditory-oral communicative modality used by parents, which frequency of occurrence was clearly lower than the predominant one (bimodal), showed differences in Situation 2 (with amplification), that is, parents used more turns in the auditory-oral modality than in the visospacial one. This fact indicates that the introduction of amplification provided by hearing aids resulted in a slight change of parental communication. In the audiological clinic situation and in the day-by-day situations, as described by Lewis (2000) and verified in the present study, the amplification of the 12 children improved the degree of audibility and the auditory skills profile. However, in the structured communicative interaction situation proposed, in which parents should transmit orders and children should perform them, the amplification caused a modification in the parents' communicative modality.

The cause and effect relation proposed in the study is illustrated in Graph 3, that is, with a 10% increase in the children's auditory skills profile there was a 5,3% increase in communicative turns used by parents in the auditory-oral modality. Even excluding S12, the positive tendency remained, although with a lower percentage of turns use in the auditory-oral modality (3,4%) by parents (Graph 4).

The fact that parents tended to use more the auditory-oral modality and less the visospacial one in Situation 2 may be related to the representation or the expectation they have about their children with and without hearing aids. According to the communicative context in which parents were -

children without and with hearing aids - they dealt with their children as interlocutors with different characteristics. These results confirm the findings of Pereira (1989), Alcantara (2000) and Andrade (2005) about the representation or image that parents build on their deaf children as interlocutors, privileging the interactive modality correspondent to his own representation of hearing loss. Parents present differential acting by using oral or gesture communication with their children accordingly, showing adequacy about the adjustment capacity to the communicative modality of each interactive situation.

Thus, when discussing amplification evaluation procedures through regularity or consistency that the child uses the hearing aid and the child's capacity and ability to process information, it should also be considered the representation parents build about their deaf children, whose first language is sign language (Libras), as interlocutors able to develop oral language. When analyzing parents' communicative behavior and counseling them about the auditory-oral modality use (how and when) with their deaf children, it is suggested that speech and language pathologists observe changes in traditional procedures results used in the audiological clinic (functional gain and auditory skills profile) in order to verify the benefits of amplification provided by hearing aids.

## Conclusions

Benefits of amplification provided by hearing aids in deaf children who use sign language preferably and who are in the initial stage of

learning of oral language are not restricted only to auditory and communicative behaviors, but also to parents or interlocutors. After the evaluation and results analysis of communicative modalities of the 12 parents in both situations (children with and without hearing aids), it is concluded that:

1. The communicative modality used by hearing parents in order to gain children's attention, to transmit and to finalize tasks was predominantly the same in both situations proposed: they used more bimodal turns indicating that they prioritized to communicate with their deaf children.
2. Verification of amplification effects on the communication between hearing parents and their deaf children was hindered due to bimodal turns used by them.
3. There was a tendency of positive effects of amplification provided by hearing aids on the auditory-oral communicative modality used by parents: parents used more communicative turns in this modality in order to gain children's attention, to transmit and to finalize tasks, due to the image they built about their children as deaf interlocutors developing skills to learn oral language.
4. The interface between hearing and communication was evidenced with the results of this study, suggesting that speech and language pathologists who work in the deafness area should take into consideration both areas during hearing aid fitting process.
5. The procedure used in this study may be used as a way to verify the benefits of amplification provided by hearing aids in deaf children users of sign language.

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