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# Assessing deaf and hearing children's communication in Brazil

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ABSTRACT

In Brazil there are no specific tests for either signed or spoken language for deaf children. A protocol evaluating communicative abilities independent of modality of communication (sign language or spoken language), and comprising assessments of (a) pragmatic profile; (b) modality of communication and linguistic level; (c) complexity of communication; and (d) style and efficacy of communication between parent and child was administered to 127 deaf and hearing children. The children, aged 3–6 years old, were distributed in three groups: 20 with severe hearing loss, 40 with profound hearing loss and 67 normally hearing. Deaf children were found to be delayed, independent of their linguistic level and preferred modality of communication. The protocol in this study proved to be an useful instrument for gathering relevant information about the three groups of preschool children's communicative abilities, and particularly suitable for use in countries where standardized assessments are not available.

**Learning outcomes:** The reader will be introduced to the use of an assessment protocol comprising its development, application and data analysis. The reader will be informed about assessment of deaf children's preferred modality of communication, by the participation of a bilingual (sign language user) professional. Communication abilities can be assessed independently of the linguistic modality. In developing countries in general, where simple and easy to administer assessments tools are scarce, such a protocol is of specific value.



## 1. Introduction

As part of a programme designed to identify and meet service provision needs in Brazil, a low cost tool developed in Zimbabwe (Wirz et al., 2001) to identify hearing impairment in children was utilized. Once deafness is identified, an appropriate service delivery plan is needed to support them and their families. This paper reports on the development of tools for assessing communication skills which would be the first stage of a programme of intervention. In particular, the researchers sought to develop an assessment protocol of children's communication abilities which would be reliable, regardless of whether children used spoken language (SpL) or signed language (SL).

In Brazil the communication assessment is problematic because there are limited tools which can be used to do this. The challenge is further complicated by the fact that some of the children will be sign language users and others will be aspiring

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to use spoken language. The research team recognized a need for developing procedures that were 'modality free' and could be used across both of these groups. Additionally, when deaf children are assessed, the lack of suitable assessment tools leads to unreliable ratings of their language development. There are few assessment tools available internationally for the evaluation of SL development in pre-school deaf children (Haug & Mann, 2008). In Brazil, there are no tests for assessing SL and very few for SpL (Bevilacqua, Moret, Costa Filho, Nascimento, & Banhara, 2003; Nascimento, 1997; Padovani & Teixeira, 2004; Teixeira, 1997) for this population.

Following recognition by the Brazilian government in 2002 of Brazilian Sign Language (also known as Libras) as the official language of the Brazilian Deaf Community, it is now used more widely in educational and health settings (Brasil, 2002, 2005) and there have been moves to establish bilingual (Libras and Portuguese) education programmes for deaf children. However, 95% of deaf children are born to hearing parents, who usually do not know SL before their child's diagnosis, and who also find it difficult to communicate with their deaf child by means of SpL. As a consequence the child may not fully develop either SpL or SL but may communicate in a mixture of signs, words and gestures. Therefore, a "modality-free" measure used before intervention can provide an assessment of communication which does not depend only on language proficiency measures.

Language assessment procedures, in general, offer information on the phonology, morphosyntax and semantics of a child's linguistic performance, identifying the presence of delay or disorder. There are many tools available for assessing English-speaking children, for example the CELF-4 (Clinical Evaluation of Language Fundamentals – Fourth Edition) (Semel, Wiig, & Secord, 2003), the STASS (South Tyneside Assessment of Syntactic Structure) (Armstrong & Ainley, 1988) and others. In Brazil, only a limited number of tools are available as there have been few linguistic studies of Brazilian Portuguese language acquisition. The Tipiti exam, published in 1981, was one of the first developed, with the aim of assessing Brazilian Portuguese language development in children aged from 3 to 18 years (Bras & Pellicciotti, 1981).

More recently, two important tests have been developed in Brazil to investigate children's language and communicative development. The Protocolo de Observação Comportamental- PROC (Zorzi & Hage, 2004) is a behavioural observation protocol designed to investigate communicative and cognitive development in children aged from 12 to 48 months, in interaction with a speech and language therapist (SLT). The ABFW (Teste de Linguagem Infantil: Nas Áreas de Fonologia, Vocabulário, Fluência e Pragmática) (Andrade, Befi-Lopes, Feranades, & Wertzner, 2004) is a language test comprising phonology, vocabulary, fluency and pragmatic ability in children aged between 2 and 12 years.

Tools designed to assess SpL development in hearing children are unsuitable for use with deaf children for various reasons: their hearing impairments may make it difficult to hear test items administered in SpL; they may be using other modes of communication, such as sign supported SpL, and more generally, when items are translated from one language to another (in this case SL), problems arise in the applicability of the original items to the other language (Herman, 1998). In addition, SLTs are unable to obtain information on how children communicate in everyday situations as their language is only evaluated in a clinical setting.

Because of the absence of appropriate tools to assess deaf children's communicative abilities in Brazil, a protocol was required which would be useful for modality-free assessment purposes, suitable for use in a variety of settings, and which would offer a wide range of information on the deaf child's communicative performance for intervention planning and research.

This study aimed to describe a communication assessment protocol, to evaluate and to compare the communication skills of hearing and deaf children, in terms of: (a) child's pragmatic profile; (b) modality of communication and linguistic level; (c) complexity of communication; and (d) style and efficacy of communication between parent and child.

This inquiry was led by the following research questions: (1) how do deaf and hearing children's communicative abilities compare when assessed independently of their linguistic phase (pre-linguistic or linguistic) and their modality of communication (SL or SpL) by this protocol? (2) Which are the contributions of different interlocutors (SLT, parents and sign language interprets) in the participation of communicative abilities assessment using this protocol?

## 2. Materials and methods

### 2.1. Sample

In Brazil, the "*Fonoaudiólogo*" is the professional trained and qualified to act in the areas in Audiology and Communication Disorders. In this paper we will denominate this professional as the Speech and Language Therapist (SLT).

The entry point for any patient in the Speech and Hearing Disorders Clinic of the University of São Paulo Medical Faculty is an interview performed by the Speech and Language Therapist, who collects information on maternal concerns about hearing problems, language delay, and applies hearing and language tests if necessary. The sample of deaf children was drawn from this group.

One hundred thirty-three participants (67 children with normal hearing; 3 with mild hearing loss, 3 with moderate hearing loss, 40 with severe hearing loss and 20 with profound hearing loss) (categories based on Davis & Silverman, 1971) aged 3–6 years old, were recruited. The deaf group were children whose parents sought help from the clinic at the University of São Paulo because of delay in language development and/or auditory problems; the second (control) group were from a local government preschool. The six children with mild and moderate losses from the deaf group were subsequently excluded, as they formed too small a group for research purposes. Therefore, the sample was comprised of 60 deaf children (age mean = 55.5 months; standard deviation = 9.3; from 41 to 72 months) and 67 hearing children (age mean = 55.4 months;

**Table 1**
Distribution of unaided and aided hearing loss (following) in the better ear, and hearing aid usage.

| Degree of hearing loss | *N* | % | Fitted with hearing aid | | Not fitted with hearing aids | |
|---|---|---|---|---|---|---|
| | | | *N* | % | *N* | % |
| Severe | 20 | 33.3 | 8 | 25.8 | 12 | 41.4 |
| Profound | 40 | 66.7 | 23 | 74.2 | 17 | 58.6 |
| Total | 60 | 100 | 31 | 100 | 29 | 100 |

standard deviation = 9.5 months; from 36 to 69 months). Children who had neurological or cranio-facial abnormalities were excluded. This study had prior approval from the Ethics Committee of the Institution (Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo – no. 192/02) and informed consent was obtained from all parents. Table 1 provides data on hearing loss and hearing aid use.

Subject data throughout this paper will be presented for 3 groups: normal hearing, severely deaf, and profoundly deaf.

### 2.2. Development of materials

Existing assessments of communication skills were examined to determine which would be most suitable for adaptation to use in Brazil. Those selected comprised The Pragmatics Profile (Dewart & Summers, 1994) and the Bristol Language Development Scales – BLADES (Gutfreund, Harrison, & Wells, 1989). The Pragmatics Profile approach has at its centre the goal of recognizing the child's communicative abilities in all situations and for all tasks of everyday life, while the BLADES is a language development test which is suitable for use with any language, as it assesses only function and meaning, providing categories for sentence semantics and sentence function. Together these tools assessed the main dimensions of communication which were of interest to the research group and relevant to the participants and were ideal as sources for development of a multiple element protocol.

The protocol used in this study is 'modality-free', in that the child's communication in any modality (spoken, signed or gestured) can be coded. It comprises the following sections: (1) Child Pragmatics Profile; (2) Modality-Free Measure of Child Communication; (3) Mean Length of Longest Utterances; (4) Style and Efficacy of Communication between parent and child. Each is described in detail below.

#### 2.2.1. Child Pragmatics Profile

The Pragmatics Profile was based on Dewart and Summers (1994) (Appendix B). Assessment in this section relates to the child's communicative behaviour in both clinical and home contexts. Two measures of communication skills are obtained: the first based on a play–interaction between the assessor and child, and the second, a parental report obtained by interview. Three categories of communication function are coded: (1) communicative intentions, (2) response to communication, and (3) interaction and conversation (Appendix B). Categories are based on events and everyday experiences. In the interview, parents are asked "how" questions about the child's typical communicative behaviour in daily life. The emphasis is on what children can do rather than what they cannot do, for example: How does your child get your attention? How does she indicate that she wants something? How does she reject something?

#### 2.2.2. Modality-free measure of child communication

This section comprised the following tasks:

*2.2.2.1. Naming.* 10 pictures (aeroplane, house, broom, car, bird, ice-cream, fish, clock, ball and doll) were presented to the child one at a time. The child was asked to name each item presented, as follows: "*What's its name*?". All responses were recorded on a score sheet.

*2.2.2.2. Re-telling a story.* The assessor (either a therapist or deaf member of the research team) set a four-picture story in front of the child, then told the story either in Portuguese or in Libras as follows: I will tell you a story. "*Once upon a time there was a boy riding a bike. Suddenly he did not see a piece of wood and felt down off his bike. Poor boy! He hurt himself and he cried. Then he went home and his mother took care of him. He got so happy!*" The child was then asked to retell the story (Appendix C): "Now it is your turn. Would you tell me the story? What happened to the boy?" Sentences were coded using categories from BLADES for sentence function and sentence semantics.

*2.2.2.3. Parental report and Speech & Language Therapist (SLT) observations about child's functional communication.* The parent was interviewed about the child's communication at home; additionally an SLT observed the child's functional communication during a spontaneous play–interaction session with toy animals, dolls, cars and house furniture.

#### 2.2.3. Mean Length of Longest Utterances

Utterance length was determined by a measure of Mean Length of Longest Utterances (MLU-L), which was based on the three longest utterances (in SL or SpL) produced by the child during the 20 min video-recorded sample of interactive play

(Volterra & Erting, 1994). The MLU-L was designed as an alternative to measuring the Mean Length of Utterances (MLU) in morphemes (Brown, 1973). The MLU-L enables the examiner to measure children's utterances even during early linguistic development, when most children have restricted linguistic communication.

*2.2.4. Style and efficacy of communication between parent and child*

Style and efficacy of parent–child interaction was assessed by means of an interaction task. Parents were requested to encourage their child to perform six tasks, using whatever approach to communication they chose (speech, sign, gesture): (1) "*Give me the small block*"; (2) "*Give me the blue block*"; (3) "*Put the small block under the big one*"; (4) "*Put the yellow block on the blue block*"; (5) "*Put the small yellow brick beside the small blue one*"; and (6) "*Put the big red brick on the chair and give me the blue one*".

Six different features of parental communication style were coded:

(1) Whether the parent got the child's attention before starting to communicate
(2) Use of signing, speaking and pointing – at the same time or sequentially
(3) Turn-taking in the interaction
(4) How the child's attention was obtained: touching the child firmly or gently; signing or gesturing in the child's visual field; waving to catch the child's attention
(5) Whether the child refused to perform a task or gave up on one or more tasks
(6) Whether the parent explained what was required before beginning each task.

## 2.3. Procedure

Families were invited to attend the University of Sao Paulo Language Clinic. An SLT greeted the family at the reception and took the child to one clinic room and the parent to another. In Room 1 each child was assessed by a Libras interpreter and SLT. At the same time, in Room 2, a second researcher conducted an interview with the child's parent. The assessment and interviews lasted approximately 50–60 min. Following the interview, the parent was taken to Room 1 for the interactive play session (Appendix D). All parts of the assessment were video-recorded for subsequent transcription and analysis by the researchers.

Two conversational dyads were recorded during the interactive play session: child–parent followed by child-examiner. The interactive play session was designed to elicit spontaneous communication (vocalisation, SpL, SL, gesture and/or home sign). The setting was free play, using as stimuli a set of toys (cars, dolls, furniture, animals, etc.).

The schedule of the procedures for data collection is illustrated in Appendix D.

## 2.4. Coding

*2.4.1. Child Pragmatics Profile*

Examiner's observations and mother's report on presence or absence of pragmatic functions were recorded, together with information about the modality in which each function appeared.

*2.4.2. Modality-free measure of child communication*

*2.4.2.1. Naming.* One point was scored for each picture either correctly named or named by its function. The criterion for a correct answer was functional appropriateness of the response. For example, if the child responded to the picture of a watch by miming or signing 'wake up', or by speaking or signing 'to see the time', the response was coded as correct. On the other hand if the child responded (either by signing or speaking) "ribbon" on being presented with the doll it was coded as an incorrect response.

*2.4.2.2. Re-telling a story, parental report and SLT observations about child's functional communication.* Responses were coded for: (1) presence or absence of the functions (see Appendix C) (Story Telling Task); (2) modality of communication (Visual/spatial and/or auditory/oral); (3) Child's level and type of communication: pre-linguistic, linguistic (spoken) or linguistic (signed).

*2.4.3. Mean Length of Longest Utterances*

The following rules were used to calculate utterance length: (1) vocatives, negatives, affirmatives, polite terms, greetings and repetitions were ignored; (2) Inflectional morphemes (e.g. plurals) were counted; (3) compound words, proper names, and reduplications were counted as single morphemes. The MLU-L was calculated for speech or sign produced during spontaneous play and during the story-telling sequence. Example: [The boy fell off his bicycle and cried]

spoken Portuguese: [O/ menin /o/ cai /u / da / bicicleta /e /chor / ou] = scoring of MLU-L for SpL = 10 morphemes
Libras: [MENIN / O / CAIR / BICICLETA /CHORAR] = scoring of MLU-L for SL = 5 morphemes.

Children were classified as being at the Pre-Linguistic Level when their MLU-L was equal to zero; and at the Linguistic Level (signed or spoken language) when their MLU-L was equal to or above 1.0.

*2.4.4. Style and efficacy of communication between parent and child*

A score for communication effectiveness (success of the parent in getting the child to do the task correctly) was calculated. The interaction was coded as *successful* when the child performed the task, regardless of how the mother transmitted the information or how the child performed the task. A task was coded as *unsuccessful* when either the child failed to perform the task, the child refused to perform the task, or the parent gave up transmitting the task. The coding of style of communication was based on frequency of occurrence of a given strategy: always/often (>51%) or rarely/never (<50%). This coding was used for each of the six tasks for each parent–child pair. The percentage of pairs using each strategy was then calculated for deaf and hearing child groups.

*2.4.5. Reliability of measures*

Three research assistants (all SLTs) were trained to code Pragmatic Functions and MLU-L using an 8 min videotape segment. After this training, the three research assistants independently coded videotapes of nine children's Pragmatic Profile and MLU-L videotapes. *The interjudge agreement* was calculated by using the following formula for each pair of coders: [number of agreements/(number of agreements + disagreements) × 100] (Sackett, 1978). Afterwards, the mean average of the three results was obtained. The interrater reliability for the Pragmatic Profile was 82.9% and for MLU-L was 88.9%, which was considered a good level of agreement between assessors, therefore highly reliable.

For the tasks "Modality-free measure of child communication" (naming, retelling story) and "Style and efficacy of communication between parent and child" (six tasks) the reliability was assessed in two stages: in the first, one research assistant coded each occurrence in the nine videotapes; then, a second research assistant coded the same material. 207 occurrences were identified (90 for naming; 9 for retelling the story; 108 for style and efficacy of communication). The agreement between coders was 91.8%.

## 3. Results

### 3.1. Child Pragmatics Profile

*3.1.1. Clinical observation*

The first Pragmatics Profiles (Appendix B) for hearing and deaf children were obtained from the clinical observations. These were coded in three categories: (a) presence or absence of each function; (b) the modality of communication (visual/manual or auditory/oral); and (c) the linguistic level of the child, i.e. pre-linguistic, spoken linguistic, signed linguistic.

There was variation in the frequency of occurrence of the functions across the sample (Fig. 1). Table 2 illustrates the pragmatic functions which showed significant differences ($p \leq 0.05$ and $p \leq 0.001$) among the 3 groups (normal hearing, severely deaf, profoundly deaf).

No significant differences were found between the severely deaf and profoundly deaf groups in relation to the communicative abilities identified in the SLT observation. However, there are significant differences ($p \leq 0.05$ and $p \leq 0.001$) between the two deaf groups (severe and profound) and the hearing group: the hearing children named, gave information, anticipated situations, performed conversational repair, requested clarification and overheard conversation significantly more often compared to the children in the deaf group.

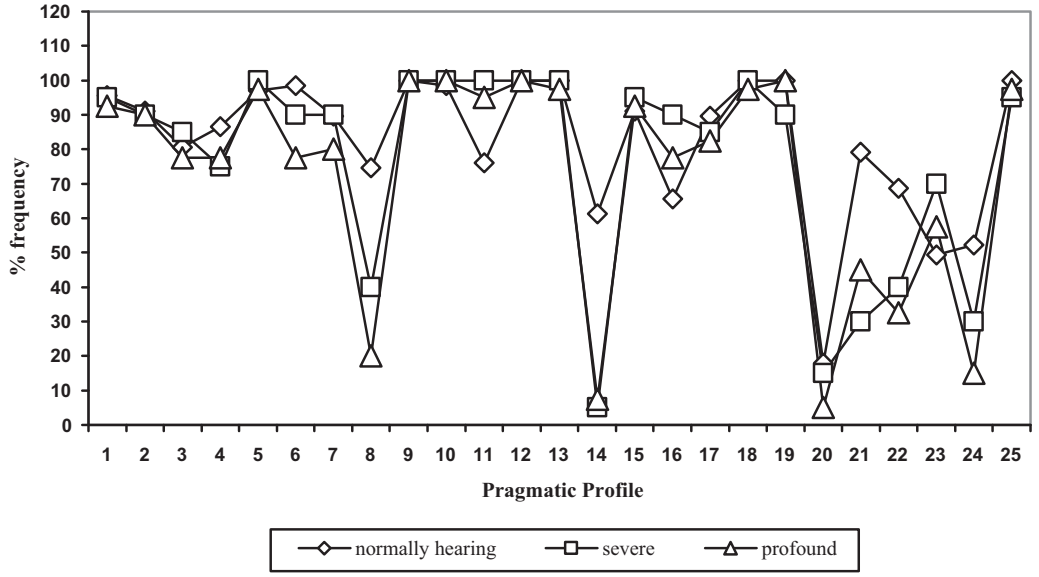


**Fig. 1.** Distribution of the 25 functions drawn from the Pragmatics Profile and obtained through clinical observation expressed as % in each group.

**Table 2**
Comparison of pragmatic functions (4) obtained by observation among the 3 groups.

| Hearing Status<br>Pragmatic Functions | Group I Hearing ($N = 67$) % | Group II Severely deaf ($N = 20$) % | Group III Profoundly deaf ($N = 40$) % | Sig. | Comparing the groups |
|---|---|---|---|---|---|
| 8 – giving information | 74.63 | 40 | 20.00 | ** | I ≠ (II = III) |
| 11 – understanding of gesture | 76.12 | 100 | 95.00 | * | I ≠ (II = III) |
| 14 – anticipation | 61.19 | 5 | 7.50 | ** | I ≠ (II = III) |
| 21 – conversational repair | 79.10 | 30 | 45.00 | ** | I ≠ (II = III) |
| 22 – request for clarification | 68.66 | 40 | 32.50 | ** | I ≠ (II = III) |
| 24 – overhearing conversation | 52.23 | 30 | 15.00 | ** | I ≠ II ≠ III |

*$p \leq 0.05$; **$p \leq 0.001$; ≠difference between groups; =no difference between groups. Sig. = significance.

**Table 3**
Comparison of parental report of pragmatics functions × child's hearing status (4).

| Hearing status<br>Pragmatic Functions | Group I Hearing ($N = 67$) % | Group II Severely deaf ($N = 20$) % | Group III Profoundly deaf ($N = 40$) % | Sig. | Comparing groups |
|---|---|---|---|---|---|
| 8 – giving information | 90.32 | 69.23 | 51.61 | ** | I ≠ (II = III) |
| 14 – anticipation | 73.33 | 66.67 | 37.50 | * | (I = II) ≠ III |

**$p \leq 0.001$; *$p \leq 0.05$; ≠difference between groups; =no difference between groups. Sig. = significance.

### 3.1.2. Pragmatic Profile by Parental Report

A second Pragmatic Profile for hearing and deaf children was calculated through parental report, with the same method of scoring as used for the clinical observation. Fig. 2 illustrates the distribution of functions in the parental report for the three groups of children. Table 3 details those functions that showed significant differences ($p \leq 0.05$ and $p \leq 0.001$) among the 3 groups: for the anticipation function there were no differences between the severely deaf and hearing groups, but both differed significantly from the profoundly deaf group.

The "giving information" function did not show a significant difference between the severely and profoundly deaf groups, although they differed from the hearing group. For the "anticipation" function, the severely deaf and hearing groups did not differ from each other, although they differed from the profoundly deaf group.

### 3.1.3. Comparison between parental and SLT ratings of children's Pragmatic Profiles

An Analysis of Variance (ANOVA) was performed to compare the 3 groups of children × by source of report (parent or SLT) (Table 4).

Parents reported the use of a wider range of communicative functions in daily life than the SLT observed during the clinical assessment for the three groups of children. Among the 25 communicative functions assessed in the hearing group, eight functions (68% agreement) differed significantly between parental report and SLT observation; while in the profoundly deaf group, seven functions (72% agreement); and in the severely deaf group, three functions (88% agreement).

## 3.2. Modality of communication and linguistic level

The results of the $\chi^2$ test showed that the profoundly and severely deaf groups differed significantly ($p < 0.001$) from the hearing group, with more deaf children being at the pre-linguistic level, and with less use of SpL. The distribution of the

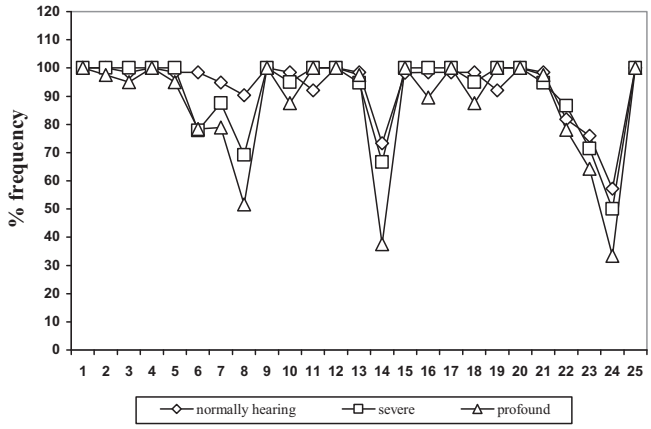


**Fig. 2.** Parental report: distribution of the 25 functions drawn from the Pragmatics Profile (Dewart & Summers, 1994) expressed as % in each group.

**Table 4**
Distribution of functions that differed significantly between parental report and SLT observation.

| Hearing Status<br>Pragmatics Functions<br>(numbers following Dewart & Summers, 1994) | Group I Hearing<br>($N = 67$), % | Group II Severely deaf ($N = 20$), % | Group III Profoundly deaf ($N = 40$), % |
|---|---|---|---|
| 2 – requesting | * | NS | NS |
| 3 – rejecting | ** | NS | * |
| 4 – greeting | ** | NS | * |
| 11 – understanding gesture | * | NS | NS |
| 16 – response to 'no' and negotiation | ** | NS | NS |
| 20 – presupposition and shared knowledge | * | NS | NS |
| 22 – request for clarification | * | * | ** |
| 23 – Terminating an interaction | ** | NS | NS |
| 14 – anticipation | NS | * | ** |
| 21 – conversational repair | NS | * | ** |
| 8 – giving information | NS | NS | ** |
| 17 – initiating interaction | NS | NS | * |

$^{**}p \leq 0.001$; $^{*}p \leq 0.05$; NS = not significant.

**Table 5**
Subjects' distribution according to their Hearing Status, Modality of communication and Linguistic level during picture naming task.

| Modality of communication and Linguistic level | Pre-Linguistic | | Spoken Language | | Signed Language | | Total | |
|---|---|---|---|---|---|---|---|---|
| Hearing Status* | *N* | % | *N* | % | *N* | % | *N* | % |
| Group III Profoundly deaf ($N = 40$) | 26 | 65.0 | 2 | 5.0 | 12 | 30.0 | 40 | 100.0 |
| Group II Severely deaf ($N = 20$) | 13 | 65.0 | 3 | 15.0 | 4 | 20.0 | 20 | 100.0 |
| Group I Hearing ($N = 67$) | 1 | 1.5 | 66 | 98.5 | 0 | 0.0 | 67 | 100.0 |
| Total | 40 | 31.5 | 71 | 56.0 | 16 | 12.5 | 127 | 100.0 |

Profoundly deaf = Severely deaf ≠ Normal hearing.
* $\chi^2$ test ($p$) < 0.001.

**Table 6**
Distribution of hearing and deaf children's linguistic level and modality of communication according to SLT observation and parental report.

| Linguistic level and modality of communication | Pre-Linguistic | | Spoken Language (SpL) | | Sign Language (SL) | |
|---|---|---|---|---|---|---|
| Hearing Status | SLT Obs | Parent report | SLT Obs | Parent report | SLT Obs | Parent report |
| Group III Profoundly deaf ($N = 40$) | 26 | 26 | 02 | 02 | 12 | 12 |
| Group II Severely deaf ($N = 20$) | 13 | 16 | 03 | 02 | 04 | 02 |
| Group I Hearing ($N = 67$) | 01 | 0 | 66 | 67 | 0 | 0 |
| Total | 40 | 42 | 71 | 71 | 16 | 14 |

SLT = speech & language therapist. Obs = observation.

hearing, severely deaf and profoundly deaf subjects according to their hearing status, modality of communication and linguistic level during the picture naming task is described in Table 5.

As shown in Table 6, the parental reports and SLT observations used the same classifications of linguistic level for the profoundly deaf and hearing groups. However, parents and SLTs differed in their classification of linguistic level of the severely deaf group.

### 3.3. Mean Length of Longest Utterances – MLU-L

Fig. 3 shows the distribution of the 127 children in terms of their MLU-L (SL and SpL groups combined). Of the profoundly deaf children, 57.5% ($N = 23$) had a MLU-L score equal to zero, indicating that those children were in a pre-linguistic stage of language development. Of the severely deaf group, 65% ($N = 13$) were at the pre-linguistic stage; 30% had an MLU-L above 1 and below 5.4 and one (5%) had an MLU-L above 8.5. Fifty percent of the hearing children had an MLU-L equal to 8.5 or above.

An independent *t*-test showed that children using SpL, regardless of hearing status, have a MLU-L significantly higher than those using SL (Table 7).

### 3.4. Style and efficacy of communication between parent and child

#### 3.4.1. Style of communication between parent and child

A $\chi^2$ showed that parents of deaf children used a significantly wider range of communication strategies than parents of hearing children, in a significantly different way (Critical value = 8.84 (Table 8)). They used sign, speech and pointing at the same time, as well as gentle or firm touch in order to get their children's attention before initiating communication.

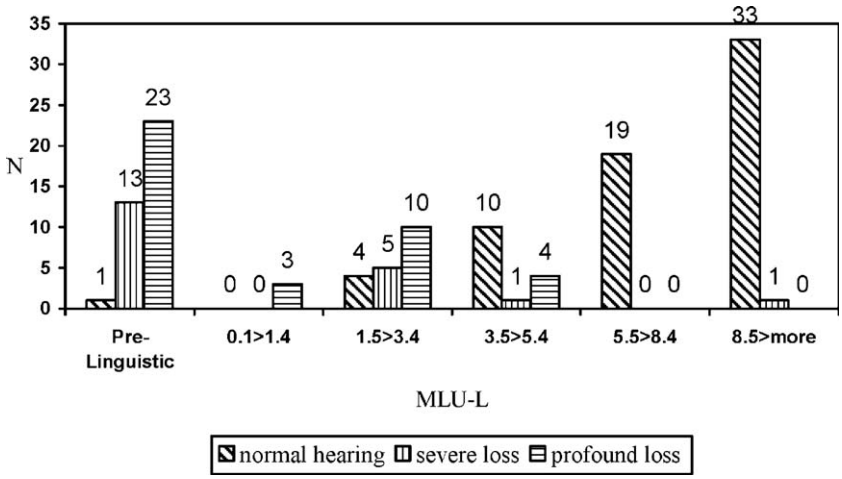


**Fig. 3.** Distribution of the MLU-L for the three children's groups (SL and SpL users).

### *3.4.2. Efficacy of communication during parent–child interaction*

The results of the $\chi^2$ test showed a significant difference between the hearing and the deaf children on Tasks 1, 5 and 6. Although all children found Task 5 (put the small yellow brick beside the small blue one) and Task 6 (put the big red brick on the chair and give me the blue one) relatively difficult, the parents of the hearing children were able to get their children to perform these tasks more often than the parents of the deaf children (Table 9). There were no differences between groups on Tasks 2, 3 and 4.

**Table 7**
Comparison of Mean Length of Longest Utterances (MLU-L) in Spoken Language (SpL) and Sign Language (SL).

| MLU-L | Language | | Independent *t*-test | Result |
|---|---|---|---|---|
| | SpL (morphemes) | SL (morphemes) | | |
| Mean | 7.9 | 2.3 | | |
| Standard deviation | 3.2 | 1.0 | <0.001* | SpL > SL |
| *N* | 71 | 16 | | |

**Table 8**
Style of communication during parent–child interaction.

| Hearing Status | Group I Hearing (*N* = 67) % | | Group II Severely deaf (*N* = 20) % | | Group III Profoundly deaf (*N* = 40) % | | Qui-square Critical value = 3.84. | Results |
|---|---|---|---|---|---|---|---|---|
| Style of communication | A/O | R/N | A/O | R/N | A/O | R/N | Observed value | |
| Does the parent gain child's attention before starting communication? | 41.8 | 58.2 | 72.5 | 27.5 | 65.0 | 35.0 | 6.88* | H ≠ S = P |
| Does the parent sign, speak and point at the same time? | 11.9 | 88.1 | 67.5 | 32.5 | 60.0 | 40.0 | 40.87* | H ≠ S = P |
| Does the child respond to the parent's request/take turns in communication? | 86.6 | 13.4 | 82.5 | 17.5 | 60.0 | 40.0 | 8.15* | H ≠ S = P |
| Does the parent gain the child's attention by touching firmly? | 9.0 | 91.0 | 25.0 | 75.0 | 40.0 | 60.0 | 13.26* | H ≠ S = P |
| Does the parent gain the child's attention by gentle touch? | 7.5 | 92.5 | 70.0 | 30.0 | 70.0 | 30.0 | 47.71* | H ≠ S = P |
| Does the parent gain the child's attention by signing or gesturing in the child's visual field? | 4.5 | 95.5 | 32.5 | 67.5 | 20.0 | 80.0 | 9.96* | H ≠ S = P |
| Does the parent gain the child's attention by waving? | 1.5 | 98.5 | 7.5 | 92.5 | 5.0 | 95.0 | 1.49* | H ≠ S = P |
| Does the child refuse or give up on one or more tasks? | 7.5 | 92.5 | 20.0 | 80.0 | 30.0 | 70.0 | 4.77* | H ≠ S = P |
| Does the parent explain to the child what to do before initiating the task? | 97.0 | 3.0 | 72.5 | 27.5 | 75.0 | 25.0 | 14.76* | H ≠ S = P |

H = Hearing; S = Severely deaf; P = Profoundly deaf; *$p \leq 0.05$; A = always; O = often; R = rarely; N = never.

**Table 9**
The 127 children's performance on the communication tasks.

| Hearing Status | Performance | Task 1 | Task 2 | Task 3 | Task 4 | Task 5 | Task 6 |
|---|---|---|---|---|---|---|---|
| Group I Hearing ($N = 67$) | Succeeded | 62 | 59 | 57 | 53 | 45 | 49 |
| | Failed | 5 | 8 | 10 | 14 | 22 | 18 |
| Group II Severely deaf ($N = 20$) | Succeeded | 15 | 14 | 15 | 12 | 7 | 7 |
| | Failed | 5 | 6 | 5 | 8 | 13 | 13 |
| Group III Profoundly deaf ($N = 40$) | Succeeded | 30 | 32 | 27 | 25 | 20 | 20 |
| | Failed | 10 | 8 | 13 | 15 | 20 | 20 |
| Significance | | * | NS | NS | NS | * | * |
| Results[a] | | H ≠ S = P | H = S = P | H = S = P | H = S = P | H ≠ S = P | H ≠ S = P |

*$p \leq 0.05$; NS – not significant.
[a] H – Hearing; S – Severely deaf; P – Profoundly deaf.

## 4. Discussion

This study aimed to answer the following research questions: (1) how do deaf and hearing children's communicative abilities compare when assessed independently of their linguistic phase (pre-linguistic or linguistic) and their modality of communication (SL or SpL) by this protocol? (2) Which are the contributions of different interlocutors (SLT, parents and sign language interpreters) to the assessment of child communicative abilities using this protocol?

In relation to the first question, this protocol was found to be a suitable instrument for providing information about deaf children's communicative abilities in their preferred modality of communication. By describing and assessing deaf children's abilities either in SL or in SpL, instead of focusing on their difficulties in mastering SpL, it is not restricted only to a description of development in a specific language but describes how deaf children use communication functionally. This is particularly important, since, of the minority of deaf children in this study who had developed some language skills, only 5/60 used SpL, while 16/60 used SL.

Children with normal hearing and those who were severely or profoundly deaf expressed all the pragmatic functions in the checklist (although in different modalities), but in the deaf groups the frequency of occurrence was lower, suggesting a delay in their acquisition and consequently in their use as illustrated in Figs. 1 and 2.

With regards to communicative intention, the range and forms expressed were similar for all children with the exception of naming and giving information, where a lower percentage of utterances with these communicative intentions were used by the severely and profoundly deaf children in comparison to hearing peers. In relation to how children respond and react to communication from others, the deaf children not surprisingly exhibited more difficulty in responding to spoken input than hearing children, *especially for the anticipation function. In terms of interaction between the child and the examiner, the results showed that severely and profoundly deaf children contribute less than hearing children to conversational interaction with respect to conversational extension, nature and effectiveness.*

In relation to the second question about the contributions of different interlocutors (SLT, parents and sign language interpreters) to the assessment of child communicative abilities using this protocol, the reports by parents of the use of more communicative functions in daily life than observed in the clinical setting show, as stated by Dewart and Summers (1994, pp. 1–2), that clinical assessment needs to be complemented by a "picture of the child as communicator outside the context of the clinic ... so parents and other carers needed to be actively involved in this exploration by sharing the knowledge they have about communicating with the child".

The comparison of the parental reports of pragmatic functions and SLTs' observations found that mothers reported a greater number of functions than those observed by the SLT in the clinical setting. This almost certainly reflects the more extensive interaction in a wide range of settings by mothers and their children than are available to the clinician. Mothers' observations and reports of their children's communicative skills have an important contribution to make in the investigation of deaf children's language development. Their insights provide useful complementary information in assessment and therapy planning, particularly in the Brazilian context where, because of the socio-economic situation there is a shortage of professionals and long waiting lists for provision of services. Greater use of mothers as partners in assessing children can form the basis for intervention planning; they can also have a much more active role to play as intervention agents.

Dewart and Summers (1994) believe that parents are unfamiliar about stages of normal language development, and therefore are not confident in their reports. However, if questioned appropriately they are able to record information with minimum distortion, as illustrated in Table 4. Parents should therefore always be involved in assessment, as they are uniquely able to provide complementary information to professionals' assessment.

The results obtained with this protocol can be used for the planning and following up of intervention programmes for deaf children, as well as for assessment purposes, and may also be useful for hearing children with communication disorders or developmental delays as well as for deaf children. During this study it was found that training for SLTs and interpreters took about 2 h, and administration of the protocol about 60 min per child: much less time than the three or four sessions required for previous assessments. This protocol has been used in the Language and Deafness Service of University of São Paulo with

deaf children for the last two years and has showed its usefulness in highlighting the communicative abilities of deaf children born to hearing parents and with limited or no fluency in SpL or SL.

As expected, the majority of the hearing children were developing their linguistic abilities (Woll, 1998) in SpL. However, the majority of deaf children in this sample (39/60) had attained linguistic development in neither SpL nor SL, despite their attendance at intervention programmes for deaf children in São Paulo and their later registration in bilingual intervention programmes.

"It is clearly important to have some way of monitoring the success of the intervention programme and in particular the progress made by children in SpL and SL" (Woll, 1998, p. 65). The results obtained from an evaluation of a structured bilingual (Portuguese/Libras) intervention programme (Lichtig, Couto, Sousa, & Ideriha, 2001; Lichtig, 2004) demonstrate that the failure of deaf children to develop a first language at an early age has long-term consequences. Children who are 6 years old and are without language (either in the auditory or visual modality) are clearly at risk of problems in later life in terms of language, education, socialisation and mental health (Austen & Crocker, 2004).

Fifty percent of hearing children in this study had an MLU-L higher than 8.5. These results agree with data reported by Araújo and Befi-Lopes (2003) on Brazilian preschool hearing children's MLU-L. In contrast, deaf children's MLU-L values ranged between 1.0 and 4.0, suggesting delay in language development, whether spoken or signed (Woll, 1998). (It should be noted, however, that MLU is not directly comparable in Portuguese and Brazilian SL, as they have different morphological structures.) Again, these results might arise from many causes, including lack of public diagnostic facilities, and limited access to suitable intervention programmes.

Fig. 3 (MLU-L) indicated that the MLU-L of the severely and profoundly deaf groups was always delayed compared to the hearing group. Cárnio et al. (2000) report a strong correlation between literacy development and linguistic development, independently of the modality of the language used by the child, i.e., Spoken Portuguese and Libras are equally valuable in developing literacy in written Portuguese. As most deaf children are born to hearing parents, their linguistic proficiency is frequently delayed with consequent repercussions for their academic performance (Kyle, 1999).

The parents of deaf children need to obtain their child's visual attention before communicating (Vaccari & Marschark, 1997) (i.e. they need to first have the child attend to them before signing or speaking). The mothers of deaf children in this study, when trying to obtain their child's attention, simultaneously combined sign, speech and pointing, reflecting that they were not orientating themselves well to the communication needs of their children. Couto (2003) describes how parents of deaf children value the maintenance of interaction over the transmission of messages using formally structured language, so they are responsive to training and support to help them change their interaction style.

Parents with deaf children also touch them frequently in order to obtain and maintain attention. Givens (1978, p. 44) has pointed out that a "mother's non-verbal presentation [is] a most accurate indicator of her parenting style, positive or negative. Conceivably, the family counsellor or therapist could very quickly identify the aversive-dominant behaviour units and, with videotape, could show the parent precisely the adverse effects they might be having on the child".

In the present study, the mothers of the deaf children often touched them gently to obtain their child's attention. This may suggest mothers' willingness to maintain interaction in the absence of linguistic communication. This reflects differences in style of interaction between hearing mothers with deaf children and hearing mothers with hearing children.

The participation of an SL interpreter was crucial in the assessment of children whose preferred language was Libras. However, it would be preferable to have a bilingual professional, proficient in Portuguese and Libras, to administer the assessment in order to optimise the spontaneous interaction with the child which may be lost when the child needs to switch attention between two adults (Barbosa & Lichtig, 2008). The presence of a deaf member of staff is desirable as he/she provides an appropriate Libras language model (Lichtig, 2004). This suggests the need to change the training of SLTs working with deaf children in Brazilian contexts, particularly as, following the official recognition of Libras in 2002, the language has been offered in undergraduate courses.

## 5. Conclusions

The protocol described and administered in this study proved to be an useful instrument for gathering relevant information about hearing and deaf (severely and profoundly deaf) pre-school children's communicative abilities.

Comparing the results obtained from hearing and deaf children's communicative ability, it was found that deaf children were delayed in communication ability, independently of their linguistic level of communication and their preferred modality of communication.

The Protocol's innovative features, including assessments by 3 different adults: parent, SLT, and Libras interpreter, and its "modality-free" nature enable its use with the full range of deaf children, including those who have developed neither SpL nor SL.

## Conflict of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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## Appendix A. Continuing education

CEU Questions

1. The relevance of the protocol to Brazilian health professionals is due to its usefulness as an instrument for gathering relevant information about pre-school hearing and deaf children's communicative abilities. True/False.
2. The protocol provides information about deaf children's language profile and about the parameters for the intervention program. True/False.
3. The four sub-sections of the protocol may help health-professionals to design an effective intervention program centered on a family basis. True/False.
4. In additional to describing the children's communication profile, the deaf children were delayed in their communication abilities independently of their linguistic level of communication and their preferred modality of communication. True/False.
5. The protocol indicates that clinical assessment needs to be complemented by a ''picture'' of the child as a communicator outside the context of the clinic, by comparing mother's and examiner's evaluations. True/False.

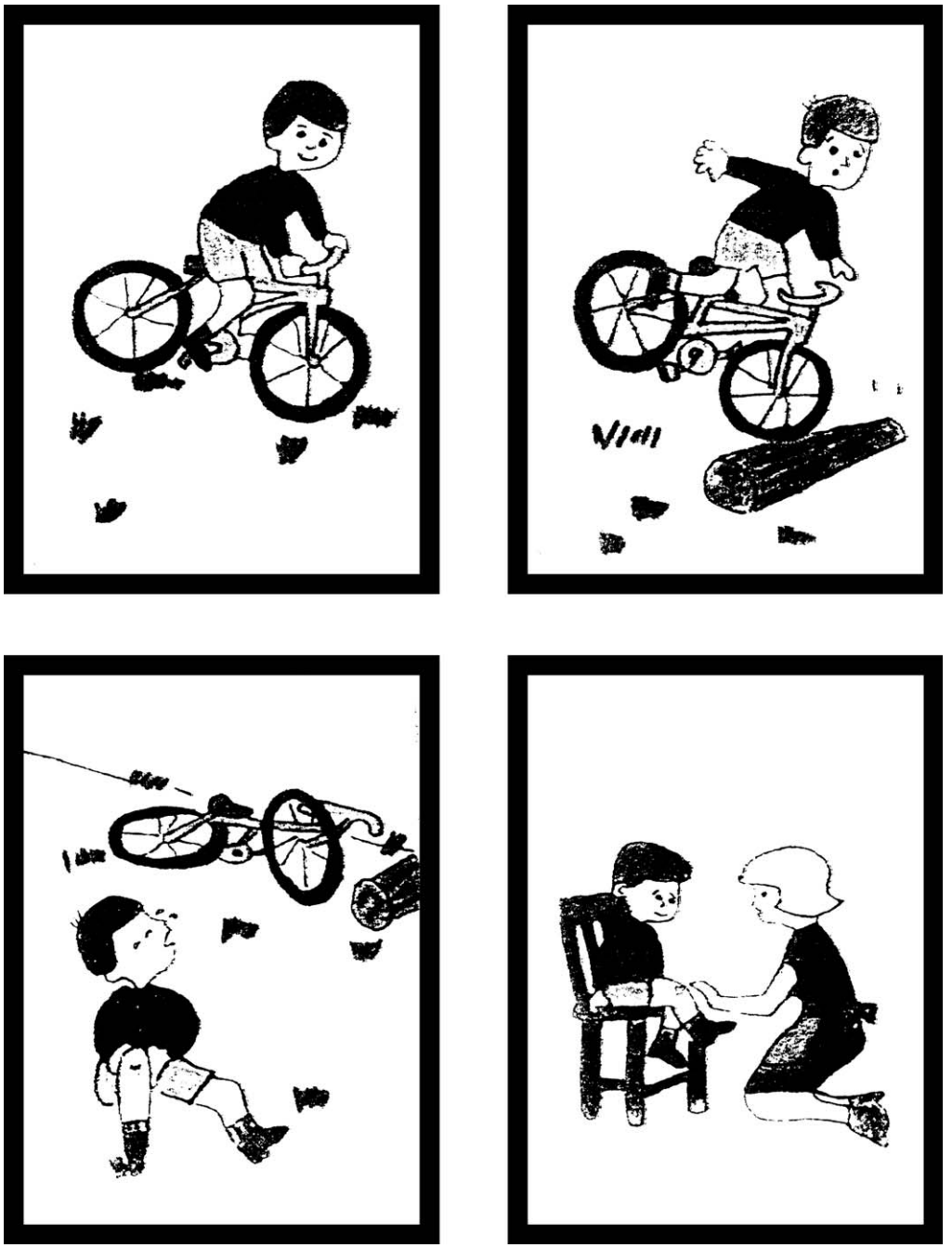
## Appendix B. Dewart and Summers' Pragmatics Profile (1994)

A. Communicative intentions
   1. Attention directing
   2. Requesting
   3. Rejecting
   4. Greeting
   5. Self-expression and self-assertion
   6. Naming
   7. Commenting
   8. Giving information

B. Response to communication
   9. Gaining child's attention
   10. Interest in interaction
   11. Understanding of gesture
   12. Acknowledgement of previous utterance
   13. Understanding of speaker's intentions
   14. Anticipation
   15. Responding with amusement
   16. Response to ''No'' and negotiation

C. Interaction and conversation
   17. Initiating interaction
   18. Maintaining an interaction or conversation
   19. Intelligibility
   20. Presupposition and shared knowledge
   21. Conversational repair
   22. Request for clarification
   23. Terminating an interaction
   24. Overhearing conversation
   25. Joining a conversation

## Appendix C. Four-picture sequence for story telling task



## Appendix D. Schedule of protocol administration for data collection

| | | |
|---|---|---|
| 1st stage | Room 1:<br>Who and What:<br>SLT (A), Interpreter and Child<br>SLT (A) interacting with hearing child and the interpreter video recording | Room 2<br>Who and What:<br>SLT (B) and Mother<br>SLT (B) interviewing mother |
| 45 min | Or<br>Interpreter interacting with deaf child and SLT (A) video recording<br>Task:<br>Spontaneous play between examiner and child, picture naming, story telling<br>OBS: all the session was video recorded | Task:<br>Parental report on pragmatic profile in home context |
| 2nd stage | Room 1:<br>Who and What:<br>Child, mother and SLT (A)<br>Child interacting with mother and SLT (A) video recording | |
| 15 min | Task<br>Interaction activity where mother was requested to get her child to perform six tasks<br>OBS: all sessions were video recorded | |

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