

Identifying Atypical Sign Language by Bilingual Speech Therapy Clinics and Schools for the Deaf

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ABSTRACT – Identifying Atypical Sign Language by Bilingual Speech Therapy Clinics and Schools for the Deaf. The atypical sign language is a linguistics-based dysfunction expression that is manifested in the language processing of the deaf and may jeopardize the comprehension and/or production of sign language. The objective of this paper is to present a description of referral cases identifying the use of atypical sign language in a partnership case between a bilingual speech therapy clinics and schools for the deaf in the city of São Paulo. For this study, interaction and contact procedures between professionals at a bilingual speech therapy service and schools for the deaf were registered. The flow of initial referrals accomplished for the health clinics are described and analyzed. Out of fifty-three referrals for screening, fifteen failed in the speech therapy screening and were evaluated using the Brazilian Sign Language (*Libras*). Following the conclusion of the evaluation, those deaf students who presented a diagnosis of atypical sign language were referred to sign language-based speech therapy.

Keywords: Sign Language. Language Impairment. Acquisition. Education. Linguistics.

RESUMO – A Clínica Fonoaudiológica Bilíngue e a Escola de Surdos na Identificação da Língua de Sinais Atípica. A língua de sinais atípica é a expressão de uma disfunção de ordem linguística que se manifesta no processamento da linguagem dos surdos, podendo comprometer a compreensão e/ou a produção da língua de sinais. O objetivo deste trabalho é apresentar a descrição de um caso de parceria entre um serviço fonoaudiológico bilíngue e escolas para surdos da cidade de São Paulo na identificação e encaminhamentos iniciais de casos de língua de sinais atípica. Para este estudo foram registrados os procedimentos de contato e interação entre os profissionais de um serviço fonoaudiológico bilíngue e das escolas de surdos. São descritos e analisados os fluxos de encaminhamentos iniciais realizados para o serviço de saúde. Foram realizados 53 encaminhamentos para triagem e, desses encaminhamentos, 15 alunos falharam na triagem fonoaudiológica e passaram por avaliação de linguagem baseada na língua de sinais brasileira. Após a conclusão da avaliação, os alunos surdos com diagnóstico de quadro de língua de sinais atípica foram encaminhados para terapia fonoaudiológica baseada na língua de sinais.

Palavras-chave: Língua de Sinais. Distúrbio de Linguagem. Aquisição. Educação. Linguística.

Introduction

Neither the deaf are all the same nor are their linguistics production. That includes the production by hearing people who are users of the oral modality which are also not homogeneous when it comes to either the internal processing (the language *per se*) or the language expression, the signing itself. This is such a proposition that could be taken as common sense since the diversity among people in general is no novelty. Therefore, the diversity within the deaf community should not be observed as something exotic, either.

Being focused on linguistics issues, we have observed that those differences more easily identified among the forms of communication used by the deaf are related to the application of different types of communicative modalities which would be information pertaining to the deaf community. It is then easier to identify if the form of communication is visual-spatial, oral or bimodal; if Portuguese or sign language is predominant; if the deaf is oral or not; or, if sign language was learnt or not. When the identification of other factors occur, such as a difficulty in sign language understanding, difficulties in understanding orders, or in the speech logical organization, these factors are unfairly classified into a non-specified group attributed to deaf.

In reality, to observe which language modal is predominant is a positive feat and a great accomplishment for deaf-assisting professionals, especially for those in schools, an advance in history. More than just identifying, adapting the communication form with the deaf individual from the predominant communicative modality at first; and subsequently, investing time, resources and procedures to advance in sign language acquisition and development when needed, are essential measures to assure the adequate development of the deaf individual when it comes to academic development.

With the development of studies of sign language descriptive linguistics from around the world, including Brazil, more differences have been identified. Besides the discovery and description of new sign languages from around the world, sociolinguistics studies started to describe the linguistic variation within a given sign language. Studies from different speech (sign) communities have been accomplished, discussing linguistic variations within sign languages (Lucas, 2001; Schembri; Johnston, 2007; Schembri; Lucas, 2015). In Brazil, such studies prevail at lexical-level analysis (Temoteo, 2010; Martins, 2012).

Nevertheless, these are not the only differences in linguistic terms which may be observed in the deaf community. The aforementioned differences so far are of natural-base and belong to its normal, unaltered and typical performance. However, there are differences that can be exposed and should not be exposed under ideal circumstances. This article is intended to discuss such differences.

For the individual to develop a proper language, he needs to be submitted to an adequate language acquisition process. The language as a cognitive, symbolic, and representational ability has its maximum performance upon language acquisition that must occur within an appropriate context and period (Mayberry, 1993; Cormier et al., 2012), by using fluent sign language interlocutors who are available and who allow the child to have frequent language contact (Góes, 2000), and a healthy neuropsycholinguistic substrate (Atkinson et al., 2005), among many other factors.

Studies on language acquisition by deaf children in Brazil were reported in the 1990's by Karnopp (1994; 1999) and Quadros (1995; 1997). These studies presented results about the acquisition process on deaf children with no complaints on language disorders and therefore, perform results on the typical language acquisition process.

Unfortunately, not always do children find such ideal conditions so that the language acquisition can be appropriately developed. The delay at the beginning of the language acquisition (Janjua et al., 2002; Mecca et al., 2002; Lichtig et al., 2004, Lichtig et al., 2008), the family member difficulties in sign language interaction with deaf children (Góes, 2000), the lack of school skillful staff in hosting deaf children (Aspilicueta et al., 2013; Svartholm, 2014; Silva et al., 2014) are a few of the reported situations in the literature that can be hindrances for the linguistic development of the deaf child.

In face of these adverse conditions, the inadequacy of the language acquisition process is initially generated, influenced by one or more factors in inadequacy, and from there on, this condition can lead to problems in language development and, consequently, the development of language disorders (Mayberry, 1993; Lichtig; Barbosa, 2009; Cormier et al., 2012; Woll; Morgan, 2012).

There are diseases which can occur in the perinatal or in the infancy periods and result in severe sequelae. The TORCH¹ Syndrome (Mussi-Piñata; Yamamoto, 1999; Vasconcelos, 2004), Meningitis (Swenson, 2009), Chronic Non-Progressive Encephalopathy (Tyrone, 2004), among others, may cause deafness and bring with deafness serious health problems such as brain injury, creating losses in the substrate for language acquisition (Vasconcelos, 2004) and triggering of language problems that may affect, for example, the educational development of the deaf person.

Yet, even when the sign language acquisition is appropriate, there is the possibility acquiring a disease which may compromise the necessary functions for the proper functioning of the body, especially brain areas responsible for language processing. In such cases, the language disorder does not have a developmental character, but an acquired one. This is the case of aphasia, which may occur in deaf people and have similar linguistic expression to those observed in oral languages (At-

kinson et al., 2005), as there is similarity in the activation of language areas in the left hemisphere in deaf sign language users, when compared to hearing people processing oral languages (MacSweeney et al., 2002; Levänen et al., 2001; Valadão et al., 2013.).

These language disorders have no connection with deafness. The emergence of language dysfunction in these cases does not occur as a result of hearing loss, since what is at issue (in terms of language processing and cognitive generator) is the sign language and not the spoken language. We will address language disorders expressed in sign language, which cause what we call atypical sign language², a condition that began to receive more attention at the beginning of this century, with works of American and British researchers, initially with studies of acquired language disorders such as aphasia and more recently, developmental disorders, such as Specific Language Impairment. Authors like Barbosa (2005; 2007; 2010), Atkinson et al. (2005), Mason et al. (2010), Woll and Morgan (2012), Marshall and Morgan (in press) and Barbosa & Neves (in press) present studies on the subject in British Sign Language (BSL) and *Libras* (Brazilian Sign Language).

Based on these authors, it is possible to understand that the atypical sign language is not a variation of sign language used by deaf people in Brazil and is not a new form of language use by a specific group of deaf. It is the expression of a linguistic dysfunction that defines the alteration or alterations in the processing of deaf language so that both the understanding and the production of sign language may be jeopardized at various levels of language processing. It is a health problem that should be the object of intervention by health professionals and, depending on its severity, by a multidisciplinary team.

Expressions of atypical sign language can be observed in the various language processing levels. High levels of linguistic processing can affect cognitive abilities (Atkinson et al., 2002). Intermediate levels of language processing may affect syntactic and morphological levels (Marshall et al., 2004). Peripheral levels may affect the phonetic-phonological and articulatory levels (Tyrone, 2004).

The levels and language processing have been described by Garrett (1990) based on the output of the judgment and the relative frequency of speech errors from hearing individual without language problems. This model is based on spoken language; however, since it uses linguistic terminology used to describe natural languages, it may be used to describe language processing in sign languages. The author describes five levels of representation in the sentence production process, as follows: (i) the message level, where semantic processing can be observed; (ii) the functional level, where the syntactic processing can be seen; (iii) the positional level, where the lexical processing can be seen; (iv) phonetic and articulation levels, where the phonetic-phonological processing can be observed. This model postulates that these levels of representation can be established at the time of construction through

serial and unidirectional sentences; however, it is only observed up to the sentence level.

The use of this linguistic processing for communication is associated with pragmatics (Dewart; Summers, 1994; Fernandes, 1996; Savignon, 2007), the linguistic processing area comprising the mentioned processing levels and social use. The observation of the pragmatic level can be described through the protocol proposed by Gerber and Gurland (1989), the Assessment Protocol of Pragmatic-Linguistic Skills (AP-PLS). This is an evaluation protocol of linguistic and pragmatic abilities based on the strategies used in the interaction process between communicative partners, with special attention to conversational breaks and the maintenance of interaction. In this protocol, the authors cite the language problems and divide them into three types: phonological problems, lexical problems and semantic-syntactic problems. And being a protocol that proposes a pragmatic analysis, it also looks at this descriptive level.

The identification of the alteration and the identification of the level at which the alteration occurs are important actions for the design of therapeutic procedures (Lichtig; Barbosa, 2015); however, the current Brazilian health system does not have bilingual services able to identify individuals with atypical sign language.

The early identification of atypical sign language and referrals and procedures based on sign language following the detection of language disorder framework can be decisive for the language and cognitive development of the deaf person, which generates a major impact on school development, social inclusion and the recognition of the deaf person as a citizen; therefore, impacts related to the deaf individual and the deaf community who benefit from school and bilingual clinics intervention.

The area of knowledge that deals with the study and treatment of human communication disorders is the Speech Therapy. For the treatment of atypical sign language, the professional to be sought is the speech therapist, the same professional seen in the past as one who was primarily valued by orality and often put sign language in the background. This is the professional who has in his training background both the technical knowledge and the legal support to intervene in cases of language disorders, even in those that are expressed in sign language. What is primarily needed is the breakdown of the clinical paradigm, leaving aside the Medical Model and progressing towards the Social Model, in addition to an in-depth study of the Brazilian Sign Language (*Libras*), acquiring the required fluency for diagnosis and adequate care for deaf people. In this case, we shall have the bilingual speech therapy clinics.

For such cases, identification and early intervention are extremely important. The speech therapist can develop interventional strate-

gies for deaf disorders to be minimized or completely eliminated (Lichtig; Barbosa, 2009; Lichtig; Barbosa; Moura, 2014). In the cases of deaf subjects diagnosed with language acquisition delays, the delay impacts can be mitigated through specific speech therapy (Lichtig; Barbosa, 2012). The perception of the professional for the detection and diagnosis of what the deaf child displays as inappropriate shall be developed through specifically designed strategies, so that the child can meet the inadequacies in language development. For injury-related and syndromic cases, after appropriate diagnosis, learning and teaching strategies can be used to support the language development (Lichtig; Barbosa, 2015).

The intervention of the clinical bilingual speech therapist based on sign language follows the same conceptual principles that support clinical practices in language disorder rehabilitation in oral language. Lichtig and Barbosa (2012; 2015) present a series of suggestions for therapeutic activities based on sign language that can be used by the speech therapist who is fluent in *Libras* in cases of delays in sign language acquisition or language disorder cases of the adult deaf person.

This information shall be shared with teachers for deaf so that, in their contacts with their students, they are more sensitive to the perception of these inadequacies and may have subsidies to conduct referrals and the necessary guidance to adapt the language to their deaf students. Such initiative, that starts at school, can benefit the deaf community because they compete for individual linguistic enhancement of its components and promote the educational and human development of their children.

The aim of this paper is to present a description of a partnership case between a bilingual speech-language service and schools for the deaf in São Paulo in the identification and initial referrals of cases of atypical sign language. It also discusses the importance of this interaction for the optimization of language development of the deaf person and providing educational and clinical intervention to cases when required.

Methodology

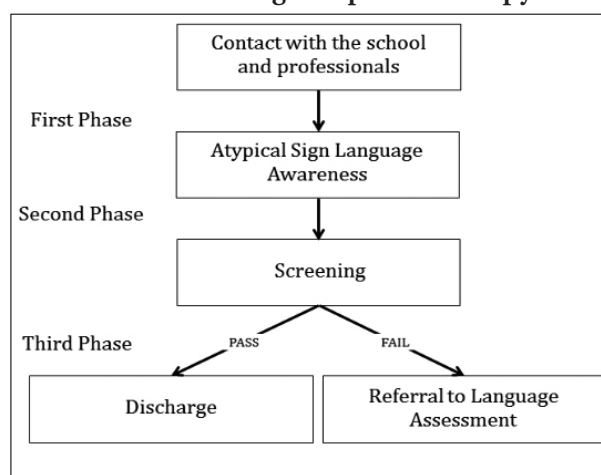
For the proposed case description, according to the objectives of this work, there were initial contact and interaction procedures between professionals of the relevant services. The flow of referrals to the health service as well as the results of the screening procedure and the language evaluation conducted with deaf people referred from schools are described and analyzed here.

Two private and one public schools for the deaf in the city of São Paulo participated in the interaction with the bilingual clinics. The initial contact was made with the school coordinators, and then teach-

ers appointed by the coordinators attended meetings with the clinical team, consisting of a bilingual speech therapist and a deaf pedagogue.

From the contact and interaction between professionals from these institutions, three operational phases were developed. These phases are shown in Picture 1 below.

Picture 1 – Phases of the Joint Intervention between the School for the Deaf and the Bilingual Speech Therapy Clinics



Source: created by the author for this study.

First Phase

The first phase was aimed at raising awareness of deaf teachers in relation to the characteristics of the atypical sign language. For this goal to be achieved, the following schedule was carried out:

1. Initial contact made with the schools principals and/or coordinators;
2. Contact with the teachers for the deaf and explanation of the bilingual speech therapy clinics goals;
3. Conducting of informal discussions and short lectures on language theory and on language disorders;
4. Proposal and clarification of the criteria for referral of deaf students to the bilingual speech therapy clinics.

Second Phase

The second phase was aimed at identifying possible atypical sign language cases from referrals made by teachers and coordinators for the speech therapy service. For this, a screening based on the Brazilian

Sign Language was carried out, where the results analyzed expressed adequate (pass) or inadequate (fail) in comprehension and language production.

The purpose of this screening was to determine whether the comprehension skills and expression of the Brazilian Sign Language were preserved. As it was a screening and not an evaluation, the production of a language diagnosis was not the objective.

The elaborated screening consisted of two parts: a semi-structured interview, to be applied at the first contact of the speech therapist with the deaf person; and a moment of discursive production based on a visual stimulus.

The semi-structured interview consisted of a guide to assist the speech therapist in the initial interaction with the deaf person. It contained suggestions on how to initiate contact through a simple introduction, requesting the deaf person's name and sign, and from there on, engaging into a most possible natural interaction through questions about the person's daily activities, school, contact with sign language and issues related to the family. In this phase of the screening, the speech therapist observes the following aspects, pointing out those that occur:

- (a) Does he/she respect communicative shifts?
- (b) Does he/she maintain eye contact?
- (c) Does he/she stay within the conversation topic?
- (d) Does he/she present communicative intent?
- (e) Does he/she make revision when breaks occur?
- (f) Does he/she request clarification when does not understand?
- (g) Does he/she behave appropriately within the communicative environment?

In the discursive production, the deaf person is asked to look at the "Bank Robbery" picture (Nespoulous et al., 1986) and to tell a story based on it or explain it. The speech therapist shall observe the following points about the signed production:

- (a) Does he/she display all events and characters?
- (b) Was it chronologically organized and well fit?
- (c) Was it clear?
- (d) Did he/she present complete use of syntactic structures?
- (e) Did he/she present the use of different syntactic formulations?
- (f) Did he/she present spatial organization?
- (g) Did he/she mark temporal events?

The deaf who did not get the minimum of 5 points in each of the steps failed. The deaf who obtained scores above five passed the screening.

Third Phase

The third phase was aimed at referring the deaf who failed the applied screening to evaluation based on sign language, in order to check if language disorder was truly existent and whether there was a need for speech therapy. At this phase, language tests were applied with experimental adjustment to *Libras* and with different analysis focuses such as the Token Test (De Renzi; Vignolo, 1962), Signs and Pseudosigns Span Test (Bilo-Baio et al., in press), Protocol of Phonetic-Phonological Assessment - *Libras* (Barbosa, in press), ABFW Vocabulary Test (Befi-Lopes, 2000) and the APPLS (Gerber; Gurland, 1989).

The results were analyzed based on the inadequacies in accordance to the levels of linguistic analysis, and were divided in: Pragmatic Level, Semantic Level, Syntactic Level, Lexical Level and Phonetic-Phonological Level.

These levels were included in the evaluation, as follows:

- (i) Pragmatic Level: rated through the Assessment Protocol of Pragmatic-Linguistics Skills - APPLS (Gerber; Gurland, 1989). This is a functional analysis protocol which observes the speaker's linguistic and pragmatic characteristics in a free interaction. This same protocol also notes the individual's syntactic-semantic, lexical and phonological problems assessed during the language interaction in use.
- (ii) Semantic Level: APPLS (Gerber; Gurland, 1989), as presented, and the ABFW Vocabulary Test (Befi-Lopes, 2000). The latter is a picture-naming test built for the evaluation of Brazilian hearing children, with names grouped in different semantic fields. We considered the score described in the test as the reference for normal. When applied to adults, we adopted the highest score as the reference for normal.
- (iii) Syntactic Level: APPLS (Gerber; Gurland, 1989), as presented.
- (iv) Lexical Level: ABFW Vocabulary Test (Befi-Lopes, 2000), as presented, and Signs and Pseudosigns Span Test (Bilo-Baio et al., in press). The Span Test cited herein was prepared for *Libras*. As a reference for normal, we adopted the scores described by the authors in their studies.
- (v) Phonetic-Phonological Level: APPLS (Gerber; Gurland, 1989), as presented, and the Protocol of Phonetic-Phonological Assessment, developed for *Libras* (Barbosa, in press). This evaluation observes the performance of the forming signs parameters and does not have a scoring system as a reference for normality. The results are presented in a descriptive quantitative manner. It consists of a list of signs to be produced through the naming of pictures and a list through repetition (the deaf person observes the examiner producing the sign and then repeats the produc-

tion). Those deaf without phonetic-phonological impairment disorders are expected to adequately perform all evaluation signs.

Hereafter, in the Results and Discussion item, we present the developments of the case study proposed in this article. The results that follow were obtained in the three phases presented.

Results and Discussion

First Phase Results

The initial contacts were made through the school pedagogic coordinators and then with deaf and hearing teachers active with deaf students in the schools. The awareness process began through the presentation of contents related to the language theory and language disorders applied to *Libras* in informal conversations and in formal situations.

The initial contact with the teachers took place in the individual study time in the public school and during the teachers' breaks or at the end of classes in the two private schools.

Each institution received at least one lecture on the specific issue of awareness and, additionally, teachers who felt a need for more information on the subject received individualized information on specific students. In two of the schools, the educational coordination received private counseling from the clinics staff; and internal events were held on the subject in the three institutions to provide to the majority of the teaching staff, contact information about language disorders expressed in sign language.

Thus, it was requested from the school and the teachers that, in their daily contacts with deaf students, they exercised the observation of unique characteristics in the production and/or understanding of *Libras* by their students, and that, in case of need and upon the identification of a deaf with linguistic problems, with specific complaints or complaints from colleagues or teachers, there would be contact and referral for speech therapy screening.

The criterion for referred students was age. Students with a starting date of acquisition prior to five years of age and with at least seven years of exposure to *Libras*, therefore, 12-year-old or older deaf students, should be referred for screening.

The referrals were started at this initial stage of awareness and were performed by the teachers in conjunction with the school pedagogic coordinators and principals. Information on the complaints by teachers and reasons for referrals were recorded in each deaf student identification card.

Second Phase Results

With the awareness of professionals held in the First Phase, 53 students were sent for screening. Table 1 below shows the data collected from referrals performed. In the general data tabulation, the subjects were numbered 1 through 53 and we only display the data of deaf students with atypical sign language hypothesis. The data of the other subjects were suppressed in this table to better view the atypical sign language data.

Table 1 – Students Referred by Schools with Atypical Sign Language Hypothesis (* No complaint about the sign language)

Subject	Age	Atypical Sign Language Hypothesis	Sign Language Acquisition Age	Complaints in School Performance	Previous Health Diagnosis
39	12	Comprehension and Expression	< 5 years	-	Brain Injury
40	12	Comprehension and Expression	< 5 years	Delay	-
41	9	Expression	< 5 years	-	CNPE
42	5	Comprehension and Expression	< 5 years	Delay	CNPE
43	3	Comprehension and Expression	< 5 years	Delay	TORCH and Brain Injury
44	15	Expression	< 5 years	-	CNPE
45	16	Comprehension	< 5 years	-	-
46	15	Comprehension	< 5 years	Delay	-
47	9	Expression	< 5 years	Delay	-
48	18	Expression	< 5 years	-	CNPE
49	16	Comprehension	< 5 years	Delay	-
50	15	Comprehension	< 5 years	Delay	-
51	14	*	< 5 years	-	-
52	16	Comprehension and Expression	< 5 years	Delay	-
53	18	Expression	< 5 years	-	CNPE

Source: created by the author for this study.

Out of the 53 students, 15 (28.3%) were referred due to atypical sign hypothesis and 8 (15.0%) with complaints related to school performance, reported by teachers as delays in relation to their classroom groups.

The overall average age of the students referred, composed of 15 students presented in in the table above and the other students without atypical sign language hypotheses, was 18-year old, with a minimum age of 3 years and a maximum of 22 years of age.

The minimum age of 3 years presented above, which is out of the established criteria for referrals, took place at the request of teachers. Four children below the defined age group were referred because they had previous health condition diagnoses, with specific conditions that could interfere with language development: two children with Chronic Non-Progressive Encephalopathy (CNPE) (a 5-year old and a 9-year old), one 3-year old child with TORCH syndrome and one 9-year-old, sent for presenting extreme difficulty in understanding and learning *Libras*. In addition to these students, three others were referred with previous di-

agnoses, reaching a total of 7 students. All students referred, including 4 children under 12 years of age, began the acquisition of *Libras* prior to being 5 years old.

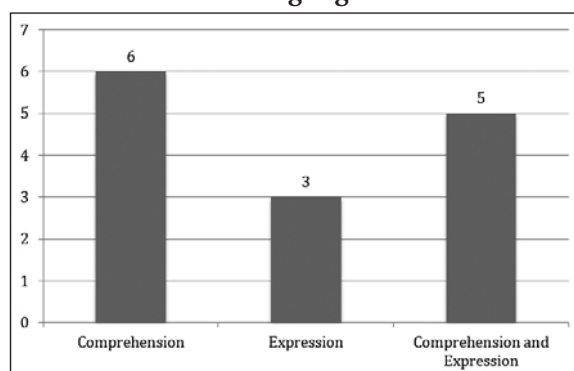
The language complaints were based on reports by teachers and deaf students (communicative pair complaints). These complaints were started by the observations that the deaf and hearing professionals (teachers for the deaf) conducted at school and were divided into three types:

Understanding: complaints based on difficulties in understanding sign language - the deaf student had difficulties in understanding *Libras* in classes taught by deaf teachers or hearing teachers.

Expression: complaints based on the difficulty of sign language expression - the deaf student presented difficulties in the production of *Libras* when interacting with classmates or with deaf or hearing teachers fluent in *Libras*.

Comprehension and Expression: complaints based on the difficulty of understanding and expressing *Libras* - the deaf student presented difficulties both to understand and to produce sign language.

Picture 2 – Distribution of Complaints Related to the Deaf Students Language Abilities



Source: created by the author for this study.

In the case in question, teachers for the deaf reported a greater number of complaints concerning comprehension skills and comprehension skills associated with expression skills. Out of the fifteen students referred with complaints, only three had complaints related to their expression skills in *Libras*. One student, presented in Table 1 under number 51, was sent under no complaints concerning his production and understanding in sign language. However, according to reports made by teachers, this student had Portuguese learning difficulties as a second language, having a lower performance compared to his group, although his development was appropriate in other disciplines. The

school requested the student to be included in the screening aimed at verifying the absence of language disorders.

Out of the total number of deaf students referred, 7 had medical health condition diagnoses that possibly would lead then to some alterations in language processing at some level, such as Chronic Non-Progressive Encephalopathy (CNPE), the TORCH syndrome and brain injury in childhood (Mussi-Piñata; Yamamoto, 1999; Vasconcelos, 2004; Swensson, 2009; Tyrone, 2004). These referrals were made based on the contents worked with the school in the First Phase of the program. Although they have been initially identified by previous medical diagnoses, the assumptions made by teachers were exclusively language-related, emphasizing orientation in the watchful eye of education professionals for issues related to sign language components in the overall picture of the student's health.

The four instances where diagnostic hypotheses have been indicated for the expression of *Libras*, for example, are related to *CNPE* conditions. Within this health picture, probably observed inadequacies are phonetic-phonological stemming from the motor condition, as a secondary manifestation of the disease itself, i.e. the *CNPE* causes mismatches in the motor control of the deaf person and as a consequence, articulatory alterations (Tyrone, 2004).

The phenomenon observed in this type of referral is important with regards to the identification of the language disorder itself. In this case, when the atypical disorder is appointed as belonging to sign language, it should be noted that the motor function caused by *CNPE* is the cause of linguistic inadequacy expressed in the phonetic-phonological level. There is no way to decouple the neuromotor condition from the language disorder that is installed from it, with regards to the signed production. It is interesting to note that the perception of teachers is directed to the linguistic fact and made no reference to the possible motor disadvantages caused by *CNPE*.

Complaints from teachers were not consistent with the results observed in the speech therapy evaluation and screening, as seen below. Although it has no detailed data regarding the characteristics of the linguistic profile, screening is the first step in the evaluation process and can help define procedures and tests to be used in language assessment that follows.

Table 2 shows the results obtained in the speech therapy screening.

Table 2 – Results Obtained in the Speech Therapy Screening Based on Libras

	Comprehension		Expression		Total	
	N	%	N	%	N	%
Pass	42	79.2	37	69.8	36	67.9
Fail	11	20.8	16	30.2	17	32.1
	53	100	53	100	53	100

Source: created by the author for this study.

Results show that 32.1% of the deaf failed in the speech therapy screening. Expression issues with *Libras* were most evident, as 30.2% of the subjects who underwent screening failed, which is not consistent with complaints from teachers who reported a greater number of complaints related to the understanding of *Libras*. In the referred cases, 28.3% of the deaf had a hypothesis of language issues, while only 5.6% had complaints related to the sign language expression, a percentage related to the *CNPE* condition.

The average age of the deaf who failed the screening was 16 years and 6 months, i.e., deaf adolescents and high school students who would benefit from speech therapy intervention programs for adequacy in the development and use of *Libras*. This would impact on their future educational process, including removing limitations that may be presented on behalf of a possibly installed language disorder.

Additionally, regarding the age of the screened deaf, the lowest recorded age was 3 years; however, only two deaf children in the age group of the early childhood education were referred for screening and language assessment: two deaf girls, one 3 years old with TORCH Syndrome and another one, 5 years old diagnosed with *CNPE*, both with early medical diagnosis and therefore had a diagnosis of language impairment driven by the general health situation. It is likely that development disorders such as the Specific Language Impairment remain without identification and may lead children to school failure, given the failed detection and diagnoses in such health conditions.

Third Phase Results

Deaf people who failed the screening held at the Second Phase were referred to language assessment, but only 15 attended the service and followed assessment procedures.

Out of the 15 deaf who came to carry out the evaluation, 6 (subjects 45, 46, 47, 49, 50 and 51) received guidance and were discharged since they presented no indication of atypical sign language, in spite of having failed the screening process; and two deaf were discharged because despite presenting alterations in language tests, these altera-

tions were not reasons of personal complaints regarding their language skills (subjects 44 and 48). The remaining seven deaf presented in Table 3 under numbers 39, 40, 41, 42, 43, 52 and 53 showed inadequacies in language assessment and were referred for speech therapy based on sign language.

The following items related to the language processing were observed in the assessments done: Pragmatic, Semantic, Syntactic, Lexical and Phonetic-Phonological processing. Table 3 below shows, in simplified form, the main characteristics of linguistic problems presented by the deaf who underwent language evaluation. A positive sign (+) marked the levels of language processing and linguistic analysis that showed inadequate; and, the negative sign (-) marked the levels that were adequate.

Table 3 – Main Findings of the Language Assessment – Linguistic Problems Pertaining to Pragmatic, Semantic, Syntactic, Lexical and Phonetic-Phonological levels

Subjects	Main findings of the Language Assessment – Linguistic Problems Pertaining to the levels:				
	Pragmatic	Semantic	Syntactic	Lexical	Phonetic-Phonological
39	-	-	+	+	+
40	+	+	-	-	-
41	-	-	-	-	+
42	+	+	+	+	+
43	+	+	+	+	-
44	-	-	-	-	+
45	-	-	-	-	-
46	-	-	-	-	-
47	-	-	-	-	-
48	-	-	-	-	+
49	-	-	-	-	-
50	-	-	-	-	-
51	-	-	-	-	-
52	+	+	+	+	-
53	-	-	-	-	+

Source: created by the author for this study.

The results obtained in the evaluations show that all proposed language levels can present language alterations, and yet, more than one level can be altered in one deaf subject. The applied tests are based on the analysis of production of subjects evaluated; therefore, they exhibit language processing expression responses of these individuals. The vocabulary test, although it has been analyzed through subject's production, shows signals of understanding at the lexical level.

The result presented by subject 42, for example, displays alterations in all five levels of analysis proposed in the applied assessment, while subjects 43 and 52 show alterations in almost all levels, except in the phonetic-phonological level.

Cases as such can present learning-installed difficulties and serious impairment in the school development due to inadequacies in high levels of language processing. The difficulties in language processing in the pragmatic, semantic and syntactic level have greater impact at the message level and can be accompanied by impairments of other cognitive abilities such as memory (Montgomery et al., 2010; Hill et al., 2015).

Either extreme delays in the language acquisition or the conditions of severe syndromes that affect neurological substrate exhibit this type of configuration with respect to the profile of linguistic problems when these occur.

Alterations in the average level of language processing, as observed in data collected from subject 39, preserved the skills involved when the message was generated under the inferential level. In this case, learning seems not to have been damaged, according to the data on Table 1, showing no complaints in school performance.

With phonetic-phonological, lexical and syntactic alterations, linguistic problems that arise in this case operate in functional, positional and phonetic levels (Garret, 1990), leaving clear from interference the message level only. The absence of learning issues indicated by not appointing complaints in school performance suggests that difficulties in the lexical level are not expressed with semantic or memory issues; that the syntactic level does not involve enough issues that compromise general understanding; or that pragmatic and semantics skills are used to compensate the syntactical difficulties presented by the subject, a common phenomenon in cases of language disorders (Befi-Lopes; Toba, 2012; Kiran; Standberg, 2012).

The syntactic problems, however, should not be seen as supporting issues and easily made up through the use of other compensatory language skills (Evans; MacWhinney, 1999).

Language disorders in childhood can be difficult to be identified, even by qualified professionals (Maximino et al., 2009). In the early childhood education, linguistic contents focused on the language skills of children with language acquisition in progress are addressed. As the education evolves, the contents will deepen and language use in the classroom begins to require the student to master the language. For this reason, the identification of atypical sign language often occurs late. Therefore, syntactic problems that may go unnoticed in kindergarten, begin to be identified later when observing difficulties of understanding signed texts that are produced by deaf teachers (or hearing teachers fluent in *Libras*) and by the pairs of deaf students with atypical sign language.

Subject 40 showed dysfunction in pragmatic and semantic levels without alterations in other levels. According to the data in Table 1, this student has delays in school development, which can be explained by alterations at the message level and at the functional level (Garrett,

1990), which may compromise cognitive abilities (Atkinson et al., 2002; Marshall et al., 2004). The identification of the complaint in language and subsequent diagnosis were made late, with referral made by the school when the student entered adolescence.

Subjects 41, 44, 48 and 53 showed phonetic-phonological dysfunction only, and no alterations at other levels. These conditions are described above similar to those with previous medical diagnoses of Chronic Non-Progressive Encephalopathy (CNPE). The motor condition generated by CNPE made it impossible the proper production of typical movements and postures by *Libras*. For this reason, the answers given in the phonetic-phonological tests resulted inappropriate. Similar to the other levels, particularly in the higher processing levels, no alterations were reported. These students had no academic problems related to the language development.

Subjects 45, 46, 47, 49, 50 and 51 did not report the presence of atypical sign language in the performed tests. They were referred to with complaints related to the understanding of *Libras*. It is possible that tests have not been sensitive enough to detect subtle disorders. There is need for the development, adaptation and standardization of tests for *Libras* to subsidize the language diagnosis area, and even to allow a differential diagnosis in cases where there is a complaint, but there are no obvious clinical signals in the evaluation protocols.

Upon completion of the evaluation phase, the deaf students diagnosed with the atypical sign language condition were referred to speech therapy, undergoing language treatment based on sign language.

Conclusion

This article presents the description of a partnership between a bilingual speech therapy clinics and schools for the deaf in the City of São Paulo. It also presented and discussed the detection process of atypical sign language cases and their subsequent referrals to a health service prepared to receive sign language deaf users with complaints concerning their skills in sign language.

The presented results suggest the importance of this interaction between the school and the specialized clinics for the optimization of an early diagnosis of deaf signers with language disorders. Such interaction and the consequent unfolding of clinical procedures can promote the development of appropriate language by the deaf person.

Early detection of atypical sign language cases is extremely important for the proper design of clinical and educational programs for deaf students who need specialized intervention for the treatment of language disorders. The impact of late diagnosis in these cases and the late establishment of intervention procedures for adequacy (and in many cases, the lack of diagnosis and treatment) of these disorders is inadequate language development and its consequences, such as gaps

in academic and professional development; and furthermore, possible limitations in human development, depending on the severity of the condition.

Many of these cases can be treated to the point of a complete adaptation of the language development; in other cases, partial adequacy in improvement of the individual's quality of life; and in more severe cases under a limited prognosis, communicative functionality. However, the treatment will certainly allow for the evolution from a disorder condition to a larger communicative adequacy picture, social integration and capability to participate in the educational environment, often depriving the deaf affected by the processing of atypical sign language.

The partnership between the school and the bilingual speech therapy clinics is essential to inform educators about the language features of atypical sign language and the early detection of possible cases of language disorders. With school awareness and referrals made, the possibility of establishing rehabilitation procedures of sign language for the deaf affected by language disorders is optimized.

Received in December 23, 2015

Approved in April 27, 2016

Translation from Portuguese: Jóis Alaby
Translation Proofreader: Ananyr Porto Fajardo

Notes

- 1 The TORCH syndrome proposed by Nahmias et al. (1971) is a set of signals and symptoms observed in newborns affected by a group of diseases that form the acronym TORCH - Toxoplasmosis, Others, Rubella, Cytomegalovirus and Herpes Simplex.
- 2 The atypical sign language term can be used by any disorder manifestation of communication expressed in sign language, according to the definitions proposed by Andrade (1996), applicable to developmental disorders, such as those generated by the delay in acquisition or disorders acquired that can be the result of a primary deficit (a disease that is not due to another) or secondary deficit (occurring as a consequence of another disease).

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