Grammatical aspects in spontaneous communication: speech characteristics of children with SLI, Autism and Down syndrome

• Fernandes, Fernanda DM
• Befi-Lopes, Debora
• Limongi, Suely C

University of São Paulo
Brazil
Aims:

• To propose spontaneous communication situations as a useful resource of objective data about speech performance of children with language disorders of different origins.

• To present the results obtained in spontaneous speech analysis of grammatical aspects of three groups of individuals with ASD, SD and SLI

Key message:

Spontaneous speech is a useful tool to objectively assess language
• Clinical practice of SLPs frequently includes the assessment of language of children with different characteristics as those of the autistic spectrum disorders, or Down syndrome or with Specific Language Impairment.

• This assessment may be comprehensive enough to allow a complete language diagnosis.
That means to focus on language as a whole, with its various sub-systems:

- **Phonetic/Phonologic** – speech sounds and their organization within the words of a given language (parole)
- **Lexical** – words and their meaning relations
- **Morpho-syntactic** – meaning linguistic units and their organization in phrases
- **Pragmatic** – the use of language to express communicative functions
Challenges

• There are many specific tests for the assessment of each of these sub-systems.

• Depending on the instrument and on the sub-system in question, the native language will interfere in different levels.
Pragmatic

• Regarding the pragmatic assessment it is possible to apply very similar criteria to many cultures and different languages.

• Although there are variations, as the different social roles – more rigid structures in some cultures than in others (as authority, gender and age differences), in most situations the criteria for pragmatic assessment may be used with different populations.

• The most frequent problems are related to obtaining functional communication data about non-cooperative individuals.
Phonetic/Phonologic

- Tests must include language-specific aspects that demand extreme care when used in different languages.
- There are syllabic structures that occur in some languages and not in others:
  - Left, slight – construção (built)
- Word extension must be considered when adapting image-prompted testing:
  - For example:
    - ant
    - formiga
Other aspects: meaning relations involved in speech production. Some sounds determine meaning differences in some languages but not in others.

example: /th/ and /s/:
– in Portuguese, either if you say /sapo/ or /thapo/ you will get

– In English, the same sounds determine different meanings:
  think  
  sink
Lexical

• The interference of phonology on vocabulary makes it impossible to use the same test for different languages.

• The vocabulary of the first two years is influenced by the phonological development – the child tends to use words that are easier to speak.

• For example: pillow (travesseiro – in Portuguese) is understood well before it is spoken.
After the initial acquisitions the social-cultural aspects have a strong influence on the vocabulary development, which is still clearer in large countries as the US and Brazil.
There are different words used with the same meaning in different regions or by different groups.

“timão”

a soccer team                          the boat’s steering wheel

Some meanings cannot be transferred from one culture to other.

Coach                          capoeira                          berimbau

Besides, there are socio-cultural aspects that may interfere quantitatively and qualitatively on the lexical domain.
Morpho-syntactic

• Although it involves the assessment of a formal aspect and is influenced by different languages, its analysis can be universal if there is a specific criteria.

• The choice of specific tests for each group presupposes a reasonably consistent diagnosis hypothesis.

• i.e.- the instrument should be adequate for the subject that is being assessed (considering factors such as age and socio-cultural and cognitive levels) and to the present condition (subjects with brain lesions, neurological syndromes or developmental disorders will clearly present different challenges).

• On the other hand, if the SLP can use the same tool for the assessment of different subjects, the work will be easier.
Spontaneous communication

• Objective data, obtained through the same criteria applied to groups of subjects with different conditions may support therapeutic intervention programs with more efficient focus on individual differences and group similarities.

• This way, when there are no specific information about each subject and/or specific instruments focused on specific needs, the use of spontaneous communication samples analyzed according to objective criteria may be a useful alternative.
Problem

• Describe the language characteristics of individuals with ASD, DS and SLI when there are no specific tests (completely standardized) for the Portuguese language.
• Current practice: each language sub-system is individually assessed considering the boundaries between language, cognitive and social development.
Some results and analysis

Main results show:

• Pragmatics – significant differences refer specially to communicative means between SLI and ASD, communicative functions between DS, SLI and ASD and to the number of communicative acts per minute after language therapy between SLI and ASD.

• Phonetics and Phonology – there are few impairments in ASD, they are very significant in SLI (varying according to the subtypes) and inconsistent delays and disorders in DS.
Other results

- Vocabulary – correct labeling is better in SLI than in DS and better in DS than in ASD – the same is true for atypical substitutions.

- Morpho-syntax – useful results based on MLU analysis of spontaneous speech.

- We will now discuss this aspect in further detail
Spontaneous speech
how do we obtain the sample?

- Partners: SLP, parents, siblings
- Material: toys, miniatures, child books, drawing material, play dough
- Interaction: play settings, symmetric situations
- Filmed samples transcribed with objective criteria.
- Sample: 100 segments - determined by topic change, change in the focus of attention or interruption by the adult.
Medium Length of Utterance
(Brown, 1973)

- Analysis: Medium Length of Utterance is determined for morphemes and words.
- The number of words of each segment is added and divided by the total number of segments of the sample to determine the MLU-w.
- The number of morphemes of each segment is added and divided by the total number of segments of the sample to determine the MLU-m.
- MLU-m provides data about the use of grammatical and lexical morphemes and about the organization of the grammatical rules of flexing and concordance.
- MLU-w provides data about the lexical information and word classes used by the child.
The other criterion involves the determination of the amount of grammatical morphemes of two different grammatical classes: type 1 (GM1) – articles, nouns and verbs; type 2 (GM2) – pronouns, prepositions and conjunctions. This criterion provides parameters for a qualitative analysis that is extremely useful for the intervention planning.

Adverbs, adjectives and interjections are excluded from all of the analysis.

These criteria demand careful analysis in order to maintain the parameters throughout the assessment. Filmed samples allow the verification of the segments in order to confirm data.
Analysis - Grammatical morphemes type 1 Portuguese

### Articles
- Gender: MF
- Number: SP

### Substantives
- Gender: MF
- Number: SP
- Degree: AD

### Verbs
- Person: 1, 2, 3
- Number: SP
- Time: P, Pd, F
- Mode: In, Im, Sb
Analysis - Grammatical morphemes type 2
Portuguese

- Preposition
- Conjunction
- Pronouns
  - Personal
  - Relative
  - Demonstrative
  - Indefinite
  - Possessive
  - Interrogative
Research

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Number</th>
<th>Mean chronological age</th>
<th>Mean mental age</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASD</td>
<td>8</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>DS</td>
<td>12</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>SLI</td>
<td>13</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Material:
Samples of 30 minutes filmed interaction between therapist and each child
Different types of toys were available.

Procedures:
The standard procedures to MLU analysis were used
Statistical analysis used ANOVA and Tukey Test, with a significance level of 0.05%.
Results ASD

- Observing MLU we can see that autistic children do not present significant differences in the amount of words and morphemes, indicating a poor morphological organization.

- On the other hand, the great differences observed in grammatical morphemes reflect the difficulties in the use of language.

- Learning to use grammatical morphemes of type 2 demands, besides a linguistic competence, the use in communicative contexts.
Results

ASD

- All subjects used more verbs and nouns than articles.

- Wide variation in the use of word classes.
  - All subjects used pronouns.
  - 87.5% used prepositions
  - 75% used conjunctions
Results

DS

- Children with DS also do not present significant differences between MLU-m and MLU-w. As autistic children, they present poor morphological organization.

- These results confirm literature data: children with DS have difficulty on the use grammatical morphemes related to the words which learning depends on the understanding and use in communicative contexts.
- Children with DS use words with more semantic value (as nouns and verbs) more effectively.

- Data show verbs and nouns with similar values.

- On the other hand, closed class words have grammatical (as opposed to semantic) meaning and their use in a syntactical structure is more difficult for children with DS.
- Children with SLI do not present significant differences between MLU-m and MLU-w. As autistic children and children with DS, they present poor morphological organization.

- These results confirm grammatical difficulties as a clinical feature of children with SLI.
Results
SLI

- Children with SLI use more verbs than nouns and articles, as do normal developing children who speak Portuguese.
- Despite this quantitative similarity there is an important qualitative difference.

- It can be observed that the mean number of pronouns used is very close to that of nouns (what is similar to normal developing children with 4 years of age).
- In Portuguese pronouns are frequently used as substitutes for nouns.
Results
comparison between the groups

- MLU shows that the difference between children with ASD and the children of the other groups is statistically significant.

- The graphic shows that the difference between MLU-m and MLU-w is greater for children with DS.

<table>
<thead>
<tr>
<th></th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLU-m</td>
<td>0.016* (ASD)</td>
</tr>
<tr>
<td>MLU-w</td>
<td>0.014* (ASD)</td>
</tr>
</tbody>
</table>
Results
comparison between the groups

- GM-1 are more frequently used by all children.
- There is a statistically significant difference between the three groups on the use of GM-2.
- In respect to MG-1 only the mean results of the ASD group are different from the others.

<table>
<thead>
<tr>
<th></th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM-1</td>
<td>0.020* (ASD)</td>
</tr>
<tr>
<td>GM-2</td>
<td>&lt;0.001*</td>
</tr>
</tbody>
</table>
Results

comparison between the groups

- The study of word classes allows a qualitative analysis of speech production of children of the three groups.
- It clearly shows the greater disabilities of autistic children even when they are compared to children with important language deficits as SLI and DS.
- The autistic children use statistically fewer nouns and verbs than the children of the other groups.
- It suggests that their language delay is atypical once it involves word classes that are the first to be acquired by children with normal language development.

<table>
<thead>
<tr>
<th>Word Class</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article</td>
<td>0.086</td>
</tr>
<tr>
<td>noun</td>
<td>0.047* (ASD)</td>
</tr>
<tr>
<td>Verb</td>
<td>0.012* (ASD)</td>
</tr>
<tr>
<td>Pronoun</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Preposition</td>
<td>0.346</td>
</tr>
<tr>
<td>Conjunction</td>
<td>0.003* (ASD)</td>
</tr>
</tbody>
</table>
Results
comparison between groups and normality

- The graphic shows the clear differences between the three groups and the performance of normal children of the same mental age.

- It can be observed that there is consistency on the configuration of results of the four groups (MLU-m > MLU-w).
Results
comparison between groups and normality

- The graphic shows that children with normal language development also use greater amounts of GMs, but the differences between MG-1 and MG-2 are very large to all groups.
Results
comparison between groups and normality

- The qualitative analysis allowed by the word classes assessment points out to the similarities between the groups.

- This way, we suggest that there are other factors that are responsible for the qualitative differences clinically observed.
Clinical Issues

• Spontaneous speech samples (specially with different communication partners) allow an overview of the child’s real performance in naturalistic non-directed settings.

• On the other hand, spontaneous speech may not lead to the production of target morphemes.
  – For example, during a symbolic play activity, the therapist asks:
    • *What are you going to cook today?*
  – Either of the following answers would be adequate:
    • *I will cook eggs today*
    • *I will cook eggs*
    • *eggs*
Other Clinical Issues

- MLU-w – seems to minimize the differences of morphology of different languages.

- It is not always easy to obtain an adequate speech sample with the necessary amount of data of any subject (as is the case of children with language delay, interaction inabilities or no oral communication).
  
  - One possible alternative is to vary communication partners during data gathering (mother, siblings).

- The MLU analysis isn’t the only choice or even the best possible choice for speech analysis, it is one of many possibilities.
  
  - Data must be completed by other information and interpreted based on a comprehensive performance perspective.
Conclusions

• It is possible to use spontaneous speech to identify qualitative and quantitative aspects of language
• People with different language disorders present different complexity features of spontaneous speech
• MLU is an effective tool to assess some of these aspects in different populations
• There is no easy way to access spontaneous speech